

Northern Electric

GENERAL CATALOGUE

No. 7

*Northern
Electric
Company*

L I M I T E D

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Northern Electric

CATALOGUE - No. 7

ELECTRICAL SUPPLIES



Northern Electric Company
LIMITED

GENERAL OFFICES: MONTREAL, CANADA

Branch Offices and Warehouses

SAINT JOHN, N.B.	HALIFAX	QUEBEC	MONTREAL	OTTAWA	TORONTO
HAMILTON	LONDON	WINDSOR	NEW LISKEARD	SUDBURY	WINNIPEG
REGINA	EDMONTON	CALGARY	VANCOUVER	VICTORIA	

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1.A. 85-27501 TC

FOREWORD

FROM between the covers of this book leaps a veritable cavalcade of the electrical industry, it is with a deep sense of the important part which electricity has played in the development of our present standard of living that, looking back upon the Northern Electric Company's fifty three years of experience in the various branches of the electrical industry, we derive genuine satisfaction from once again having accomplished the production of our revised General Catalogue, which is bigger and better than ever before.

It has been compiled, printed and bound in Canada, and Canadian paper has been used throughout.

Included within these pages are illustrated Wires and Cables, Telephone Apparatus, Radio Broadcasting and Receiving Equipment, Police Signal, Fire Alarm and Electrical Sound Equipment of our own manufacture, together with all manner of electrical supplies—wherever possible, of Canadian or Empire in origin—of recognized high quality, to a number exceeding seventy thousand items.

Complete as this catalogue may appear, however, there may be times when the data here given is not sufficient; to supplement this catalogue, therefore, we offer you the assistance of our seventeen sales and service branches across the Dominion. Specialists are located at all branch houses ready to serve you and assist in the solution of your electrical problems.

Northern Electric

COMPANY LIMITED

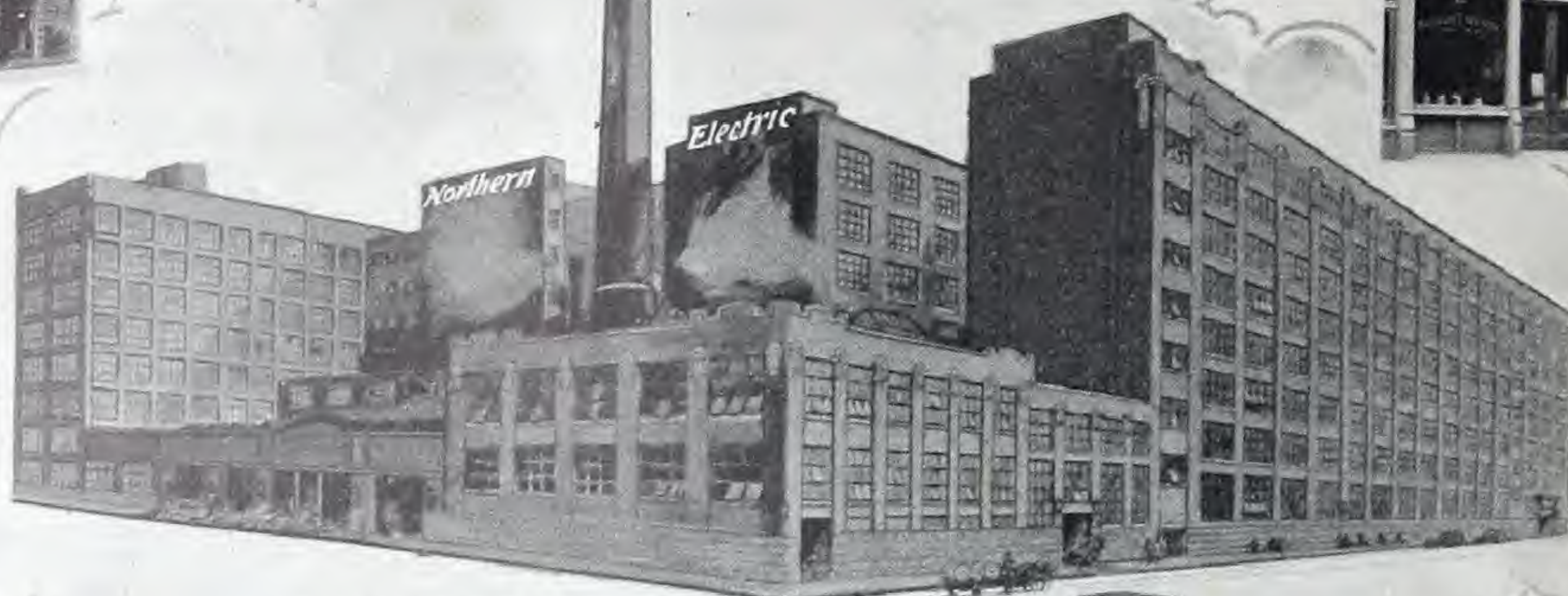
A National Electrical Service

HALIFAX • SAINT JOHN, N.B. • QUEBEC • MONTREAL • OTTAWA • HAMILTON • LONDON
SUDBURY • TORONTO • WINDSOR • NEW LISKEARD • WINNIPEG • REGINA
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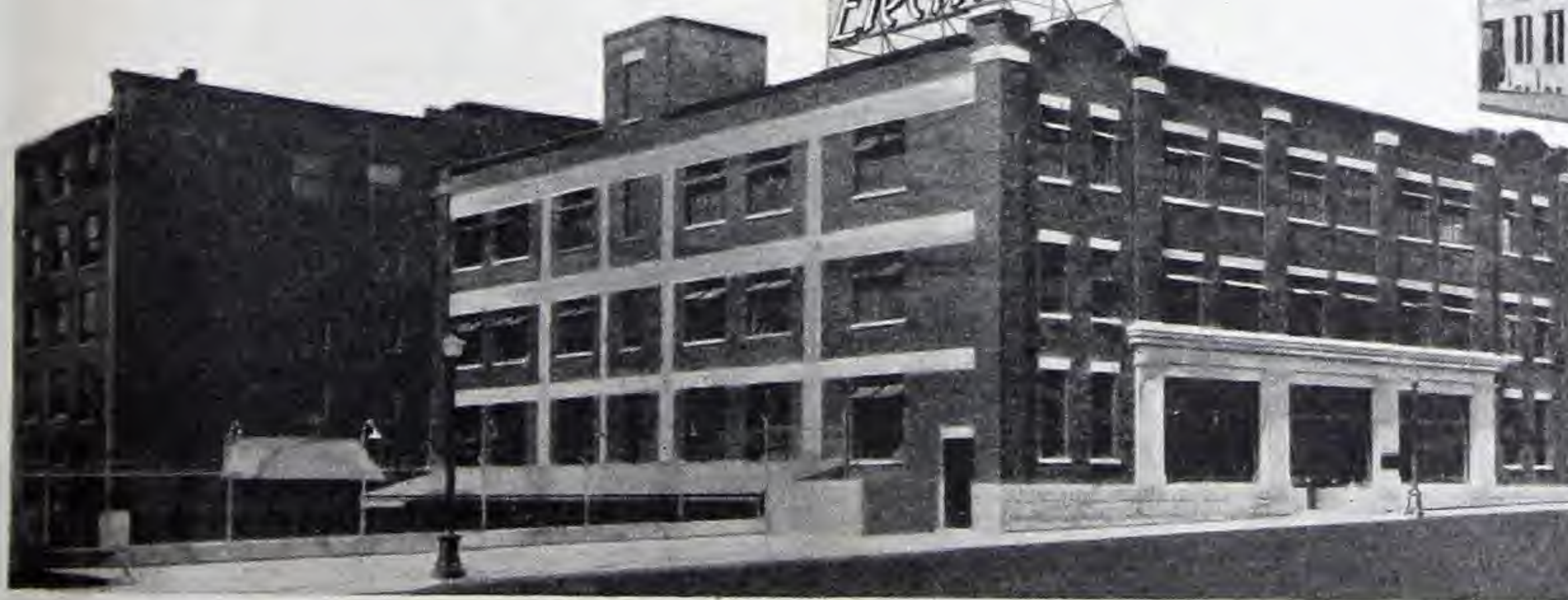
Regina



Edmonton



Calgary



Vancouver

INFORMATION

PRICES

The prices shown in this catalogue are for guidance and are subject to change without notice. For quotations and other information kindly communicate with our nearest branch.

ORDERS

It is to be noted that we have placed opposite each article, when possible, a list number. When ordering material by mail, kindly order by the list number and give a description of the article required.

We request our customers to specify the routing which they prefer.

TERMS

Our general terms are 30 days net from date of invoice. Cash discount for payment within ten days from date of invoice may be deducted as authorized in the terms shown on our invoices, except where special quotations apply.

Payments may be made by cheque, bank draft, postal or express money order, drawn to the order of or endorsed to the order of the Northern Electric Company Limited.

Payment in currency through the mails is not recommended. Registered mail may be used at the sender's risk. We are not responsible for loss or miscarriage of the mails.

Receipts are not issued for remittances unless requested. Our endorsement on remittance is acknowledgment of the receipt of the funds.

We solicit new accounts on a credit basis, and in order to give prompt service, request those purchasers who are not rated by the Commercial Agencies to send references or other information of a credit character with the order. These will be immediately acted upon, and the result held in strict confidence for our sole use, and, when reasonably satisfactory, shipment will follow with all possible despatch.

To avoid the delay incidental to communicating with references, etc., it would be mutually convenient, when immediate shipment is desired, to instruct us to ship C.O.D. by express or parcel post, or by freight subject to sight draft through a local bank against bill of lading.

We shall advise new customers of the terms on future orders promptly after communications from references are received.

RETURNED GOODS

To save transportation charges, and to facilitate the handling of returned goods by us, we request that no return of goods shall be made without having obtained our authorization and shipping instructions.

SHIPMENTS

Customers are requested to specify the method of shipment (whether rail, steamer, express or parcel post) but in the absence of specific instructions we will use our best judgment in selecting the manner of shipment and the route, but we cannot accept responsibility for extra delivery charges at destination.

We employ only experienced packers who use reasonable care in packing; consequently cannot be held responsible for breakage in packages which are delivered in "good order" to the carrier.

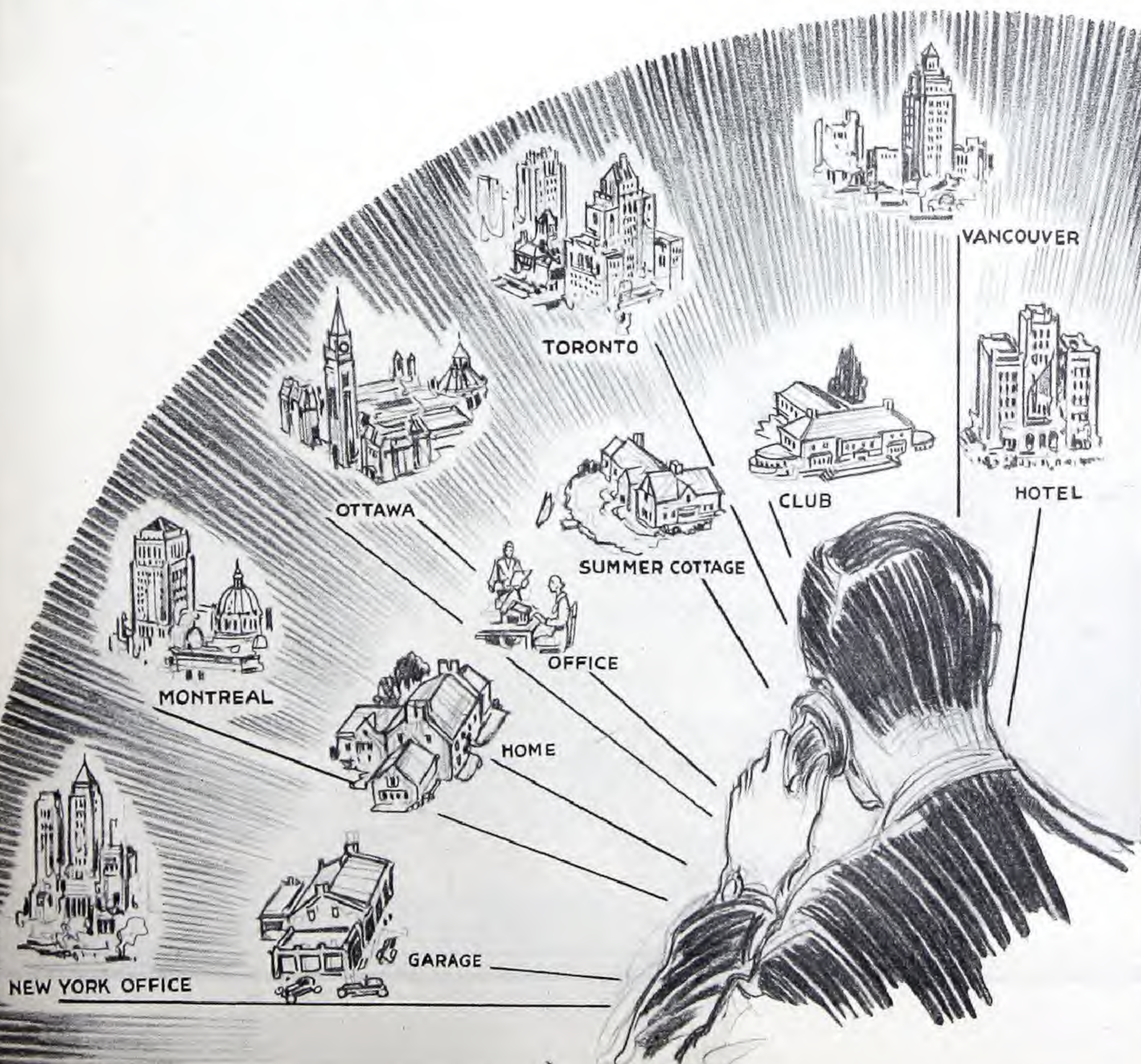
The transportation companies handle glassware and some other articles at "owner's risk." We are not responsible for damage to such shipments. All goods ordered to be shipped by parcel post are also at purchaser's risk, although we will arrange insurance on such shipments if requested to do so.

The history of the development of the telephone in Canada has been the history of the Northern Electric Company. From the early days of the telephone up to the present time the Northern Electric Company has been the foremost Canadian telephone manufacturer in all its allied branches. The Northern Electric Company is prepared to engineer and supply Telephone Systems for large industrials, municipalities or for individuals, from the most complicated automatic equipment to the simplest party to party Inter-phone System.

for TELEPHONE EQUIPMENT INDEX

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TELEPHONE EQUIPMENT INDEX



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Receivers
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Selectors
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Storage Batteries
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Telephone Set Cords
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Weatherproof Magneto Telephones

INTER-PHONE SYSTEMS



PREFACE

Interphone systems afford a quick means of communication throughout industrial plants, residences, offices, apartment houses, schools, etc.

There are numerous arrangements of these systems for specialized applications. Some of these systems are herewith described and special requirements should be discussed with our nearest representative.

System No. 1

Selective Ringing—Selective Talking

For use in business organizations, industries, stores, institutions, etc., where frequently, more than one conversation will take place at the same time, and where instantaneous connections without loss of time are necessary.

By pressing a button each station can selectively ring and talk with any other station without disturbing the rest of the stations in the system and as many separate conversations can be carried on simultaneously as there are pairs of Inter-Phones. For example, in a system of six Inter-Phones, three conversations can be carried on at the same time.

For each station in the system, one push button key is required in each Inter-Phone.

Available in standard sizes of 6, 12, 16, 20 and 24 buttons; and in number 1324 Wall Type Inter-Phones and number 6139-C and number 6116-CH Type Hand Sets.

CABLE

For connections between the various stations, cable specially designed for Inter-Phones can be supplied. This cable includes the necessary number of wire conductors (two pairs for battery leads and one pair for each station in the system) and is furnished in three different types to suit various locations and conditions:

No. of Stations	6	12	16	20	24
No., Fire resisting Braid.....	134B	141-B	157-B	158-B	136-B
No., Brown Cotton Braid.....	155-B	156-B	...	...	...
No., Lead Covered..	134-BL	141-BL	157-BL	158-BL	136-BL

These cables are listed on a following page.

CABLE TERMINALS

A cable terminal should be used whenever a junction is to be made between cables. For example: where an outside lead-covered cable is connected to an interior cable, or whenever a branch is taken off from the main cable. In cases where the cable can be run direct to the Inter-Phone, no cable terminal is necessary. The number of cable terminals required should be determined by the installer. For 6 and 12 button systems use the No. 19-A cable terminals. For 16, 20 and 24 button systems use the No. 19-B cable terminals.

BATTERIES

Not more than 12 dry cells will be necessary for operating the system. (Five cells for the talking circuit; four to seven cells for the ringing circuit depending upon the length of line).

Prices on application.

INTER-PHONE SYSTEMS

System No. 1

(Continued)

No. 1324 TYPE WALL INTER-PHONES—SURFACE MOUNTING



No. 1324C-12 Inter-Phone

An all metal set having a hinged face plate, movable transmitter and hand receiver. The face being hinged, makes it possible to easily inspect all connections and apparatus without disturbing the installation.

Black with nickel trimmings.

Code No.	No. of Buttons	Height Inches	Width Inches	Depth Inches
1324C- 6	6	10	6 ³ / ₈	3
1324C-12	12	10	6 ³ / ₈	3
1324C-16	16	14 ⁵ / ₁₆	7 ¹ / ₈	3
1324C-20	20	14 ⁵ / ₁₆	7 ¹ / ₈	3
1324C-24	24	14 ⁵ / ₁₆	7 ¹ / ₈	3



No. 6139C-12

No. 6139-C TYPE HAND SETS

Code No.	Hand Set and Switch-Hook Box	No. of Buttons
6139C- 6	1139-C	6
6139C-12	1139-C	12
6139C-16	1139-C	16
6139C-20	1139-C	20
6139C-24	1139-C	24

No. 6116-CH CRADLE TYPE HAND SETS

The cradle or mounting for supporting this hand set consists of a phenol compound base finished in black.



No. 6116CH-12

Code No.	No. of Buttons	Hand Set and Cradle	Cord Feet
6116CH- 6	6	1116CH	5 ¹ / ₂
6116CH-12	12	1116CH	5 ¹ / ₂
6116CH-16	16	1116CH	5 ¹ / ₂
6116CH-20	20	1116CH	5 ¹ / ₂
6116CH-24	24	1116CH	5 ¹ / ₂

Prices on application.

INTER-PHONE SYSTEMS

System No. 1

(Continued)

KEY BOX

The key box for these Inter-Phones is finished in dull black. Cable entrances are provided at bottom and ends of the box.

No.	328C-6	328C-12	328C-16	328C-20	328C-24
Width.....In.	5	5	5 $\frac{3}{4}$	5 $\frac{3}{4}$	5 $\frac{3}{4}$
Length.....In.	7 $\frac{1}{2}$	7 $\frac{1}{2}$	10 $\frac{3}{4}$	10 $\frac{3}{4}$	10 $\frac{3}{4}$
Depth.....In.	2 $\frac{5}{8}$	2 $\frac{5}{8}$	2 $\frac{5}{8}$	2 $\frac{5}{8}$	2 $\frac{5}{8}$
Button Cap....	6	12	16	20	24

STRANDED FLEXIBLE CABLES

Usually connected between key box and cable terminal. Furnished with mercerized-cotton braid.

If key box is mounted in stationary position, standard lead or braided Inter-Phone cable should be used.

Code No.....	416	428	436	444	452
No. Single Conduc- tors.....	16	28	36	44	52
Used with Button Capacity.....	6	12	16	20	24

System No. 11

Selective Ringing—Common Talking

For use where conversations can be limited to one at a time. Each Inter-Phone is equipped with a number of push buttons for calling each other station in the system.

The wall type Inter-Phones can be furnished in capacities of 2, 3, 4, 6 and 8 buttons, accommodating 3, 4, 5, 7, and 9 stations respectively in a system. The desk and hand set Inter-Phones are furnished in capacities of 4 and 8 buttons, accommodating 5 and 9 stations respectively in a system.

No. of Buttons	Wall Type Surface	Flush	Cradle Set	Hand Set
2	2527C-2	2539C-2	.....	.....
3	2527C-3	2539C-3	.....	.....
4	2527C-4	2539C-4	6145C-4	6034AZ or BG
6	2527C-6	2539C-6	.....	.....
8	2527C-8	2539C-8	6145C-8	6034BB or BH

RETARDATION COIL

A No. 51-H retardation coil must be ordered separately for installation near the battery of each system.

CABLES

Cable especially designed for connection between the various stations can be furnished. This cable includes three common wires and one individual wire for each station.

No. of Stations.....	3 or 4	6 or 8
Code No. with Fire resisting Braid.....	161-B	162-B
Code No. with Brown Cotton Braid.....	142-B	
Code No. with Lead Covering.....	161-BL	162-BL

CONNECTING BLOCKS

Where a junction is to be made between cables, or wherever a branch is taken off the main cable, a connecting block should be used. In cases where the cable can be run direct to the Inter-Phone, the connecting block is not required.

BATTERIES

Five dry cells are required for the operation of this system, when the distance between the two stations farthest apart is 750 feet or less, and Inter-Phone cable, listed above, is used. On lines of greater length it is recommended that, instead of increasing the number of battery cells to more than 5, larger wire be used.

INTER-PHONE SYSTEMS

System No. 12

Master Station—Common Talking

Consists of one centrally located "Master Station" Inter-Phone to which are connected other "Outlying Station" Inter-Phones.

The Master Station Inter-Phone is equipped with a number of push buttons; one for each outlying station in the system.

Outlying stations are equipped with one button for ringing the master station.

Only one conversation can be carried on at a time.

Capacity, one Master Station and from 2 to 8 outlying stations.

Prices on application.

MASTER STATION

No. of Buttons	Metal Wall Type Inter-Phones Surface	Flush	Cradle Set Inter- Phones	Hand Set Inter- Phones
2.....	2527C-2	2539C-2	.....	.....
3.....	2527C-3	2539C-3	.....	.....
4.....	2527C-4	2539C-4	6145C-4	6034AZ or BG
6.....	2527C-6	2539C-6	.....	.....
8.....	2527C-8	2539C-8	6145C-8	6034BB or BH

OUTLYING STATIONS

1.....	2527C-1	2539C-1	6145C-1	6042K
.....	.....	.....	.....	*6042E
.....	.....	.....	.....	6043E

*No. 6042E is same as No. 6042K, but without face plate and wall box. For details see listing elsewhere.

ACCESSORIES

Retardation Coil

A No. 51H retardation coil must be ordered separately with each master station Inter-Phone and installed near the battery of the system.

WIRING

For connections between the outlying stations and the master station either cable or insulated wires can be used, depending largely upon the layout of the system. Three common wires are required throughout the system, and in addition, one individual wire from the master to each outlying station. Where there is a long run of a large number of wires, it will be found economical to use cable, and at all distributing and junction points, to install connecting blocks. From these connecting blocks separate wires can be run to the Inter-Phones.

The sizes of cable and the number of connecting blocks required should be determined in accordance with the installation instructions.

BATTERIES

Five dry cells are required for the operation of this system when the distance between the master station and most distant outlying station is 750 feet or less and No. 22 A.W.G. wire is used.

On lines of greater length it is recommended that, instead of increasing the number of battery cells to more than five, larger wire be used. This should be determined in accordance with the installation instructions.

Note. Detailed information covering wiring diagrams, connection of wires and cables, connecting blocks, etc., can be found in our booklet, "Installing and Maintaining Inter-Phones," which will be furnished upon request.

INTER-PHONE SYSTEMS

Master Annunciator System

Nos. 12A and 12AC

2-Way Ringing—Common Talking

Especially adapted for schools where the principal may call the teachers individually and the teachers can call the principal. Similar to the No. 12 system except that the master station includes an annunciator for identifying the calls from the outlying stations.

Only one conversation can be carried on at a time.

Capacity, one master station and 3 up to 20 or more outlying stations.

System No. 12A

The master station Inter-Phone includes a push button block having as many buttons as there are outlying stations, also one extra button for electrically resetting the annunciator drops.

Each outlying station Inter-Phone is equipped with a push button which signals the master station. This call will also be registered at the master station by the operation of the annunciator drop.

MASTER STATION

— Group Code No. Consists of —

No. of Class-room Sta.	Group Code No.	*Push Button Block No.	Cradle Set No.	Cable Term. No.	Annunciator Code No.	†Surface †Flush
8	8A	9030C	6145C-0	19A	403-8	409-8
10	10A	9032C	6145C-0	19A	403-10	409-10
12	12A	9034C	6145C-0	19A	403-12	409-12
14	14A	9036C	6145C-0	19A	403-14	409-14
16	16A	9038C	6145C-0	19A	403-16	409-16
18	18A	9040C	6145C-0	19A	403-18	409-18

OUTLYING STATIONS

No. of Buttons	Metal Wall Type	Hand Set Type
1	Surface 2527C-1	Flush 2539C-1
		Cradle 6145C-1
		Surface 6043E
		Flush 6042K
		†6042E

System No. 12AC

System No. 12AC differs from System No. 12A in that a ring-all button is furnished in the push button block at the principal's station. This button will ring all stations simultaneously for school period purposes and for fire drills.

MASTER STATION

— Group Code No. Consists of —

No. of Class-room Stations	Group Code No.	*Push Button Block No.	Cradle Set No.	Cable Term. No.	Annunciator Code No.	†Surface †Flush
10	10AC	9072C	6145C-0	19A	403C-10	409C-10
12	12AC	9074C	6145C-0	19A	403C-12	409C-12
14	14AC	9076C	6145C-0	19B	403C-14	409C-14
16	16AC	9078C	6145C-0	19B	403C-16	409C-16
20	20AC	9082C	6145C-0	19B	403C-20	409C-20
24	24AC	9086C	6145C-0	19B	403C-24	409C-24
26	26AC	9090C	6145C-0	2-19A	403C-26	409C-26
				1-19A and		
30	30AC	9094C	6145C-0	1-19B	403C-30	409C-30

OUTLYING STATIONS

Wall type sets only, equipped with 24-volt direct current ringers.

No. of Buttons	1
Code No., Surface Mounting	2527AC-1
Code No., Flush Mounting	2539AC-1

*The push-button block includes a 6-foot connecting cord.

†No. 403 Type furnished unless otherwise specified.

†No. 6042E is same as No. 6042K, but without face plate and wall box.

ACCESSORIES—Retardation Coil

A No. 51H retardation coil must be ordered separately for installation near the battery of each system.

WIRING AND BATTERY REQUIREMENTS

Two wires common to all stations in the system and two individual wires for each outlying station.

System No. 12A requires a battery of five dry cells, connected in series, to furnish current for ringing and talking.

System No. 12AC requires a battery of dry cells or storage batteries to total 24 volts may be used for the ringing and talking battery supply.

INTER-PHONE SYSTEMS

Master Annunciator Systems

Nos. 12B and 12C

1-Way or 2-Way Ringing—Common Talking

Provides for communication between a master station annunciator and a number of outlying stations.

The master annunciator is equipped with a hand set Inter-Phone, and can be obtained with or without push buttons.

System No. 12B—1-Way Ringing

The annunciator is without push buttons, enabling the outlying stations to ring the master station but the master station cannot ring the outlying stations.

System No. 12C—2-Way Ringing

The annunciator is equipped with push buttons, one for each outlying station, enabling the outlying stations to ring the master station and the master station to ring the outlying stations individually.

MASTER STATION ANNUNCIATORS

Code Nos.	Code Nos.	No. of Drops	Code Nos.	Code Nos.	No. of Drops
For No. 12B	For No. 12C		For No. 12B	For No. 12C	
1204B	1204C	4	1216B	1216C	16
1206B	1206C	6	1220B	1220C	20
1208B	1208C	8	1224B	1224C	24
1210B	1210C	10	1230B	1230C	30
1212B	1212C	12			

A No. 1003D Hand Set must be ordered separately with each annunciator. This set is equipped with a 3-foot cord, and can be hung on the hook on the side of the annunciator.

Prices on application.

ACCESSORIES

Wiring

For System No. 12B one wire, common to all stations in the system, and in addition, one individual wire from the master station to each outlying station.

For System No. 12C one wire, common to all stations in the system, also two individual wires from the master station to each outlying station.

Batteries

Only one battery is required for the operation of the system. This should consist of three or four dry cells, where the distance between the master station and the farthest outlying station is 250 feet or less, and No. 22 A.W.G. copper wire is used. On lines of greater length it is recommended that, instead of increasing the number of dry cells to more than four, larger wires be used.

System No. 14

2-Station Private Line

For use where only two stations are required and where the sets are distantly located from each other.

Either station can ring the other.

No. of Buttons	Metal Wall Type	Desk Sets	Hand Sets
	Surface	Flush	Surface
1	2527C-1	2539C-1	6145B-1
			6034P
			6042AE
			*6042AF

*No. 6042AF is same as No. 6042AE but without face plate and wall box.

WIRING AND BATTERY REQUIREMENTS

Only two wires are used for connecting the Inter-Phones.

A battery of three dry cells is required at each station to furnish current for talking and ringing if the length of line is less than 750 feet. If the length of the line is increased, additional dry cells are required at each station to insure satisfactory ringing. The following list indicates the additional dry cells required at each station:

Length of Line Between Stations	No. 12	No. 14	No. 16	No. 18
750 to 1000 ft.	1	1	1	2
1000 to 1500 ft.	1	1	1	3
1500 to 2000 ft.	1	2	3	—
3000 to 4000 ft.	2	3	—	—
4000 to 5000 ft.	2	—	—	—
5000 to 6000 ft.	3	—	—	—

INTER-PHONE SYSTEMS

System No. 15

Code Ringing—Common Talking

A simple and inexpensive system for small residences, warehouses, or stores where only a few stations are required.

Only one conversation can be carried on at a time.

Each station is equipped with one push button which rings the bells at all the other stations.

The various stations are called by signalling each one with a different code ring; for instance, two rings for Station No. 2, three rings for Station No. 3, etc. If more than 6 stations are in service, signalling code mistakes are likely to occur. System No. 11 is recommended where the initial installation comprises more than 4 or 6 stations.

No. of Buttons	Metal Wall Type Surface	Desk Flush	Hand Sets Surface	Hand Sets Flush
1	2527C-1	2539C-1	6145D-1	6043CD 6042CD

ACCESSORIES

A No. 51H retardation coil must be ordered separately and installed near the battery of the system.

Four wires are required for connecting the Inter-Phones.

Five dry cells are required for the operation when the length of the line is 750 feet or less, and not more than four stations are to be used, connected by Nos. 20 or 22 A.W.G. copper wire. If more than four Inter-Phones are required or if the line is longer than 750 feet, larger wires should be used in accordance with installation instructions.

Prices on application.

Master Annunciator System No. 18C

Non-Interfering

Provides for communication between a central or master station and a larger number of outlying stations, as follows:

The master station can selectively ring and talk with any of the outlying stations and the outlying stations can call the master station annunciator.

Communications can be arranged between any two outlying stations through the medium of one or two connecting cords at the master station.

No connection can be made between this system and a public telephone system.

An annunciator supervisory feature is provided to indicate the termination of a conversation between the outlying stations. Where a large number of connections are required between outlying stations, the lamp signal, Private Exchange Switchboard for surface or flush mounting, is recommended.

MASTER STATION ANNUNCIATORS

Annunciators regularly equipped with answering cord only. If inter-communication between outlying stations is desired, one or two pairs of connecting cords may be ordered.

A No. 1003K Hand Set must be ordered separately with each annunciator.

Code No.	No. Drops and Jacks	Height Inches	Width Inches	Depth Inches
1810-C	10	15 $\frac{1}{8}$	11 $\frac{1}{4}$	5 $\frac{1}{4}$
1814-C	14	15 $\frac{1}{8}$	14 $\frac{1}{4}$	5 $\frac{1}{4}$
1816-C	16	15 $\frac{1}{8}$	17 $\frac{1}{4}$	5 $\frac{1}{4}$
1820-C	20	15 $\frac{1}{8}$	18 $\frac{3}{4}$	5 $\frac{1}{4}$
1825-C	25	19 $\frac{3}{8}$	17 $\frac{1}{4}$	5 $\frac{1}{4}$
1830-C	30	19 $\frac{3}{8}$	18 $\frac{3}{4}$	5 $\frac{1}{4}$
1836-C	36	19 $\frac{3}{8}$	21 $\frac{3}{4}$	5 $\frac{1}{4}$
1842-C	42	23 $\frac{3}{4}$	20 $\frac{1}{4}$	5 $\frac{1}{4}$
1849-C	49	23 $\frac{3}{4}$	23 $\frac{1}{4}$	5 $\frac{1}{4}$
1856-C	56	23 $\frac{3}{4}$	24 $\frac{3}{4}$	5 $\frac{1}{4}$
1864-C	64	28 $\frac{1}{8}$	23 $\frac{1}{4}$	5 $\frac{1}{4}$
1872-C	72	28 $\frac{1}{8}$	26 $\frac{1}{4}$	5 $\frac{1}{4}$
1881-C	81	32 $\frac{3}{8}$	24 $\frac{3}{4}$	5 $\frac{1}{4}$
1890-C	90	32 $\frac{3}{8}$	26 $\frac{1}{4}$	5 $\frac{1}{4}$
1900-C	100	32 $\frac{3}{8}$	29 $\frac{1}{4}$	5 $\frac{1}{4}$

OUTLYING STATIONS

No. of Buttons	Metal Wall Type Surface	Hand Sets Surface	Hand Sets Flush
1	2527C-1	2539C-1	6043D 6042D

*Same as No. 6042D, but with face plate and wall box.

INTER-PHONE SYSTEMS

System No. 18-C

(Continued)

ACCESSORIES

One wire, common to all stations in the system is required, and, in addition, two individual wires between the master and each outlying station. Where there is a long run of a large number of wires, it will be found economical to use cable and install cable terminals or connecting blocks at all distributing and junction points. From there, the installation can be continued by means of separate wires to the various outlying stations.

Five or more dry cells are required for operating the system.

DESCRIPTION OF METAL WALL TYPE INTER-PHONES

No. 2527C, Surface Mounting



No. 2527C-4

permits fastening the backboard in place on the wall and then mounting the housing unit to it.

Prices on Application.

The hinge arrangement of this set enables the installer to swing down the housing unit from the backboard for making connections to the terminals; also to permit interior inspection of the set at any time after its installation.

The metal backboard is designed to permit the entrance of wires or cabling from either the top, bottom or center of the set; also, a metal guide ring is located near the cable entrance at the base of the backboard so that the connecting wires may be looped through this ring to hold them in place and provide a proper bending point when the housing is swung forward.

Durable dull black enamel finish with nickel trimmings.

Code No.	No. of Buttons	For Systems	Dimen. Height	Housing, Width	Inches Depth
2527C-0	0	20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-1	1	12, 14, 15, 18, 20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-2	2	20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-3	3	11, 12, 20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-4	4	11, 12, 20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-6	6	11, 12, 20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$
2527C-8	8	11, 12, 20 and 21	7 $\frac{1}{2}$	5	2 $\frac{5}{8}$

No. 2539C FLUSH MOUNTING

The No. 2539C Type Inter-Phone has a flush steel face plate on which is mounted all of the talking and signalling apparatus, also a metal outlet box which is furnished for mounting the set in the wall.

The outlet box is of unique design in that metal aligning strips are fastened at the top and bottom front of the box so as to properly align the set after the face plate unit is fastened to the outlet box (in case the outlet box is installed out of plumb). It is equipped with adjustable ears for mounting it in the wall, the same as are



No. 2539C-2

furnished on standard sectional outlet boxes. Knockouts are provided at both the top and bottom for the entrance of $\frac{1}{2}$ -inch conduit or connecting wires.

INTER-PHONE SYSTEMS

System No. 18-C

(Continued)

The face plate support for installer is an added feature of this set, consisting of a wire hook mounted on a small card with printed instructions for its use. This hook is for temporarily supporting the Inter-Phone face plate, of flush type sets, during installation, so that the wires may be readily connected to the terminals by the installer.

Durable dull black enamel finish with nickel trimmings.

Code No.	No. of But-tons	For Systems	Dimensions, Inches				
			Face Plate Hgt.	Face Plate Wd.	Outlet Box Hgt.	Outlet Box Wd.	Outlet Box Depth
2539C-0	0	20	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-1	1	12, 14, 15, 18 and 20	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-2	2	20	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-3	3	11, 12, and 20	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-4	4	11 and 12	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-6	6	11 and 12	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆
2539C-8	8	11 and 12	9	5 ⁵ / ₁₆	7 ¹ / ₂	4	2 ⁵ / ₁₆

DESCRIPTION OF HAND SETS

Selective Ringing—Common Talking

No. 6139 Type



No. 6139C-1

This hand set unit was designed for installation at the side of a desk, on the wall, or any vertical surface. The set may be installed at one end, side or in the alcove of the desk; also recommended for residential purposes for mounting at the bedside, either on the bed or on the wall within reach of the bed.

The switch-hook box contains a switch-hook unit for holding the hand set in place. This hook operates on the same principle as the standard telephone hook. A 4-

foot cord connects the hand set to the switch-hook box.

Composed of

Code No.	No. of But-tons	Hand Set Switch Box	Con-necting Block	Push Button Block	Appa-ratus Box	For Use in System
6139B-1	1	1139B-1	12E	...	...	14 and 15C
6139C-1	1	1139C-1	2 No. 11A	...	...	12
6139C-4	4	1139CB	...	104AC	35B	11 and 12
6139C-8	8	1139CB	...	108AC	35B	11 and 12

Prices on application.

INTER-PHONE SYSTEMS

System No. 18-C

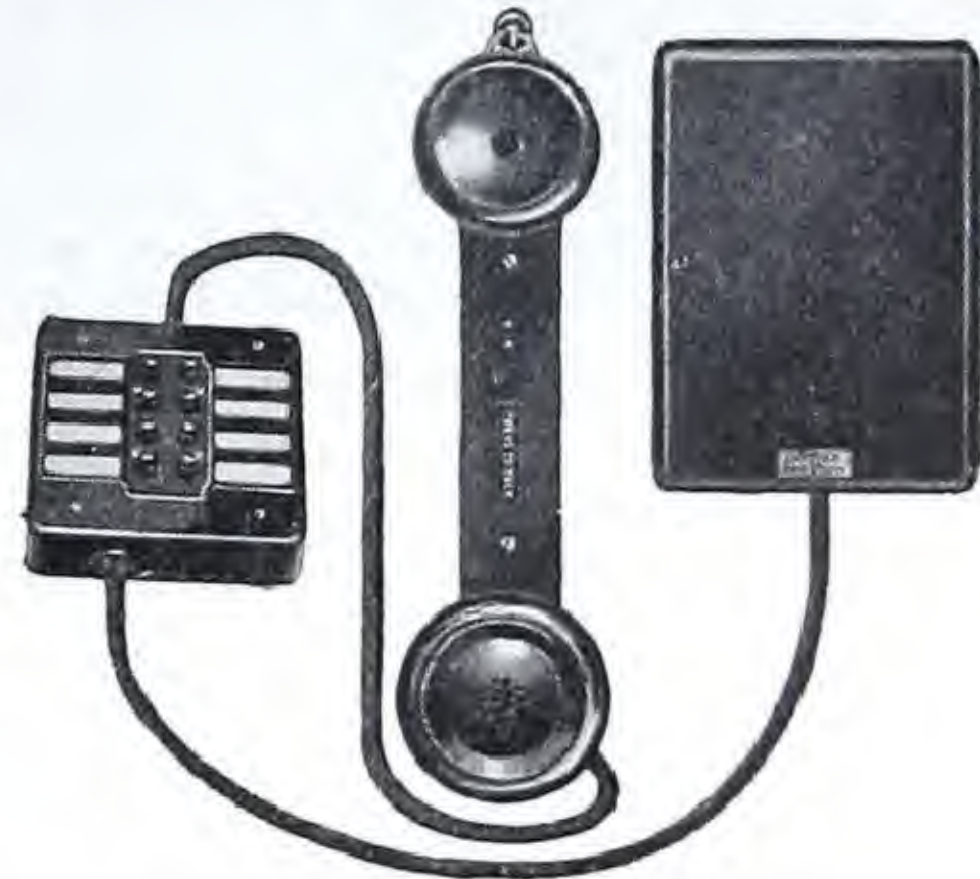
(Continued)

SELECTIVE RINGING—COMMON TALKING

No. 6034 AND No. 6043

The Inter-Phone transmitter and receiver are a part of the hand set. A bar marked Press to Talk mounted in the hand set handle is held down by the natural position of the hand while talking. When not in use, the hand set can be hung on a hook or laid down in any position.

Finished in dull black.



No. 6034 BH

No. 6034 TYPE

Code No.	No. of But-tons	Hand Set Code No.	Cord Ft.	Composed of				For Use in System
				Push But-ton Block	Ap-pa-ratus Box	Con-nect-ing Block	Bell No.	
6034BG	4	1003AD	6	104AC	35B	-	-	11 & 12
6034AZ	4	1003AD	6	104AC	-	8G	11B	11 & 12
6034BH	8	1003AD	6	108AC	35B	-	-	11 & 12
6034BB	8	1003AD	6	108AC	-	8H	11B	11 & 12



No. 6043E

No. 6043 SURFACE MOUNTING

Surface Mounting Apparatus Units (No. 383 Type) are equipped with an insulated base, black finished round metal cover and nickel hook.

Approximate size, 3¹¹/₁₆ inches in diameter by 1⁵/₁₆ inches deep.

Code No.	No. of But-tons	Code No.	Cord Feet	Appa-ratus Box	For Use in System
6043E	1	1003J	3	383J	12 & 12A
6043D	1	1003E	3	383J	12B & 18C
6043P	1	1003AB	3	383J	14 & 15C

Prices on application.

INTER-PHONE SYSTEMS

System No. 18-C

(Continued)

No. 6042, FLUSH MOUNTING



Flush Mounting Apparatus Boxes (No. 382 Type) are intended to be set in the wall and are equipped with a brush brass finished face plate. These boxes consist of three parts—a Gem A Union sectional switchbox, an apparatus unit, and a face plate. The face plate is $4\frac{1}{2} \times 2\frac{3}{4}$ inches; the wall box $2 \times 3 \times 3$ inches deep.

An important point to be observed is that wall box and face plate are the same as those used in electric light wiring for push button switches. Sets furnished either complete, including wall box and face plate, or minus these parts.

No. 6042K

Code No.	No. of Buttons	Code No.	Cord Ft.	Code No.	Switch box	Face Plate No.	For Systems
6042E	1	*1003G	3	382E			12 & 12A
6042K	1	*1003G	3	382EB	Gem A	12007	12 & 12A
6042D	1	1003K	3	382J			12B & 18C
6042M	1	1003K	3	382JB	Gem A	12007	12B & 18C
6042AE	1	1003AA	3	382JB			14 & 15C
6042AF	1	1003AA	3	382J	Gem A	12007	14 & 15C

*Hand set cord equipped with plug.

DESCRIPTION OF ANNUNCIATORS

For Systems 18C, 20J and 21J



For System 18C

No. of Drops	System 18C List No.	Systems 20J and 21J List No.	No. of Drops	System 18C List No.	Systems 20J and 21J List No.
10	1810C	2010	49	1849C	2049
14	1814C		56	1856C	2056
16	1816C	2016	64	1864C	2064
20	1820C	2020	72	1872C	2072
25	1825C	2025	81	1881C	2081
30	1830C	2030	90	1890C	2090
36	1836C	2036	100	1900C	2100
42	1842C	2042	...	...	...

Larger sizes furnished on order.

No. 18C System annunciators equipped with answering cord only. No connecting cords furnished unless ordered separately.

Prices on application.

INTER-PHONE SYSTEMS

System No. 18-C

(Continued)

For Systems 22D and 22G

No. of Drops	System 22D List No.	System 22G List No.	For No. of Sections	*No. of Calling Buttons	No. Jack and Door Buttons
2	2202D	2202G	2	12	2
3	2203D	2203G	3	18	3
4	2204D	2204G	4	24	4
5	2205D	2205G	5	30	5
6	2206D	2206G	6	36	6

*For System 22G only.

Larger sizes furnished on order.

For System 22J

No. of Drops	List No.	For No. of Sections	No. of Calling Buttons	No. Jack and Door Buttons
12	2202J	2	12	2
18	2203J	3	18	3
24	2204J	4	24	4
30	2205J	5	30	5
36	2206J	6	36	6

Larger sizes furnished on order.

HAND SET INTER-PHONES FOR ANNUNCIATORS

Annunciators do not include the hand sets which must be ordered separately.

Order No. 1003K hand set for Systems 18C, 20J and 21J, and for Systems 22D, G and J.

Description of Annunciators

These annunciators are equipped with electric reset drops. The drop indication is a white arrow which points directly at the name card. When reset, the arrow drops out of view behind the name card.

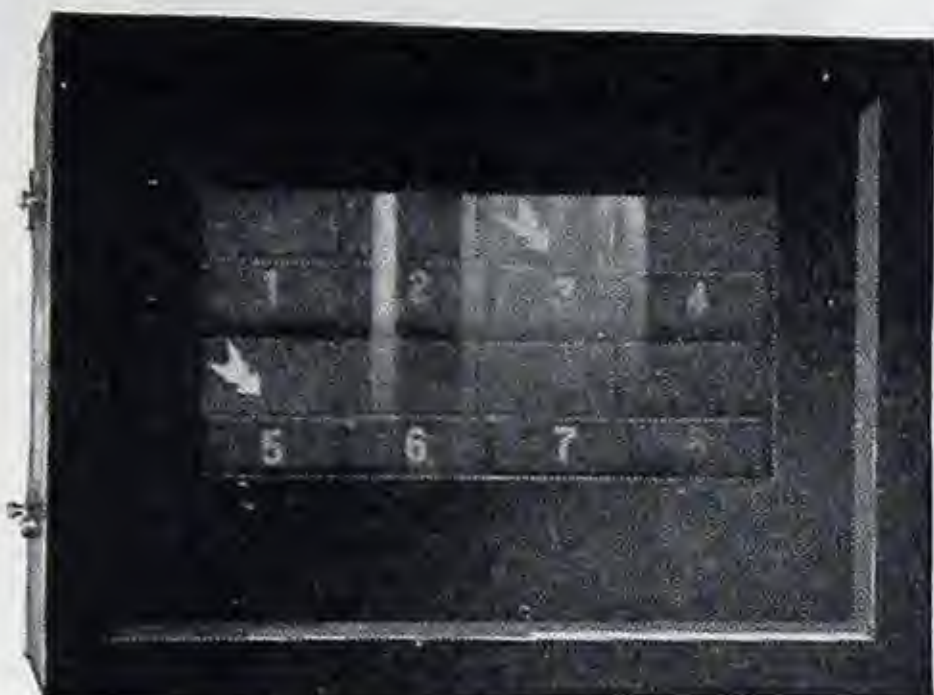
The front of the annunciator protecting the drops is plain glass and as the arrow is between the glass and the dull black background, it can be easily seen from any angle.

INTER-PHONE SYSTEMS

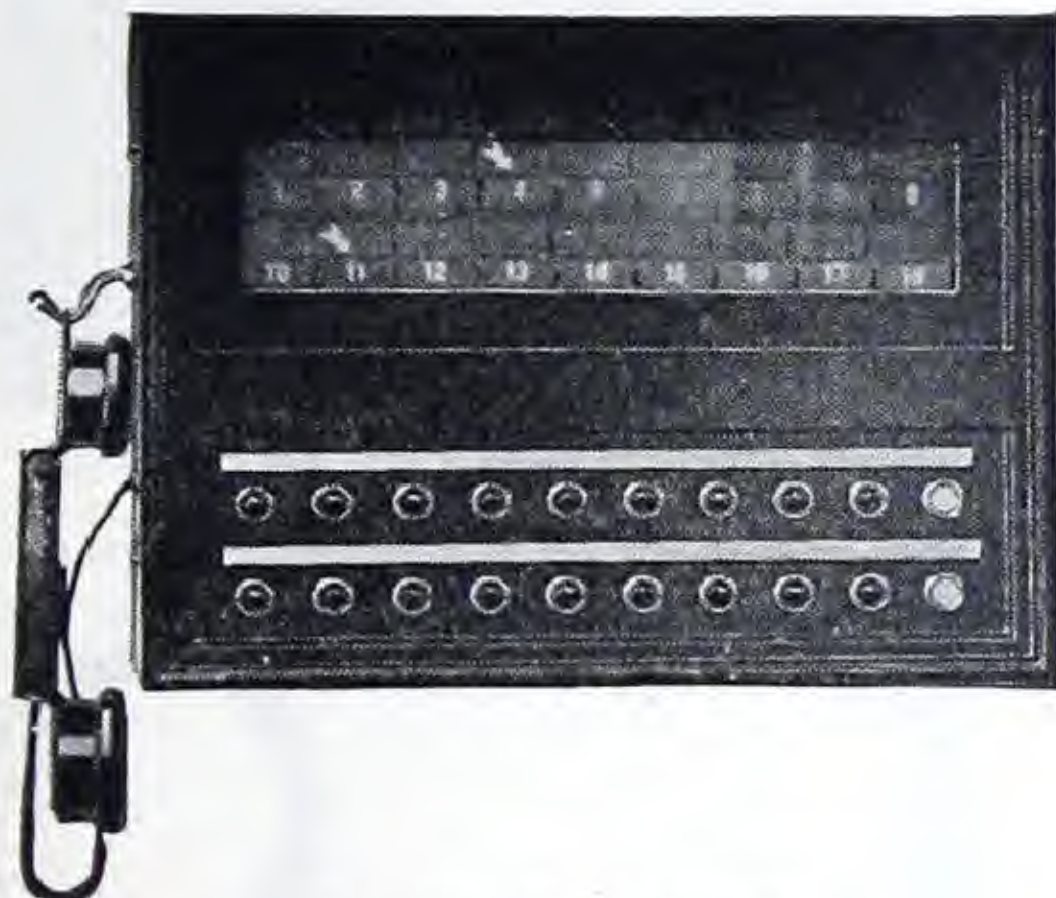
System No. 18-C

(Continued)

FOR SYSTEMS Nos. 12A, 12B AND 12C



No. 403



No. 1204C to 1230C

No. of Drops	System 12A Surface	List No. Flush	System 12B List No.	System 12C List No.
4	...	...	1204B	1204C
6	...	...	1206B	1206C
8	403- 8	409- 8	1208B	1208C
10	403-10	409-10	1210B	1210C
12	403-12	409-12	1212B	1212C
16	403-16	409-16	1216B	1216C
18	403-18	409-18	...	...
20	...	...	1220B	1220C
24	...	...	1224B	1224C
30	...	...	1230B	1230C

Larger sizes furnished on order.

HAND SET INTER-PHONES FOR ANNUNCIATORS

No. 1003D hand set must be ordered separately for Systems 12B and 12C annunciators.

Prices on application

INTER-PHONE SYSTEMS

Inter-Phone Accessories

INTERPHONE CABLE



For Outside Use



For Interior Use

The conductors are provided with single silk and single cotton insulation, which is coloured in accordance with a standard colour code, in such a way that each pair and each single wire can be identified. The pairs are properly twisted to prevent inductive disturbances. The cable is then impregnated with a wax compound and is covered with servings of paper and a heavy braiding, which is given a heavy coat of fire resisting paint.

The impregnation with wax prevents the insulation from fraying when the cables are installed. It also serves to protect the formed ends against moisture.

Three general types of cable are provided. Each type has its particular use and care should be taken to order the proper cable for any desired purpose. These types are as follows:

1—Interior Cable with outside braiding treated with gray fire resisting paint. Use only in dry places.

2—Interior Cable with glazed cotton outside braiding. Use only in dry places where exposed to view.

3—Outside Cable, lead covered. Always use this cable outside, and inside in every case where there is apt to be moisture even in a small degree. Any fire resisting type of cable may be ordered with a lead sheath.

Code No.	Conductors B. & S. Gauge No. 22 No. 18	Covering	Approx. Outside Diam. In.
*161 B	8 singles	Fire resisting braid	$\frac{5}{16}$
*161 BL	8 singles	Lead Sheath	$\frac{3}{8}$
142 B	8 singles	Brown cotton braid	$\frac{5}{16}$
*162 B	12 singles	Fire resisting braid	$\frac{11}{32}$
*162 BL	12 singles	Lead Sheath	$\frac{13}{32}$
164 B	6 singles, 2 pair	Fire resisting braid	$\frac{3}{8}$
164 BL	6 singles, 2 pair	Lead Sheath	$\frac{13}{32}$
*134 B	6 pair, 2 pair	Fire resisting braid	$\frac{13}{32}$
*134 BL	6 pair, 2 pair	Lead Sheath	$\frac{1}{2}$
155 B	6 pair, 2 pair	Brown cotton braid	$\frac{13}{32}$
*141 B	12 pair, 2 pair	Fire resisting braid	$\frac{7}{16}$
*141 BL	12 pair, 2 pair	Lead Sheath	$\frac{1}{2}$
156 B	12 pair, 2 pair	Brown cotton braid	$\frac{7}{16}$
157 B	16 pair, 2 pair	Fire resisting braid	$\frac{17}{32}$
*157 BL	16 pair, 2 pair	Lead Sheath	$\frac{19}{32}$
158 B	20 pair, 2 pair	Fire resisting braid	$\frac{9}{16}$
*158 BL	20 pair, 2 pair	Lead Sheath	$\frac{21}{32}$
136 B	24 pair, 2 pair	Fire resisting braid	$\frac{19}{32}$
136 BL	24 pair, 2 pair	Lead Sheath	$\frac{11}{16}$
140 B	31 pair, 2 pair	Fire resisting braid	$\frac{5}{8}$

*Indicates standard stock sizes normally carried in stock.

Prices on application.

INTER-PHONE SYSTEMS

Inter-Phone Accessories

FLEXIBLE STRANDED CABLE FOR INTERPHONES
and
SIGNALLING SYSTEMS



Finished in mercerized brown braid.

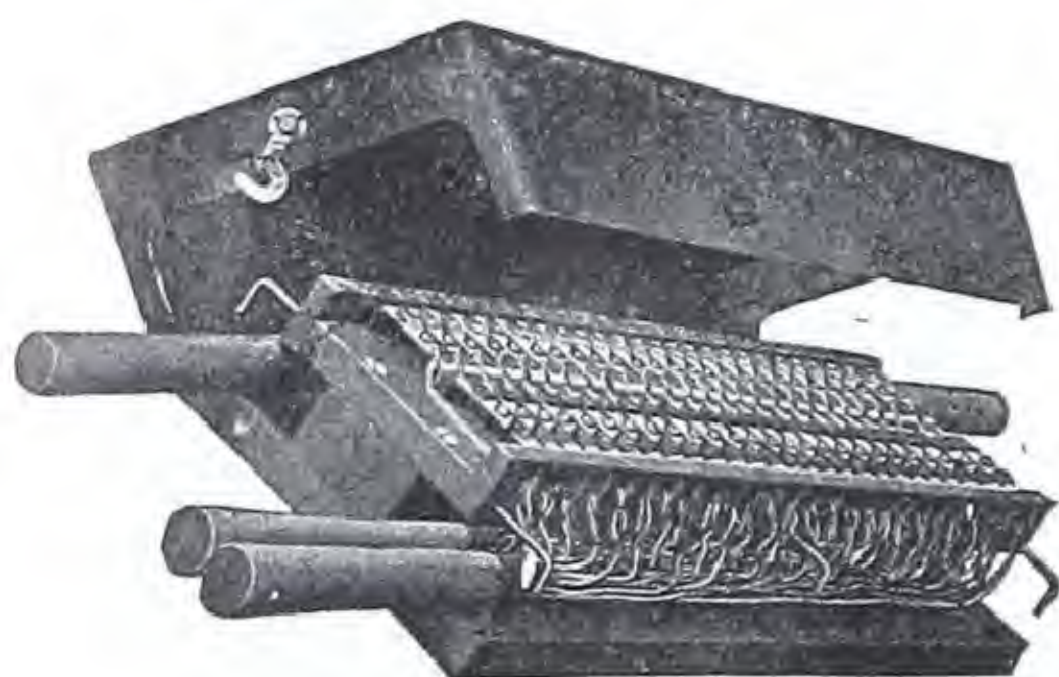
Colour code of conductors is in accordance with standard telephone practice.

Code No.....	416	428	436	444	452
No. of Conductors...	16	28	36	44	52

Prices on application.

INTER-PHONE SYSTEMS

Inter-Phone Accessories



No. 19B Cable Terminal

CABLE TERMINALS

No. 19 Type

The No. 19 Type Cable Terminal is admirably suited for interior distributing work. Made of hard wood, numbered and shellaced and equipped with a rust-proof, sheet metal cover finished in black enamel. The illustration shows four cables attached.

List No.	Capacity Pairs	Length Inches	Width Inches	Depth Inches
19A	14	8	5 $\frac{1}{8}$	2 $\frac{1}{2}$
19B	26	14	5 $\frac{1}{8}$	2 $\frac{1}{2}$

Prices on application.

TELEPHONE APPARATUS



No. N1A Battery Box

Battery Boxes

No. N1A—Black japanned sheet metal box lined with an insulating material. Holds three Northern Six dry cells. Size of box, 9 $\frac{1}{2}$ inches long by 3 $\frac{1}{4}$ inches wide by 7 $\frac{1}{2}$ inches high.

No. 2B—Similar to No. N1A. Holds nine Northern Six dry cells. Size of box, 14 $\frac{5}{32}$ inches long by 5 $\frac{23}{32}$ inches wide by 7 $\frac{9}{16}$ inches high.



No. 18 Type



No. F Type

Cable Terminals

No. 18 TYPE WITH PROTECTORS

This is a protected terminal for open wire distribution from lead-covered aerial and underground cable. Inclosed in a black finished galvanized iron cover approximately 8 $\frac{9}{16}$ inches in diameter, provided with a safety chain fastened to the mounting base.

Arranged for mounting on poles. Equipped with:
No. 7A Fuses (7 ampere unless otherwise specified).
No. 1 Protector Blocks.
No. 2 Protector Blocks.
No. 3 Protector Micas.

A 6 foot No. 22 AWG cable stub is standard.

Code No.	Capacity Pairs	Length Inches	Code No.	Capacity Pairs	Length Inches
18A	10	19 $\frac{9}{32}$	18D	30	33 $\frac{1}{32}$
18B	15	22 $\frac{1}{32}$	18E	50	46 $\frac{25}{32}$
18C	25	28 $\frac{3}{32}$	18F	60	53 $\frac{21}{32}$

F TYPE WITHOUT PROTECTORS

Cast iron case equipped with a pressed steel slip cover, both thoroughly galvanized to withstand severe weather conditions.

The terminal plate is of porcelain.

Regularly supplied with 5 $\frac{1}{2}$ foot cable stub.

Code No.	Capacity Pairs	Width Inches	Length Inches
F10	10	7 $\frac{1}{2}$	8 $\frac{1}{2}$
F16	16	7 $\frac{1}{2}$	10 $\frac{1}{16}$
F26	26	7 $\frac{1}{2}$	15 $\frac{1}{2}$

Prices on application.

TELEPHONE APPARATUS Condensers



No. NIC Condenser
No. N1 TYPES

On rural lines trouble sometimes occurs due to parties leaving the receivers off the switch hooks or "listening in" during a call. To secure good signalling in such cases it is necessary to have a condenser wired in the receiver circuit and the N1 type is used for this purpose. There are of course many other uses for the N1 type condensers.

Mounting Strap PP-954 to be ordered separately if required.

Code	Capacity	Type of Terminals
No.	MF	
N1B	$\frac{1}{2}$	Regular terminals.
N1C	$\frac{1}{2}$	Flexible leads soldered to the regular terminals.



No. 147 Type Condenser
No. 147 AND 149 TYPES

Arranged to be mounted by means of wood screws and mounting strap.

Mounting Strap PP-31078 to be ordered separately if required.

Code	Capacity	Code	Capacity
No.	MF	No.	MF
147A	2.0	149B	$\frac{1}{2}$
149A	1.0	149C	$\frac{1}{10}$

Connecting Blocks

No. 8 TYPE CONNECTING BLOCKS



Consists of bridge type connectors, mounted on a black finished maple base, equipped with a screw eye for fastening stay cord.

Code	No. of Terminals	Dimensions, Inches
No.		Length Width Depth
8G	8	$5\frac{3}{8}$ $1\frac{3}{8}$ $\frac{5}{8}$
8H	12	$8\frac{1}{8}$ $1\frac{3}{8}$ $\frac{5}{8}$

No. 11 AND 12 TYPES

These styles consist of a composition base in which the screw terminals are embedded. Each terminal consists of two screw bushings electrically connected by means of a metal strip, and provided with screws and washers.

Covers may be ordered separately if required.



No. 11A
Connecting Block
Size
Inches

Code	No. of Terminals	Dimensions, Inches
No.		Length Width Depth
11A	2	$1\frac{3}{8}$ x $1\frac{5}{32}$ Without Cover
11B	2	$1\frac{3}{8}$ x $1\frac{5}{32}$ With Cover
12E	3	$1\frac{1}{16}$ x $1\frac{3}{8}$ Without Cover
12F	3	$1\frac{1}{16}$ x $1\frac{3}{8}$ With Cover

Prices on application.

TELEPHONE APPARATUS Connecting Blocks



No. 30-B Connecting Block
No. 30 Type

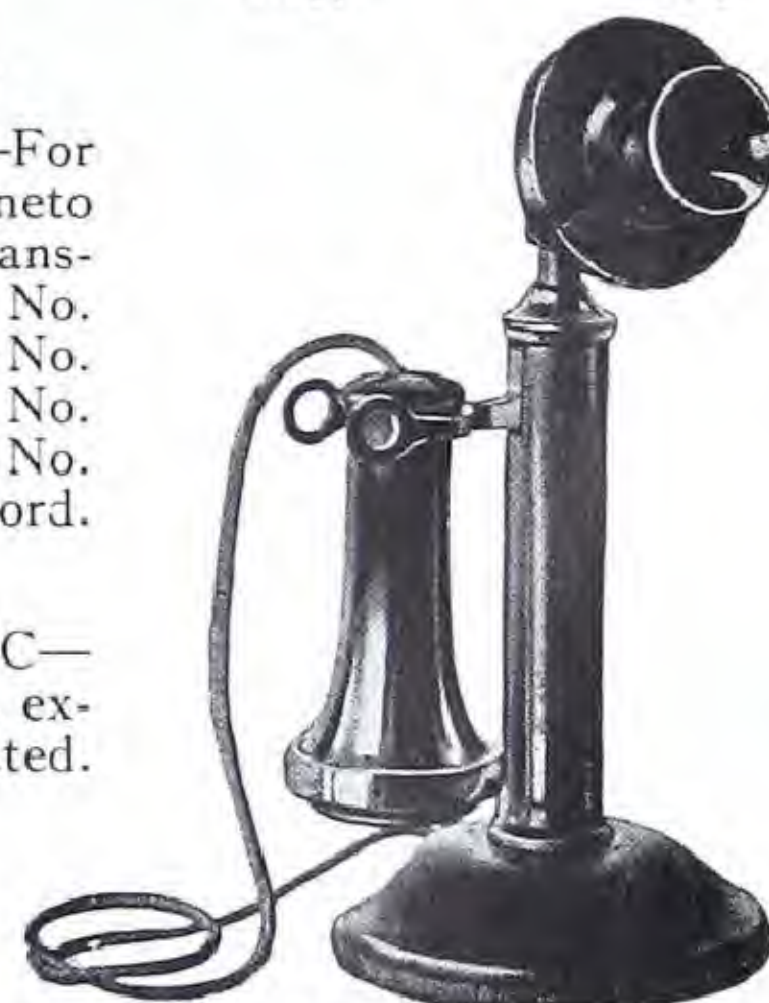
These blocks consist of brass studs embedded in a hard composition base. Studs fitted with two nuts (one a split check nut) and two washers.

List No.	Capacity Pairs	Length Inches	Width Inches
30-A	6	$4\frac{3}{16}$	$1\frac{1}{2}$
30-B	11	$7\frac{5}{16}$	$1\frac{1}{2}$
30-C	16	$10\frac{7}{16}$	$1\frac{1}{2}$
30-D	26	$16\frac{11}{16}$	$1\frac{1}{2}$

Desk Stands

List No. 1020AL—For regular bridging magneto service. Insulated transmitter. Includes one No. 20AL desk stand, one No. 323 transmitter, one No. 143 receiver, and one No. 450 combination cord. Black finish.

Code No. 1020 PC—Same as No. 1020AL except stand is nickel plated.

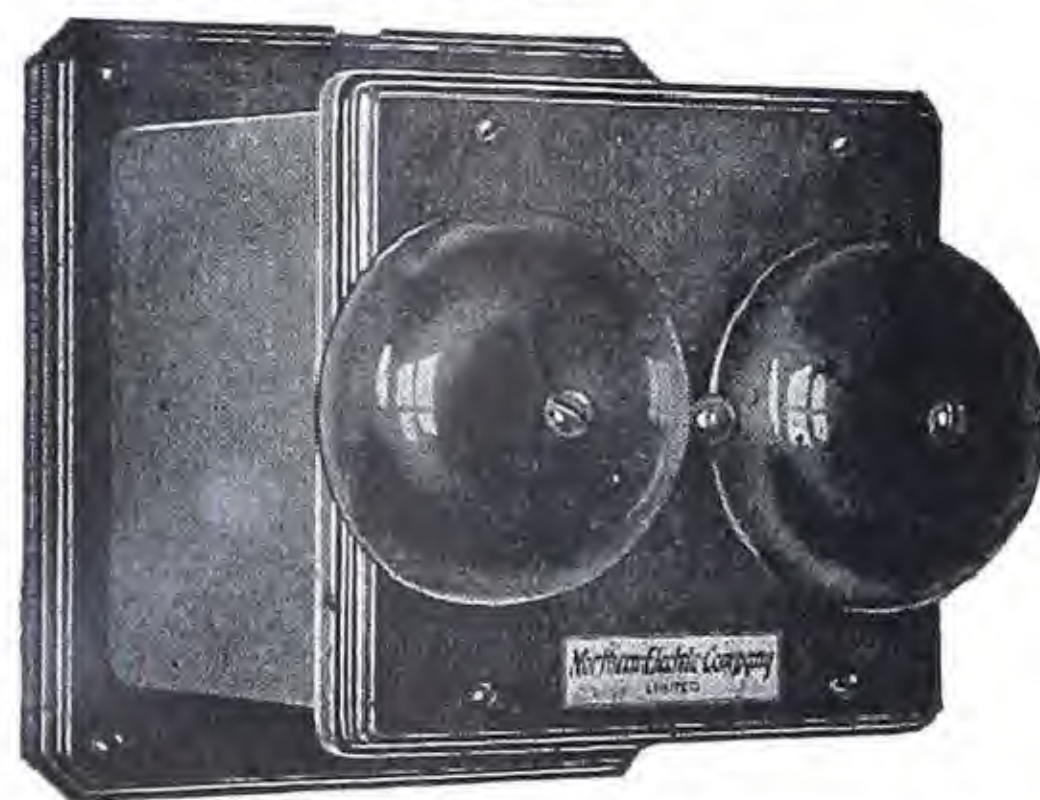


No. 1020AL Desk Stand

Extension Bells

No. N43 Type

Intended for auxiliary use in connection with telephones. The resistance of the ringer in the set should be similar to other ringers on the line. Exposed metal parts are finished black.



No. N43—Extension Bell

No. N43AA—1000 ohm.	No. 38AG Ringer.
No. N43AB—2500 ohm.	No. 38BG Ringer.
No. N43AF—1600 ohm.	No. 38FG Ringer.

No. 392 Type

Intended for use where the ordinary telephone ringer is inadequate. The coils are moistureproofed and all parts are given a protective finish. The 6-inch gongs are galvanized.

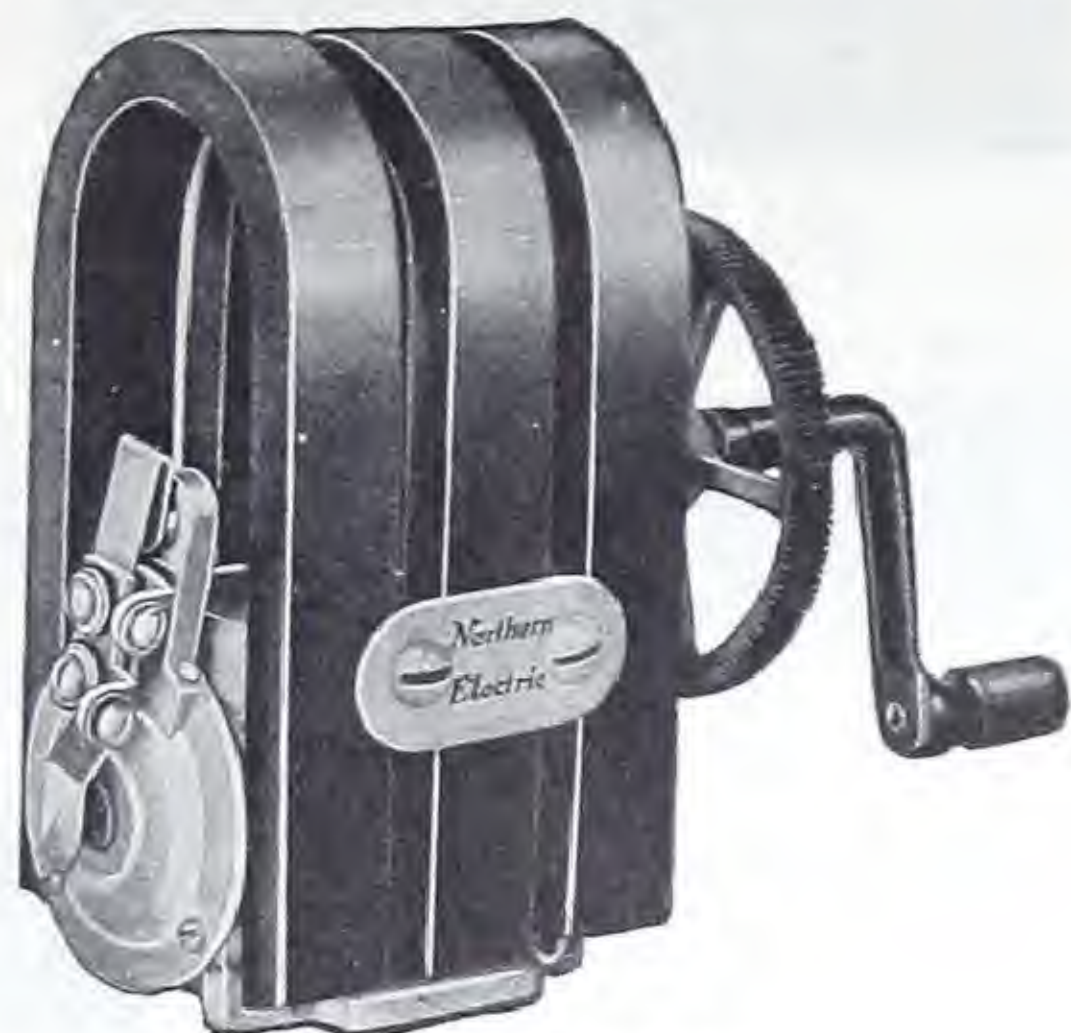


No. 392
Loud Ringing Extension Bell
Prices on application.

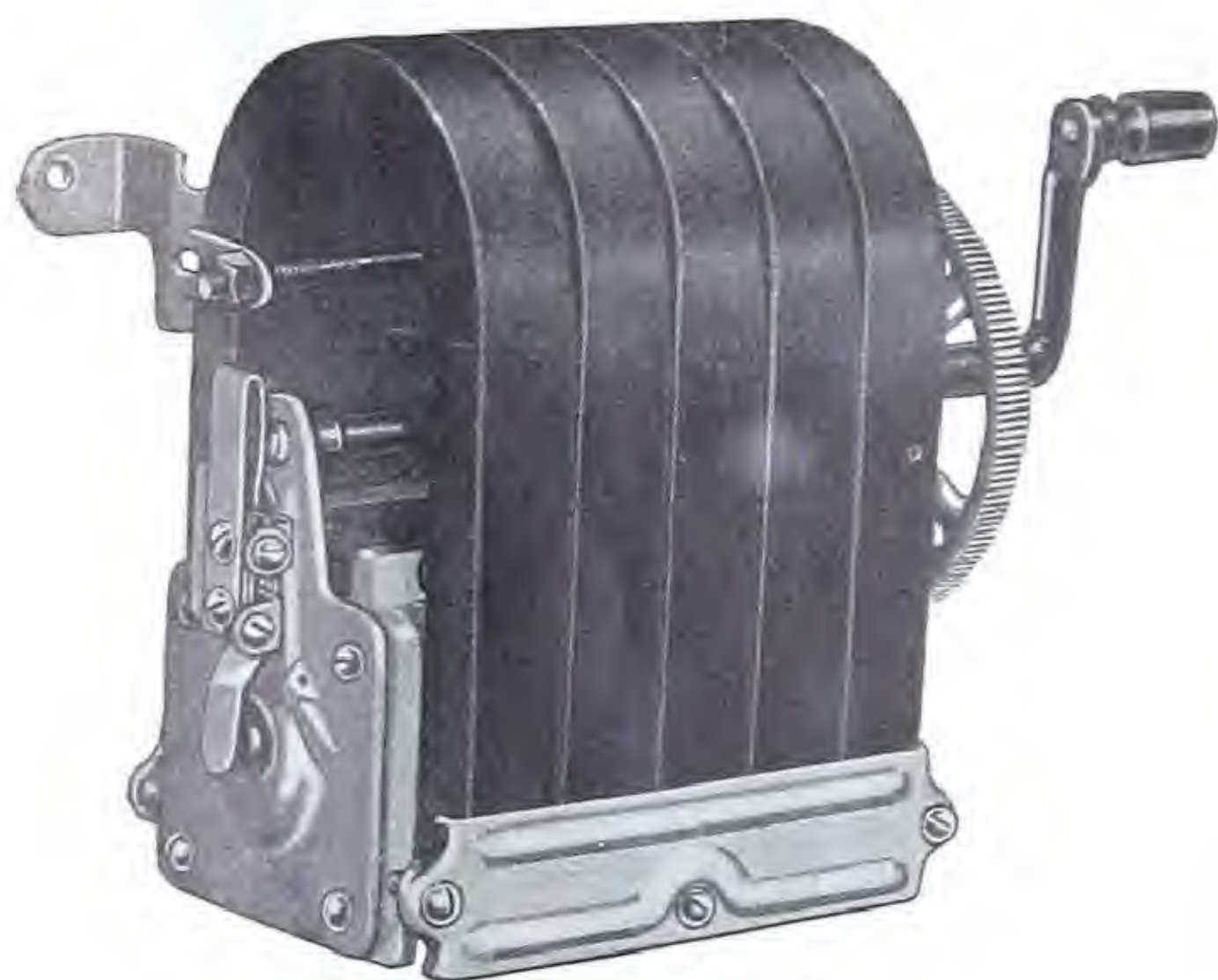
Code	Ohms Resistance
No.	
392-A	1000
392-B	2500
392-E	1600
392-J	1000 biasing spring on armature
392-L	2500 biasing spring on armature

TELEPHONE APPARATUS

Hand Generators



No. 22A Generator



No. 48A Generator

List No.	No. of Bars	HAND GENERATORS	Used in
22A	3	Current Alternating	Magneto telephone sets
48A	5	Current Alternating	Magneto telephone sets



Hand Sets

No. 1002AC

For use in place of a regular bridging desk stand or transmitter arm. Equipped with No. 141 receiver, No. 267 transmitter, and No. 318 cord.

No. 1002AC Hand Set

Prices on application.

TELEPHONE APPARATUS

Hand Telephone Sets



102A-3 HAND TELEPHONE SET

For regular bridging magneto and common battery service. The No. 102A-3 Hand Telephone Set consists of two distinct parts known as the E1B-3 Hand Set and the D1B-3 Hand Set Mounting. Both parts have a black finish. The same type of hand telephone set can, however, be furnished with other finishes.

They are readily converted to dial service by the addition of calling dial.

The same type of desk set boxes as are used at subscribers' stations for desk stands, are suitable for use with the hand telephone set.

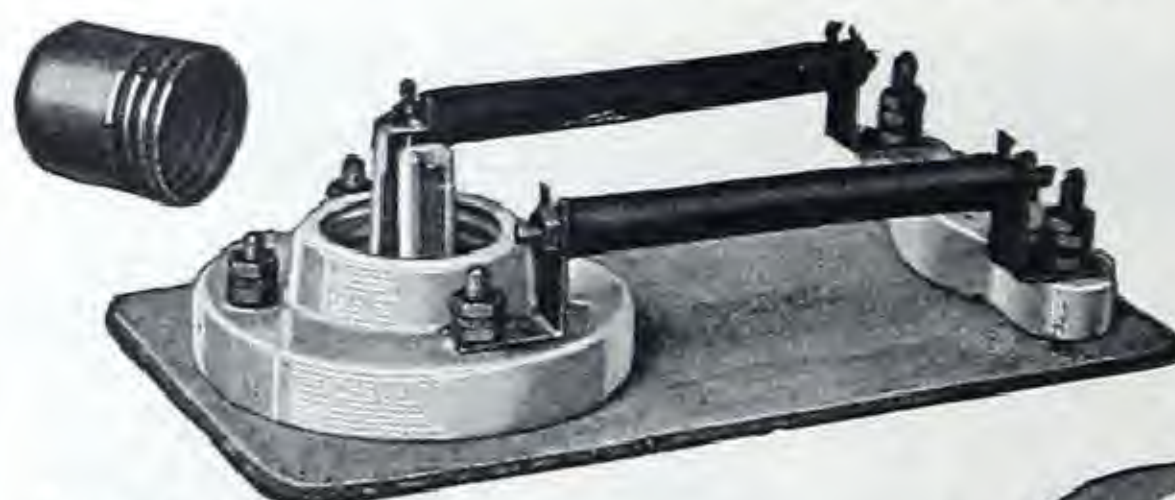
Induction Coils

No. 13



No.	Length	Width	Used with
13	3 1/4"	1"	Magneto Telephones
46	4 9/16"	1 3/8"	Common Battery Telephones

Protectors for Telephones



No. 58-AP

No. 60-AP

No. 58-AP

Used to protect telephone sets against lightning and crosses with electric circuits. Consists of two No. 11C, 7 ampere fuses, two No. 26 and No. 27 protector blocks mounted by means of No. 16 and No. 29 protector mountings on an asbestos mat, a No. 48 protector mounting.

No. 60-AP

Used to protect telephone sets against lightning only. Consists of two No. 26 and No. 27 protector blocks mounted on a No. 49 protector mounting.

Information on other types of protectors including Central Office protectors, of which the Northern Electric Company carries a complete line, will be furnished on request.

TELEPHONE APPARATUS

Protectors for Telephones

(Continued)

Protector Blocks



No. 26



No. 27

Solid piece of hard non-dusting carbon, to be used with the No. 27 protector block. Used with No. 58-AP, 60-AP and several other types of protectors.

No. 27

White porcelain frame with a countersunk carbon plug, fastened in place with low temperature fusing cement. Used with the No. 26 protector block.

No. 30

Similar to No. 27 except that it is intended for cable protection only. Porcelain is coloured blue to distinguish it from No. 27.

Prices on application.

Receivers



No. 144

No. 144—Concealed binding post hand receiver. Used with telephone sets, desk stands, telephone arms, etc. The receiver cord is not included in the code number and must be ordered separately.



No. 528

No. 528—This is a high efficiency receiver designed for use by telephone operators at magneto and central battery switchboards. The code number of this receiver includes a No. 11-A Headband and a No. 1466 Pad. Due to the increased sensitiveness of this receiver it should, for magneto switchboard use, be employed in circuits with the No. 63 induction coil.

TELEPHONE APARATUS

High Efficiency Telephone Ringers



No. 38 Type Ringer

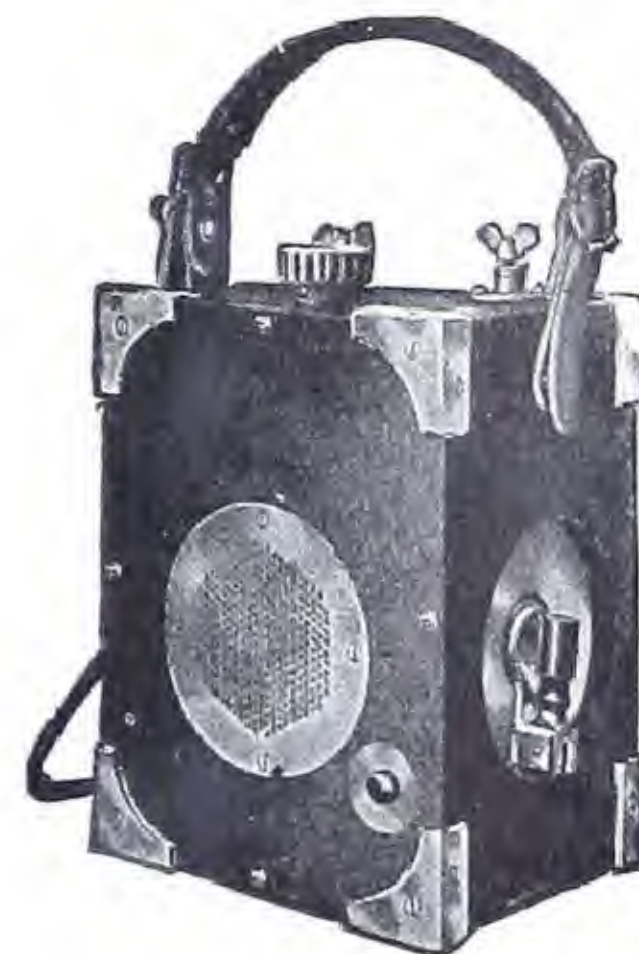
Long Coils, Unbiased

All No. 38 Type Ringers listed below have gongs and with gong posts suitable for mounting on $\frac{5}{8}$ -inch woodwork. Spacers can be furnished, however, to adapt them for mounting on $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch woodwork.

List No.	Approx. Resistance Ohms	List No.	Approx. Resistance Ohms
38AG	1000	38FG	1600
38BG	2500		

Prices on application.

Test Sets



No. 1017B Test Set

LINEMEN'S TEST SETS

No. 1017 Type

A wooden box telephone test set equipped with a regular local battery talking circuit consisting of a standard transmitter, induction coil, receiver and a special 3-cell dry battery unit. Can be used either on magneto or central battery line.

Code No. 1017B contains the following equipment:

One No. 2D buzzer, one No. 29B A.C. generator, one No. 370 cord, one No. 13 induction coil, one No. 266 transmitter, one No. 515 receiver.

Code No. 1017E has same general features as No. 1017B with several added advantages. Special literature on request.

List No.	Will Ring Through Resistance Ohms	Size of Case Inches	Finish
1017B	2500	$4\frac{27}{32} \times 6\frac{3}{32} \times 8\frac{11}{16}$	Birch Mahogany
1017E	5000	$4\frac{13}{16} \times 6\frac{5}{8} \times 9\frac{3}{4}$	Olive-green weather-proof enamel

Batteries should be ordered separately.

TELEPHONE APPARATUS

MAGNETO
TESTING
SETS

Each set consists of a hand generator and a ringer, wired in series, and enclosed in a wooden case.



No. 90510

List No.	Will Ring Through Ohms	Contains	Size Case Inches	Finish
90530	10000	One No. 22-K Generator One No. 19-B Ringer	5 $\frac{3}{4}$ x6 $\frac{5}{8}$ x5 $\frac{1}{4}$	Birch
90510	35000	One No. 22-K Generator One 19-H Ringer	5 $\frac{3}{4}$ x6 $\frac{5}{8}$ x5 $\frac{1}{4}$	Birch
90511	50000	One No. 22-N Generator One No. 19-A Ringer	5 $\frac{3}{4}$ x6 $\frac{5}{8}$ x5 $\frac{1}{4}$	Birch
90512	100000	One No. 22-N Generator One No. 19-B Ringer	5 $\frac{3}{4}$ x6 $\frac{5}{8}$ x5 $\frac{1}{4}$	Birch

No. 43A TEST SET

This is a portable set designed as a cable splicer's test set in connection with the installation and maintenance of cable in manual or dial system areas. It consists of a buzzer circuit which provides tone for identifying wires, for balance testing and for running down low resistance faults on short non-loaded cable by



No. 43A Test Set

the exploring coil method; together with auxiliary circuits which provide a battery for detecting defective pairs by receiver battery tests or for energizing the transmitter of a talking set. It also consists of a ringer buzzer by means of which the splicer may be called from a central office when communication with him is desired.

The woodwork is birch, finished in olive green.

Auxiliary test cords, etc. must be ordered separately.

Prices on application.

TELEPHONE APPARATUS

Transmitters



No. 323

No. 323—Standard insulated type transmitter for general use on wall and desk telephones.

Finished in black unless nickel finish is specified in order.

No. 337—A high efficiency transmitter similar to the No. 323. For use on long central battery subscriber's loops, where the transmitter must operate with a reduced current supply.

No. N337—For replacement purposes—consists of No. 337 transmitter less back and mounting lug.

No. N425—For replacement purposes—consists of No. 323 transmitter less back and mounting lug.



No. 232

Switchboard, Suspended Type

High resistance transmitter arranged to be suspended by two cords entering the side of case.



No. 234

No. 234 Operator's Chest Type

Switchboard operator's chest transmitter arranged to be supported from the neck by a No. 3A transmitter attachment. This attachment is not furnished with the transmitter unless so ordered.

Prices on application.

MAGNETO WALL TELEPHONES



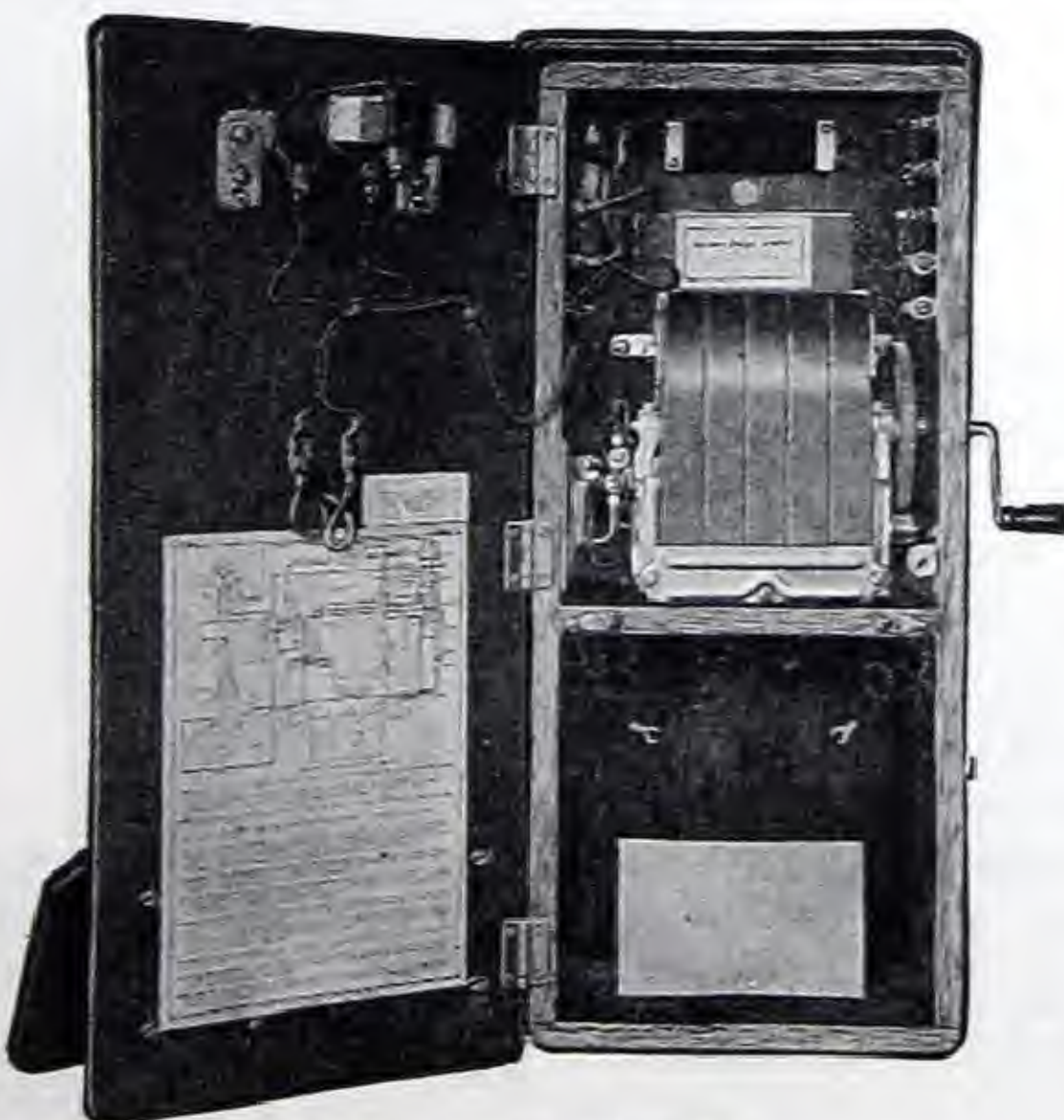
No. 1317 Type Wall Telephone

The characteristic of a Magneto Telephone is that in each telephone there is a small hand-operated generator by means of which calls to Central or other telephones are made. There is also required at each telephone a group of dry cells for speech transmission.

There are two distinct methods of calling Central. The first and most generally used is known as push-button ringing.

Push-button ringing means that a subscriber when calling Central, depresses a small push-button on the side of the telephone and gives the generator crank a turn. The call is received at Central without disturbing any other telephone on the line. We recommend this system for use on rural or party lines because it gives the silent call to "Central."

The second method does not require the use of a push-button but causes all the telephones on the line to ring each time Central is called. We recommend this system for use on town or similar lines having but one or two telephones per line, or on rural lines which are isolated, i.e., have no "Central."



Prices on application.

MAGNETO WALL TELEPHONES

1317 Type

Much thought and care, combining the experience and suggestions of telephone engineers and practical telephone men all over the country, have been devoted to the design of this apparatus, to simplify its arrangement, make it easy to install and operate, rugged and long-lived. Many of these telephones are installed at isolated points where skilled telephone men are not available.

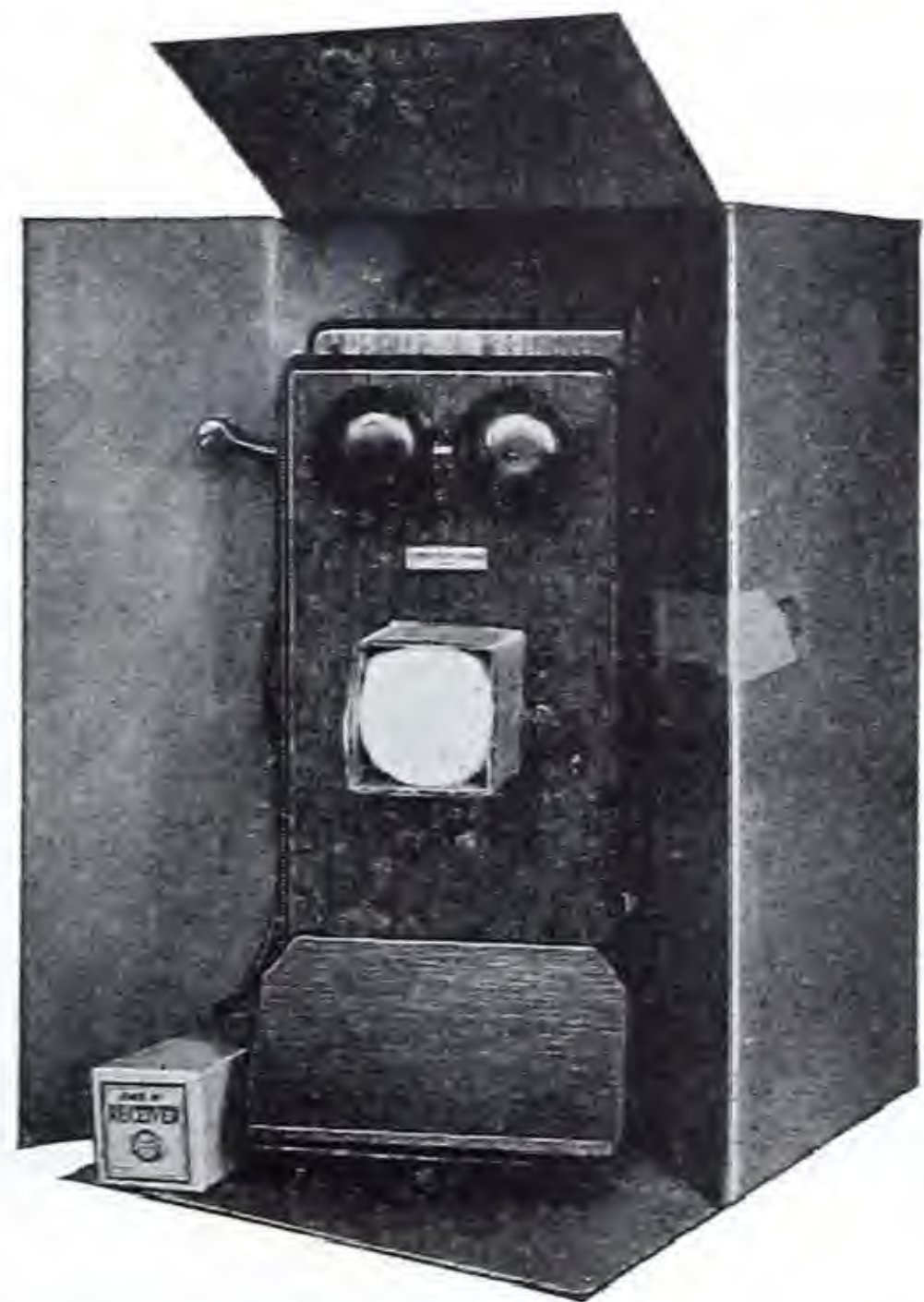
A screw-driver is the only tool required. No pliers, soldering iron, wrench or other tool is necessary. This one feature illustrates the advantage users of this telephone have, because there is no place where either a screw-driver or a good substitute is not available.

The cabinets of these telephones are strongly constructed and are given a durable, attractive finish. The door of the cabinet is hinged at the left, so that when open for inspection or adjustment, the ringer and generator can be seen when the generator crank is turned. By opening toward the left there is no danger of the door striking the generator crank and disfiguring the woodwork. The door is held closed by one self-centering screw lock. A feature of these telephones is the convenient location of the main binding posts inside the cabinet. This prevents trouble from tampering with the connections and accidentally short-circuiting the telephone at the main terminals. The backboard is slotted the entire length to permit the wires entering the telephone either from above or below.

Our Magneto Telephones are primarily designed to faithfully reproduce the natural tones of the speaker's voice on long or short lines. This is accomplished by means of highly efficient apparatus, which is the result of many years of engineering research and practical operation.

These telephones, by means of their large gongs and efficient ringers, give a loud and distinct ring which responds clearly to all code calls. Their powerful generators will enable you to ring other bells clearly under the most severe conditions.

The various parts of these telephones are connected by a cable consisting of flexible conductors highly insulated and moisture-proofed, each designated by a color and protected at points of wear. Each conductor is either permanently soldered or provided with a screw-type connector. Each telephone contains a picture wiring diagram and instructions for operation and maintenance of the telephone.



SIMPLIFIED PACKING

Before shipment from the factory, each telephone is completely assembled and carefully packed in an individual packing case. This method of packing greatly simplifies handling and installing.

The telephones are simplicity itself to install.

Prices on application.

TELEPHONE APPARATUS

Magneto Desk Telephones



Desk Telephone

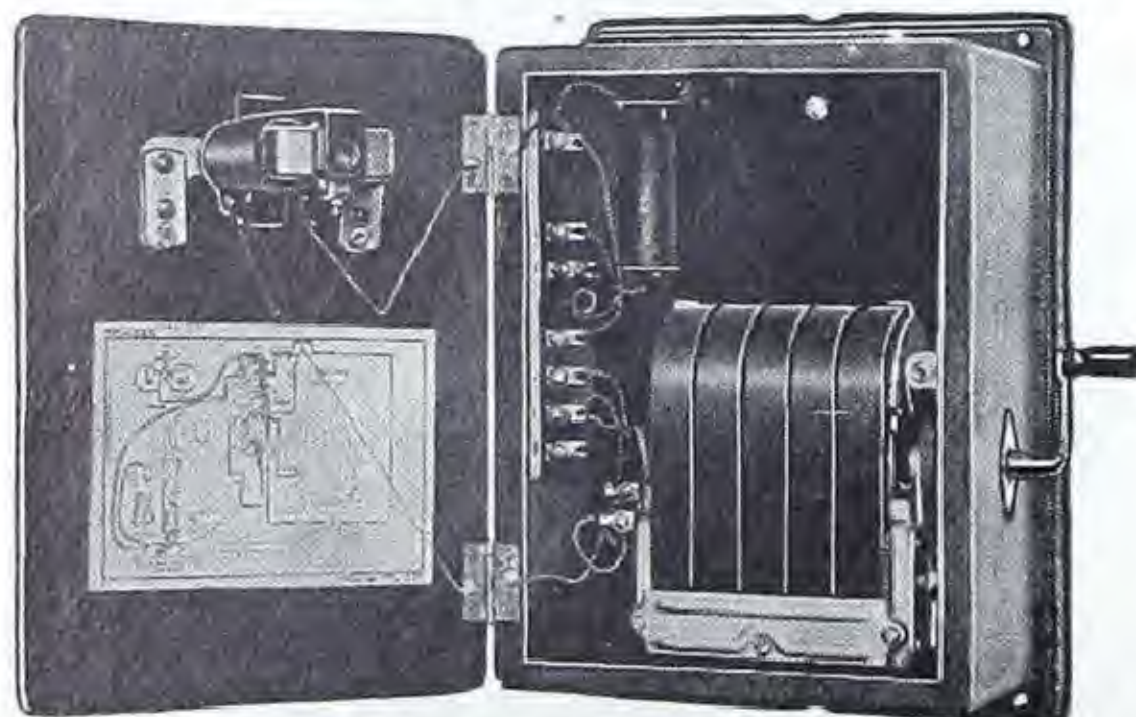
With the increasing demand for telephone service, desk sets or hand telephone sets have met with such favour that they are now used almost entirely in business offices, and to a large extent in residences. This popularity is due chiefly to their small compact form, durability, convenience and attractiveness. Being portable, they can be placed upon a desk within easy reach of the user, enabling telephone calls to be made and answered with the greatest ease.

Our desk telephones and hand telephone sets described in this catalogue require only a small expense for maintenance. They have been carefully

designed with respect to this feature, and constructed of the best materials obtainable. The working parts of the stands and mountings are enclosed, but they are readily accessible for inspection purposes.

The ringer, induction coil and hand generator are mounted in a handsome oak box, the unit being known as the desk telephone box. It can be attached to the underside of a desk or table, and is connected to the desk stand or hand set mounting (the part comprising the transmitter, switch hook and receiver) by a flexible cord. The dry cells are placed nearby in a suitable location.

DESK TELEPHONE BOXES



N300—Box Open

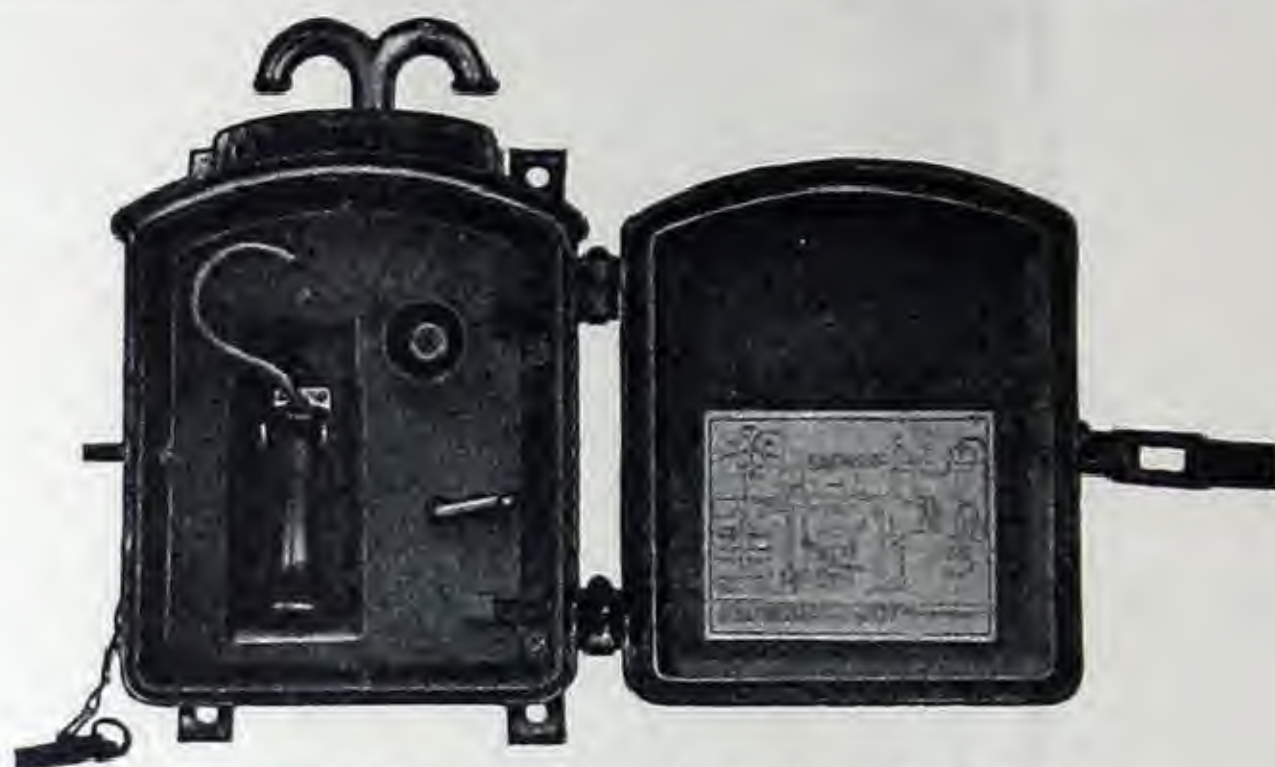
These boxes are of two types, the N300 and 315H; the former being used with the desk stands to form a desk telephone for party lines, while the latter are used with desk stands to form a desk telephone for individual lines.

The construction of the cabinets and the parts used to equip these are the same as described in detail for the No. 1317 type telephone.

TELEPHONE APPARATUS

Weatherproof Magneto Telephones

The No. 1336 Weatherproof Telephone Set will be found very desirable for use above ground in exposed locations and in mines where explosive gases are not encountered.



No. 1336 Type Set with Outer Door Open

No. 1336-E, Iron Box Telephone for heavy load service, equipped with 2500 ohm ringer, 5-bar A.C. generator, switchhook, induction coil, transmitter and receiver.

Prices on application.

Mine Telephones



No. 1536 Mine Telephone

Where explosive gases may be present the No. 1536 Telephone Set is recommended. The design of this set safeguards against explosions which might result from sparking of the switchhook and generator contacts. Other protective features are also incorporated to make this set safe.

Further particulars sent upon request.

AUTOMATIC DESK STANDS

The N1050-AL automatic desk stand is equipped with a No. 323 transmitter, a No. 143 or No. 144 receiver as required, a No. 549 receiver cord 2 feet 6 inches long and a No. 550 desk stand cord 5 feet 6 inches long. The dial is not included in the code number and must be ordered separately. Regularly supplied with a black finish.

Prices on application.



No. N1050-AL Desk Stand

TELEPHONE APPARATUS

Automatic Telephone

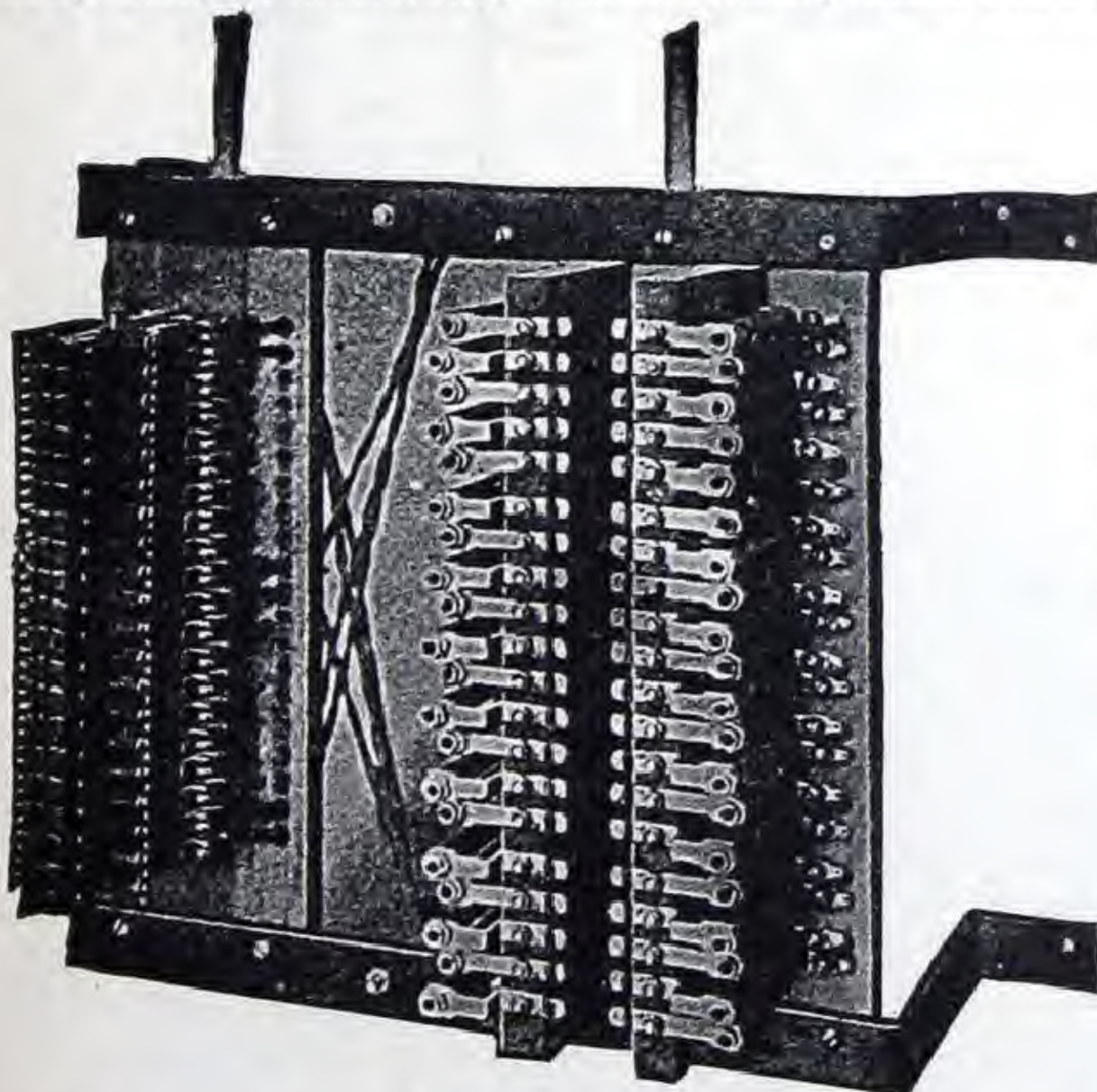


No. N1293-G and GP
Wall Type Telephone Sets

The No. N1293G and GP telephone sets are equipped with a No. 323 transmitter, a No. 143 or No. 144 receiver as required, and an N549 receiver cord, 2 feet 6 inches long. The dial is not included in the code number and must be ordered separately. Exposed metal parts have a black finish.

Distributing Frames

A distributing frame is an iron framework intended for supporting switchboard protective apparatus and terminal strips. It is usually located near the point where the outside wires enter the exchange building and provides a satisfactory method of terminating such wires, as well as a very flexible means of cross connecting any outside line to any switchboard drop without interfering with the wiring inside the switchboard.



No. 1431A,
20-line
Main
Distributing
Frame
equipped
with one
No. N1435
MP
and one
No. 1435U
Protector
Groups.

This frame is especially suitable for the small rural exchange with a No. 1800 or other switchboard equipped for from 10 to 40 lines, with little prospect of immediate growth. When more than 20 lines are to be accommodated, these frames can be lined up, one above the other. Cross connection facilities are provided by rings on the back of the frame. This frame is designed for mounting against the wall. The drilling is so arranged that our standard protector groups can be used.

In ordering, it will be necessary to specify the protector groups desired, consulting the following table.

Other types are available and information will be furnished on request.

TELEPHONE APPARATUS

Protector Groups

The following standard types of protector groups are designed for either central battery or magneto telephone exchange lines. They mount on various types of distributing frames, including the No. 1431-A described above.

No. 1435R

No protection, equipped with terminal punchings for terminating 25 lines.

No. 1435Y

No protection, equipped with terminal punchings for terminating 20 lines.

No. 1435U

Protection of 20 outside lines against abnormal current, equipped with No. 7A fuses.

No. N1435MP

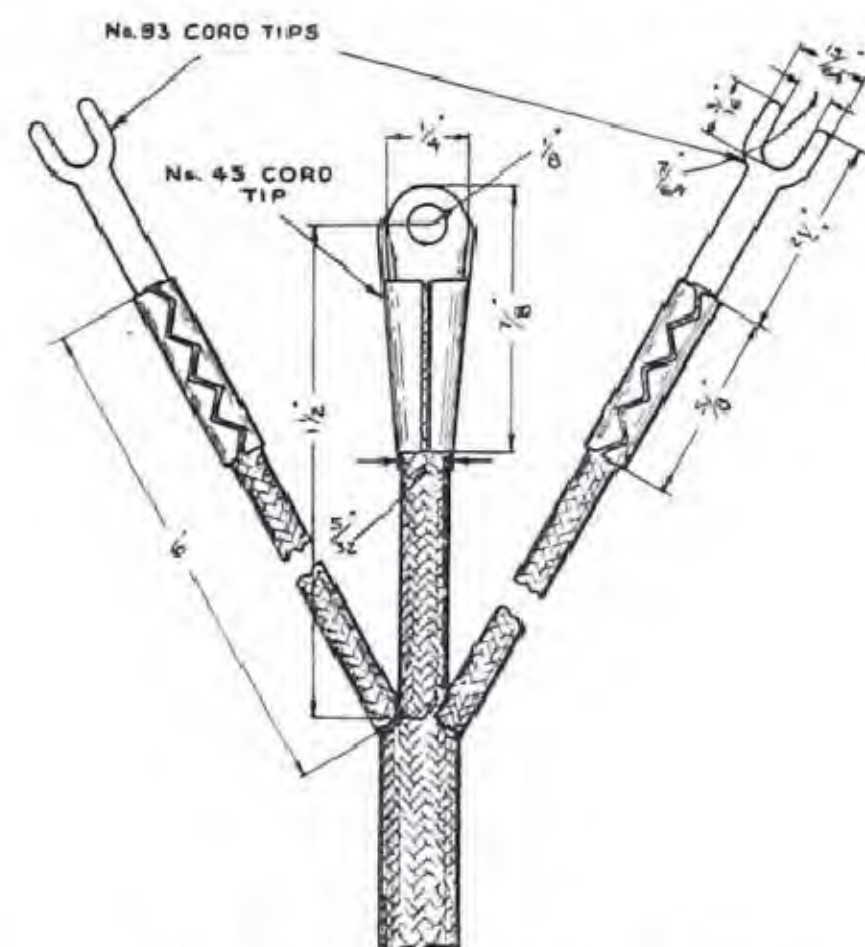
Arranged for connection to and protection of 20 inside lines against high potential and sneak currents, equipped with No. 76A heat coils and No. 26 and No. 27 protector blocks.

No. N1435MBP

Similar to No. N1435MP except arranged for connecting to and protection of 20 outside lines.

Prices on application.

Switchboard Cords



S2A Cord Switchboard End

Northern Electric switchboard cords will be found to have exceptional strength and wearing qualities, and will stand up longer in service than any other cords manufactured. These cords are all of the tinsel alloy type.

It is customary to use 4 foot switchboard and 4 foot 6 inch operators' telephone cords on small magneto and private exchanges, and 6 foot switchboard and operators' telephone cords on other boards.

These lengths are carried in stock but others will be furnished on request. The switchboard cords are regularly made in colours—red, gray, and green. The gray cords are furnished unless another colour is specified.

In ordering, give the Code No., length and colour of cord, and if plugs are to be attached, give the Code No. of the plugs. Also specify cord tips if other than the usual ones are required.

No. S2A

Two-conductor tinsel switchboard cord used with No. 47 or N47 plugs on switchboards. Stock lengths 4 foot or 6 foot.

No. L4B

Four-conductor tinsel cord, brown mercerized cotton covering. Used with operator's head receiver and chest transmitter when attached to No. N103 plug. Stock lengths 4 feet 6 inches, 6 feet and 10 feet.

No. 437

Single-conductor tinsel cord, brown mercerized cotton covering. Used with suspended type switchboard transmitter. Stock length 6 feet.

TELEPHONE APPARATUS

Telephone Set Cords

If none of the cords described below meet with your requirements, write us, sending if possible a sample cord (an old one will do) or a sketch, paying particular attention to the kind of tip required. Always specify length of cord when ordering.

TELEPHONE RECEIVER CORDS

List No.	Description	Stock Length	Cord Tip
10	Two-conductor tinsel cord, brown mercerized cotton covering.	4½ ft.	No. 29 receiver end. No. 103 set end
R2A	Two-conductor tinsel cord, brown mercerized cotton covering.	2½ ft.	No. 103 on both ends
549	Two-conductor tinsel cord, brown mercerized cotton covering.	2½ ft. 4½ ft. 6 ft.	No. 29 receiver end No. 103 set end

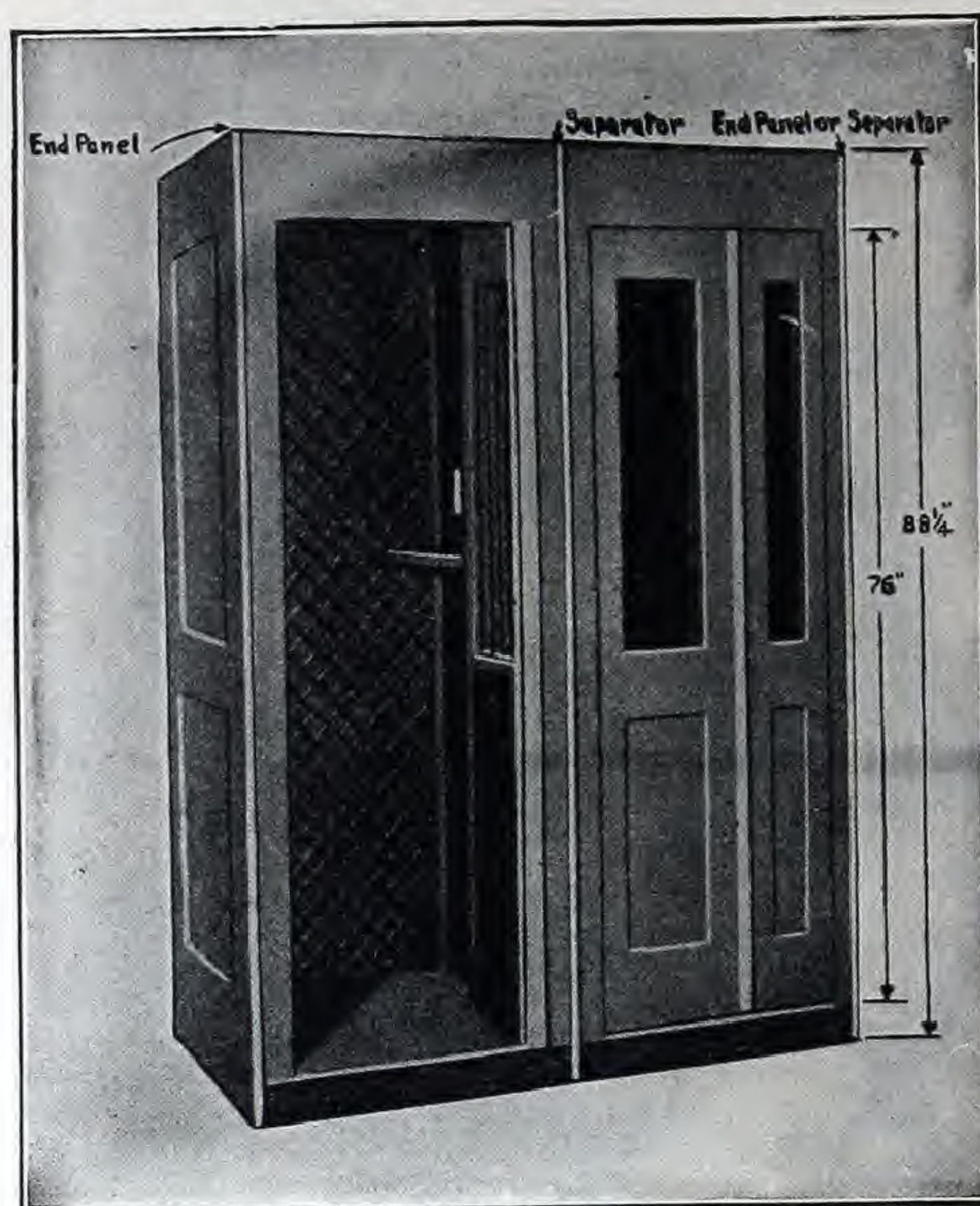
DESK STAND CORDS

T1A	Single-conductor tinsel cord, brown cotton covering; for use with transmitter on No. 1020 desk stands.	9⅞ ins.	No. 103 on stand end No. 98 on transmitter end
N549	Two-conductor tinsel cord, brown mercerized cotton covering; for use with receiver on No. 1020 desk stand.	2½ ft. 4½ ft. 6 ft.	No. 103 on both ends
550	Three-conductor tinsel cord, brown mercerized cotton covering; for use with No. 1020 desk stand to connect it with desk set box.	5½ ft. 8 ft. 10 ft. 15 ft.	No. 103 on both ends

HAND SET CORDS

H3B	Three-conductor cord, brown mercerized cotton covering; for use with No. 102A-3 Hand Telephone Set between the hand set and hand set mounting.	4 ft.	No. 103 on hand set mounting end No. 100 on hand set end
D3H	Three-conductor cord, brown mercerized cotton covering; for use with No. 102A-3 Hand Telephone Set between handset mounting and desk set box.	5½ ft.	No. 103 on both ends

Prices on application.

TELEPHONE BOOTHS
No. 1 Folding Door Telephone Booth

The No. 1 folding door booths are designed for installation in groups, being built in units with unfinished sides. They are placed with separators between adjacent units and assembled with panels at either end of the group of compartments. The backs of the units are finished as indicated in the code listings.

The folding door construction makes these booths particularly desirable for use in narrow hallways or passages as the door opens and closes in a space only three inches beyond the front surface of the booth.

This door will remain as placed in any position. The sides, ceiling and the lower panel of the door on the inside are lined with sheet metal. The floor and front baseboard are covered with linoleum and the threshold is protected with a safety tread.

These booths are strong and substantial in construction.

The special folding door design not only economizes space but protects the user.

List No.	Description
1A	Booth Birch, Light Mahogany finish, Hardwood Back.
1B	Booth Birch, Light Mahogany finish with Softwood Back.
1C	Booth Oak, Golden Finish with Hardwood Back.
1D	Booth Oak, Golden Finish with Softwood Back.
1E	Booth Birch, Dark Mahogany finish with Hardwood Back.
1F	Booth Birch, Dark Mahogany finish with Softwood Back.

Orders for No. 1 type booths should specify the following:
No. 1 (A, B, C, D, E or F) booths; end panels (state List No. of booth); separators (state List No. of booth); seats.

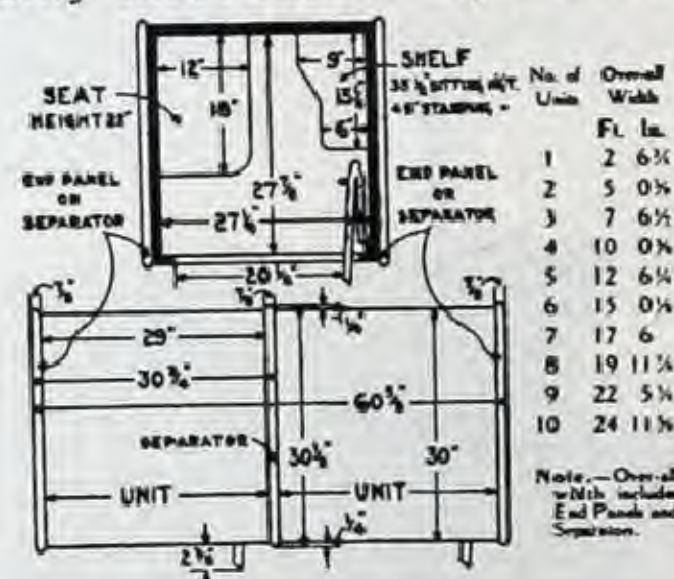
Dimensions.

No. of Units	Over All Width Ft.	In.	No. of Units	Over All Width Ft.	In.
1	2	6¾	6	15	0⅛
2	5	0⅝	7	17	6
3	7	6½	8	19	11⅞
4	10	0⅜	9	22	5¾
5	12	6¼	10	24	11⅝

Note—Overall width includes end panels and separators.

These booths may if specified be equipped with combination ceiling light and vent fixtures, outside ventilating plate and automatic switch.

Prices on application.



TELETYPE

The art of printing a message at a distant point by means of a machine similar to a typewriter has advanced remarkably in recent years. This art, together with the long distance telephone, has become the principal means of long distance communication. The machines used for this purpose are variously called Teletypes, Teleprinters, Teletypewriters or Printing Telegraph Machines.



Sending and Receiving Tape Teletype

The Northern Electric Company, because of its association with the Teletype Corporation, is able to supply these machines. They are used by the telephone and telegraph companies to handle a large percentage of their traffic but they have many other applications; for example:

- To connect a factory with its warehouse.
- To connect a city shipping office with wharf or freight office.
- To connect a central police station with the precincts.
- To connect the various departments of a hotel.
- To connect freight terminals on a railway.



Sending and Receiving page teletype

Messages can be printed on page or tape. The Northern Electric Company will be glad to discuss with you any particular application. Write our nearest Branch House.

Prices on application.

TELEPHONE APPARATUS

Railway Telephones

The Northern Electric Company manufactures several models of telephones especially for use of the railways. They are local battery telephones and are so designed that a large number of them can be used on a long line with small transmission loss. They are used by railways principally for the dispatching of trains but they can be used for other purposes and are available to others who have similar requirements. They can be had as wall telephones, desk telephones, portable telephones and telephones in weatherproof cases for use out of doors.



No. 1336F Telephone

Selective Calling Equipment

Telephone lines on which the above telephones are used may also be equipped for selective calling. This equipment permits the operator or dispatcher to call any one of the stations on the line and exclude all of the others or to call all of them at once. The equipment is very reliable. It is simple in construction and operation. It operates on alternating current. It is used all over the world.



No. 60AP Selector

No. 60-AP Alternating Current Selector

Write your nearest Northern Electric House for a special catalogue of Railway Telephones and Selective Calling Equipment.

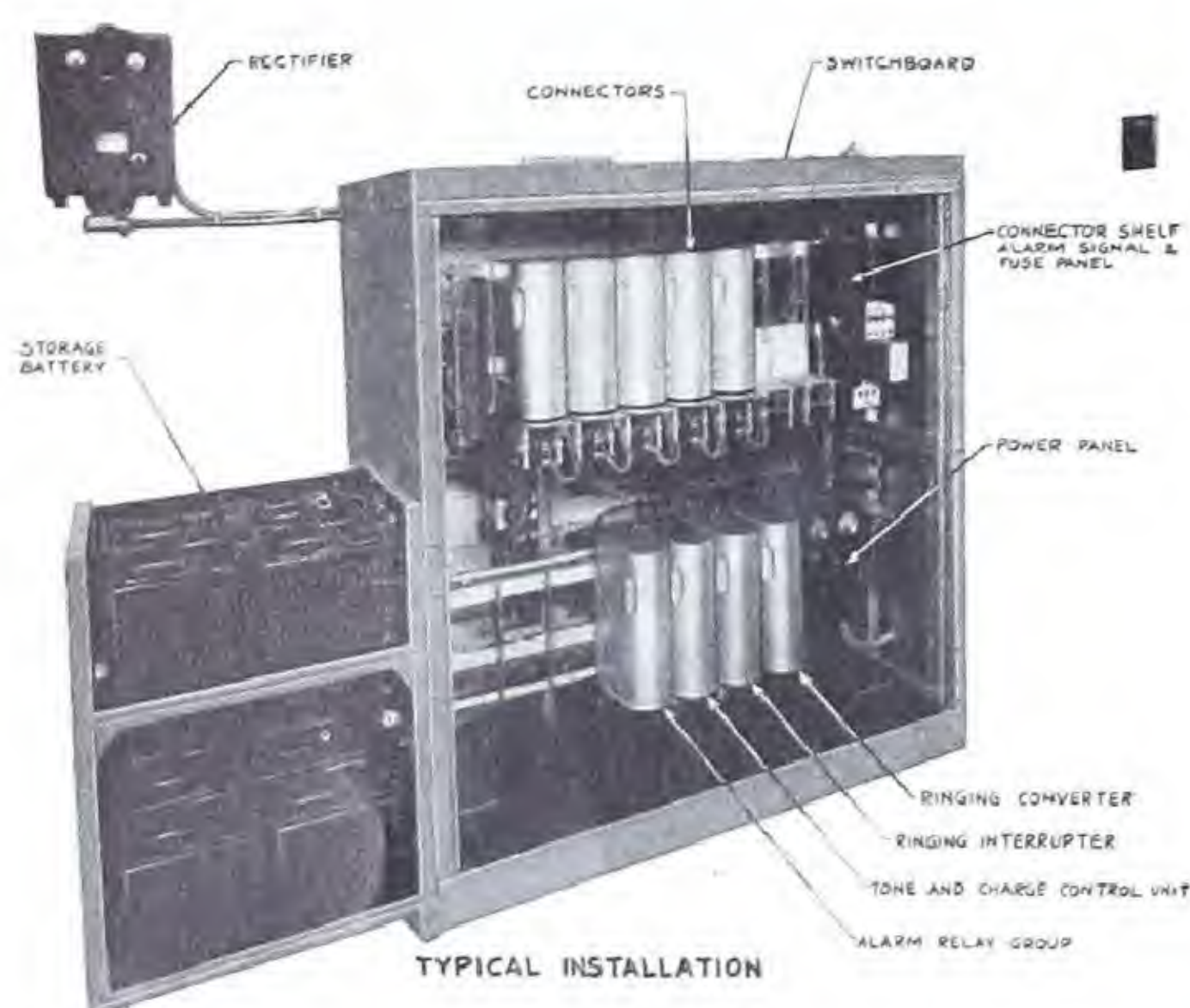
Prices on application.

AUTOMATIC TELEPHONE APPARATUS

AUTOMATIC TELEPHONE EXCHANGE EQUIPMENT

Automatic Equipment can be furnished to meet conditions of large or small offices.

Industrial and utility requirements frequently find an internal telephone system of much advantage. To meet these conditions Private Automatic Exchanges have been designed and many are now in successful operation.



One of the types most largely used has been our No. 25 type P.A.X.

This is illustrated above and consists of sectional framework which may be equipped for varying traffic conditions and up to 100 lines.

In addition to the usual traffic and line requirements, special services such as Superintendent's code call, Executive right of way, conference, etc., may be added.

Power supply may be either A.C. or D.C. of usual frequency or voltage.

The telephone sets are of the usual two-wire types and equipped with dials.

The operation is simple, i.e., remove the receiver and dial the called number, if the line is busy an audible tone is given. If not busy, the called party's line rings automatically.

We shall be glad to discuss any particular application, if you will address our nearest Branch, giving details of the proposed installation.

Prices on application.

TERMINATING CABLES

Terminating cables are of two types—one for general use and the other for locations of high humidity.

The cables for general use are Types "FA," "GA" and "UA." These cables consist of pairs of No. 22 A.W.G. tinned annealed copper wires with each conductor insulated with a double silk and single cotton wrapping, stranded together to form a core which is protected by a pure lead sheath.

Type "FA" is the more generally used. It contains from 6 to 606 pairs, and with the exception of one tracer pair, all pairs have the same color insulation, white paired with red-white.

Type "GA" cables are made in sizes from 6 to 51 pairs, and each pair is distinguishable from every other by the color of its insulation. The type "GA" cables are used only where the color code is an advantage.

Type "UA" cables are similar to the type "GA" cables except that the core is impregnated. The type "UA" cables are used where there would be objections to the usual method of waxing, during installation, of the exposed insulated conductors.

The cables for use on locations where the humidity may be high for long periods are Types "MFA," "MGA" and "MUA." These cables are the same as the types "FA," "GA" and "UA" cables except that the conductors consist of enamelled tinned annealed copper wires.

All six types have pure lead sheaths, as it has been found that this sheath is satisfactory for use within buildings.

Code	A.W.G.	Standard Size—Prs.	Conductor Resistance per mile 68° F. ohms	Dielectric Strength A.C. Volts	Insulation Resistance Megohms per mile
FA	22	6-606	96	700	500
GA	22	6- 51	96	700	500
UA	22	6- 51	96	700	500
MFA	22	6-606	105	700	500
MGA	22	6- 51	105	700	500
MUA	22	6- 51	105	700	500

Code	No. of Pairs	Size A.W.G.	Guaranteed Pairs	Nominal Thickness Sheath—Inches	Approx. Outside Diameter—Inches	Approx. Weight per foot in pounds	Convenient Shipping Lengths	Maximum Convenient Shipping Lengths
FA, GA	6	22	6	.047	.34	.25	1000	3500
UA	11	22	11	.047	.41	.32	1000	3500
MFA	16	22	16	.047	.47	.39	1000	3500
MGA	26	22	26	.047	.56	.51	1000	3500
MUA	51	22	51	.047	.73	.75	1000	3000
FA and MFA	76	22	76	.063	.89	1.19	1000	2500
	101	22	101	.063	1.00	1.42	1000	2500
	152	22	151	.063	1.19	1.86	1000	1600
	202	22	201	.063	1.34	2.26	1000	1600
	303	22	302	.094	1.69	3.85	800	1400
	404	22	403	.125	1.97	5.62	600	1100
	606	22	605	.125	2.38	7.45	600	700

STORAGE BATTERIES

A complete line of Exide-Chloride Storage Battery Equipment, suitable for Telephone, Industrial and Signalling Systems, is available and complete information and quotation can be obtained from the nearest Branch House.

Certain two-plate, open-cell types have been of such general use that detailed information is shown below, particularly with a view to convenience to identify replacement parts.



3 Cells of Type "BTH"



3 Cells of Type "PTH"

Type.....	BTH	CTH	PTH	ETH
Size of plates, in inches..	4 x 3	5 x 5	8 ³ / ₄ x 5	7 ³ / ₄ x 7 ³ / ₄
Number of plates.....	2	2	2	2
Discharge in amperes for:				
{ 8 hours...	3/4	1 1/2	3	4 1/2
{ 5 hours...	1	2	4 1/4	6 1/2
{ 3 hours...	1 1/2	3	6	9
Normal charge rate.....	3/4	1 1/2	3	4 1/2
Outside dimensions of glass jar, in inches:				
{ Length	1 3/4	2 1/4	2 1/2	2 1/2
{ Width	3 3/4	6 1/4	6	8 3/4
{ Height	6 3/4	8	12 1/4	11 1/2
Height of cell from bottom of jar to top of strap, in inches.....	7 5/8	9 1/4	14	13 13/16
Weight of electrolyte in glass jar, in pounds....	1	3 1/4	4 1/4	7 3/4
Weight of cell complete, with electrolyte in glass jar, in pounds....	5	9 3/4	17	24 3/4
Element, List No.....	21082	21080	21081	21083
Glass Jar, List No.....	217	225	229	234
Prices on application				

STORAGE BATTERIES

These same types, as well as others, are available in the more recently designed "sealed types" of cells—



5 Cell BTMH-2 unit



6 Cell PTMH-2 Unit



DMGO Cell



FMGO Cell



EMGO Cell

Prices on application.

SILK AND COTTON INSULATED SWITCHBOARD WIRE

Switchboard wire is used for the wiring of telephone switchboards and miscellaneous purposes in central offices. This wire is supplied in single conductor, pair, triple, or quadruple conductor form.

SWITCHBOARD WIRE

Code No. 2

This wire consists of Nos. 14, 16, 18, 19, 20, 22 or 24 A.W.G. tinned copper conductors covered with a double silk and single cotton wrapping and saturated with a transparent moistureproof compound. Supplied in assorted colors and combination of colors. This wire is the general standard used.

ENAMELLED SWITCHBOARD WIRE

Code No. 4

This wire is similar to Code No. 2 Switchboard Wire except that the conductors are enamelled after being tinned. This wire is used in particular circuits and in locations of high humidity.

KEYBOARD WIRE

Code No. 8 Switchboard Wire

Keyboard Wire is used for the interconnections and battery-leads of apparatus in telephone and telegraph circuits. This wire was known as "Keyboard Wire" or "B.B.E. Wire," and is now known as "Code No. 8 Switchboard Wire." This wire consists of Nos. 16, 19 or 20 A.W.G. enamelled tinned annealed copper wire insulated with one serving of silk and a cotton braid, and saturated with a transparent moistureproof compound. This wire is supplied in single conductor and two to five conductors twisted together. The twisted conductors are tested for 500 volts between each conductor, and supplied in assorted colors and a combination of colors.

SHIELDED WIRES

Shielded wires are for use in circuits susceptible to the influence of stray electrostatic fields. The shielding is accomplished by means of a copper braid which may be made with the copper braid bare or with a black or grey glazed cotton overall braid. It is most generally used with Code 8 wire.

DICTOGRAPH CABLE

Dictograph cable is developed for use with Dictograph systems and consists of enamelled copper conductors, insulated with a single serving of cotton, marked for tracing, twisted into pairs, stranded and then finished similar to inter-phone cables.

These cables can be supplied with different combinations of conductors and gauges of wire. Information on any particular combination required will be furnished on request.

The history of the development of the telephone in Canada has been the history of the Northern Electric Company. From the early days of the telephone up to the present time the Northern Electric Company has been the foremost Canadian telephone manufacturer in all its allied branches. The Northern Electric Company is prepared to engineer and supply Telephone Systems for large industries, municipalities or for individuals, from the most complicated automatic equipment to the simplest party to party Inter-phone System.

for
**SPECIAL
PRODUCTS
INDEX**

See Back of
this Page

The Northern Electric Company and Associates in the Telephone field have achieved through engineering research many new scientific developments. Some of these are adaptations of old principles for use in new fields. The equipment developed particularly for telephone and radio telephone use, has been the foundation of Radio Broadcasting, Public Address and Music Reproducing Systems, Audio-meters, Audiphones, etc. You will find this section of your catalogue most interesting, as it presents various equipment and particularly the new apparatus in each group.

*See alphabetical index
for page numbers of
listings at back
of book.*



**SPECIAL
PRODUCTS**

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Traffic Signal Systems

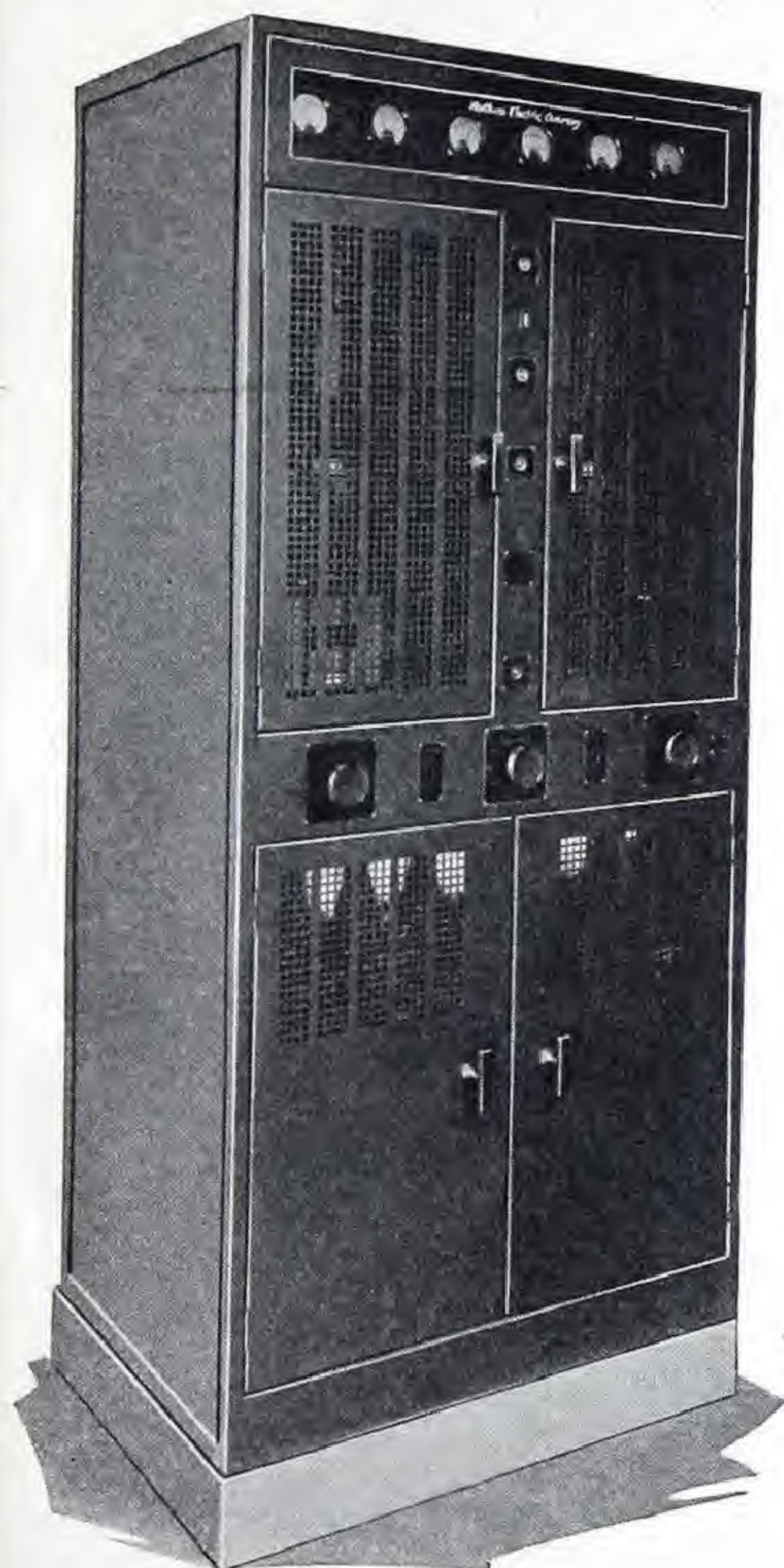
Fire Alarm Systems

Sprinkler Watchman

Northern Electric

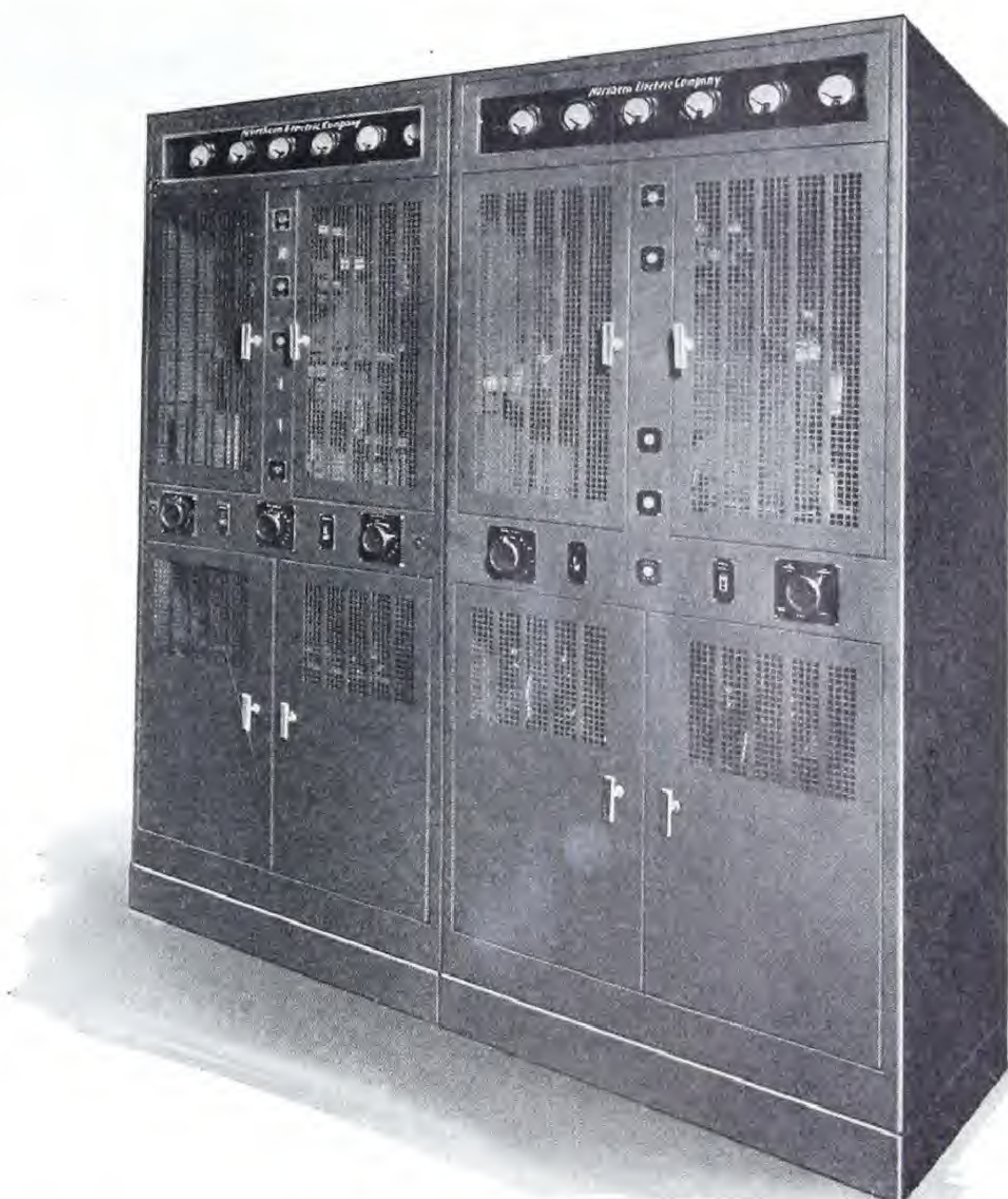
RADIO BROADCASTING EQUIPMENT

The Northern Electric Company offers a 100-watt Radio Transmitting Equipment which includes all the latest developments which heretofore have been available only for high powered transmission. Adaptability is one of the outstanding features of this Radio Transmitting Equipment and in providing this feature, an underlying thought of the designing engineers has been to protect the broadcasting station owner against early obsolescence. If at some later date, the owner wishes to expand the power of his station to 250 watts, 500 watts, 1 Kw., 15 Kw., 25 Kw., or even 50 Kw., it can be done by adding additional units to match the existing equipment. Through anticipation of this possibility the designers have made this increase in power a very simple matter. The 100-watt Radio Transmitting Equipment is also adaptable to common frequency broadcasting which promises to be a very important development in the radio field for covering considerable areas by means of a number of properly distributed low power transmitters. A recent achievement of Northern Electric engineers is the design, construction and installation of Station CKY for the Manitoba Telephone System. Station CKY with a power output of 15 kilowatts, contains every recent refinement in broadcast transmission equipment.



301-A Radio Transmitting Equipment

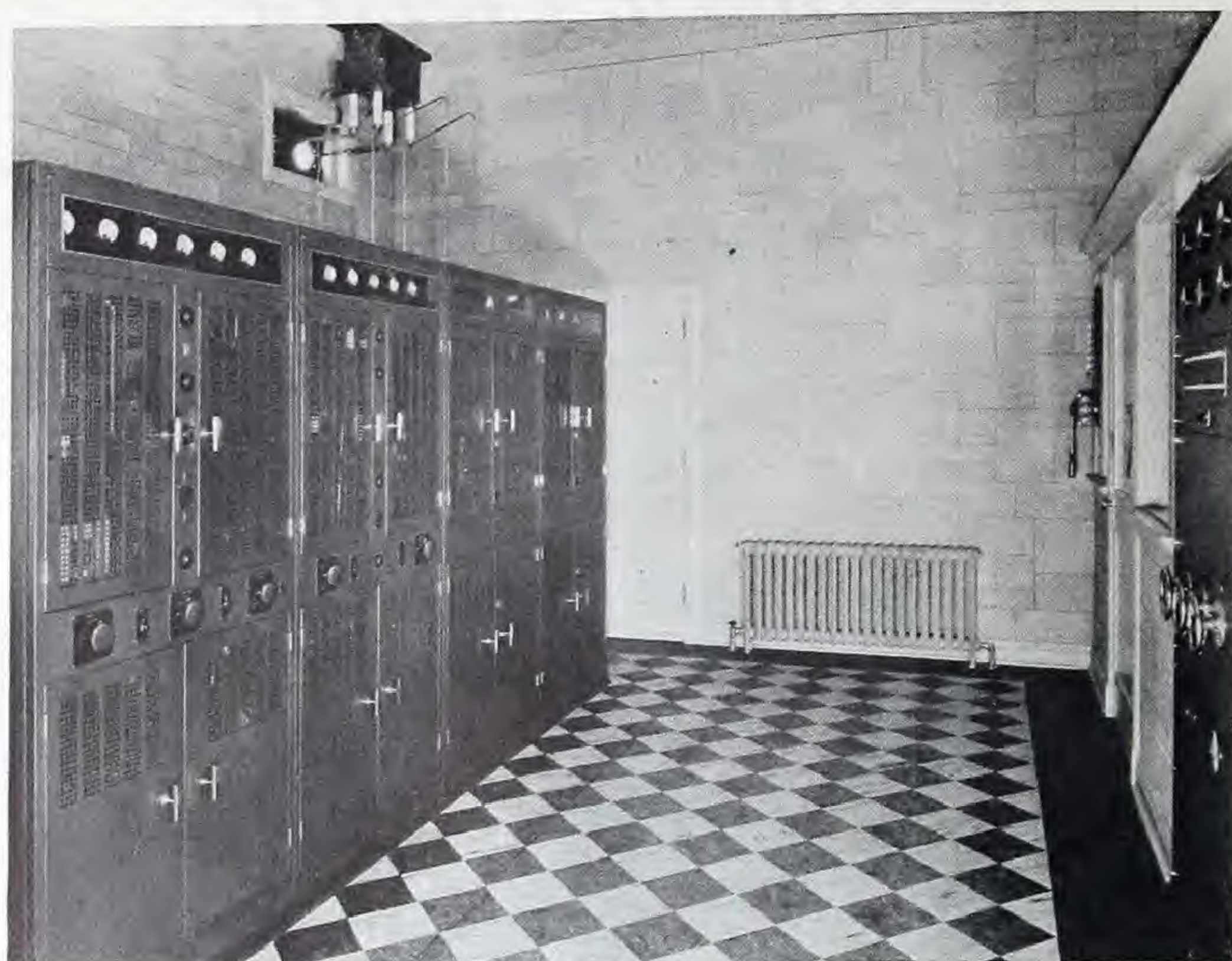
The 301-A Radio Transmitting Equipment is a single unit 100-watt broadcasting equipment capable of 100% modulation and is entirely A.C. operated. The 12-B Radio Transmitter consists of a quartz crystal-controlled oscillator, two buffer stages of radio frequency amplification, and an output stage in which modulation is effected. The transmitter is entirely contained in a grey finished steel cabinet, 6' 10" high, 3' wide, 2' deep and weighs approximately 1535 pounds. The operating, tuning and power controls are mounted on the front of the transmitter cabinet. Due to the grid-bias system of modulation, a minimum number of tubes is employed.



304-A Radio Transmitting Equipment

The 304-A Radio Transmitting Equipment is a two unit 1000-watt broadcasting equipment capable of 100% modulation and is entirely A.C. operated. This is essentially a 301-A Radio Transmitting Equipment with the addition of a 1000-watt radio frequency amplifier which is exactly the same size as the 12-B Radio Transmitter. This 71-A Amplifier consists of a single stage of push-pull radio frequency amplification and an output circuit especially designed for the elimination of radio frequency harmonics. The operating, tuning and power controls are mounted on the front of the transmitter and amplifier cabinets. Ten additional vacuum tubes are required for the 71-A Amplifier.

RADIO BROADCASTING EQUIPMENT



R-8170 Radio Transmitting Equipment

The R-8170 Radio Transmitting Equipment is a 15 kilowatt broadcasting equipment capable of 100% modulation, and requires a power source of 220 volts, 3 phase, 60 cycles a.c., 75 kv.a. for operation. This is essentially a 304-A Radio Transmitting Equipment with the addition of a power amplifier tube unit, power amplifier tuning unit, and associated apparatus. A high degree of frequency stability of the carrier is obtained by the use of the small self-contained sealed oscillator

unit, used also in the 100 and 1000 watt equipments. The frequency is controlled by a temperature-controlled quartz plate. Mercury vapor rectifier tubes furnish d.c. power at 17,000 volts and 3000 volts for the plates of the water-cooled and radiation-cooled vacuum tubes, respectively. The entire equipment is fully automatic in operation and can be started by operating a single switch which, by means of a series of relays, energizes the various circuits in their proper sequence.



R-1-A Frequency Monitoring Unit

The R-1-A Frequency Monitoring Unit is an instrument for accurately checking the frequency of a radio transmitter. It incorporates a precise source of radio frequency energy, which is the same oscillator used in the 100, 1000 watt and 15 KW Equipments, and is used as a standard for comparison, and a difference frequency indicating mechanism. The unit consists essentially of a Quartz Crystal Oscillator, two stages of radio frequency amplification, a detector and a visual indicator which registers the difference frequency between the oscillator in the radio transmitter and the oscillator in the monitoring unit. This unit fulfils the demand for high quality monitoring apparatus to meet the frequency checking requirements of the Canadian Radio Broadcasting Commission.



R-7202 Modulation Meter

The R-7202-A Modulation Meter is an a.c. operated instrument designed for use with radio transmitters to give a continuous visual indication of percentage modulation. The unit offers a remarkably compact and neat appearance as well as meeting all requirements for broadcasting stations. A volume indicator type meter is used in this unit which gives a continuous visual indication of the depth of modulation. It is extremely simple to operate, need only be checked periodically, and the adjustment can be made during a programme.

The R-7202-B Modulation Meter is a cabinet mounted R-7202-A Modulation Meter. The cabinet has a sloping panel and is finished in dull walnut, presenting a pleasing appearance.

Northern Electric

SPEECH INPUT EQUIPMENT

The Northern Electric Company, always endeavouring to provide better facilities for radio broadcasting stations, has developed and produced an entirely new series of A.C. operated Speech Input Equipments both portable and rack mounted.

In the control room, the type of equipment has ranged from the old style of rack mounting with vacuum tubes projecting on the face of the panel to the modern style of "Depressed Panel Mounting" on enclosed cabinet type racks. The Northern Electric Company offers to broadcasting stations all that is required in speech input equipment from the microphone to the output controls, including carbon and dynamic transmitters, transmitter mountings, transmitter amplifiers, monitoring loud speakers, line amplifiers, input and output control panels, frequency

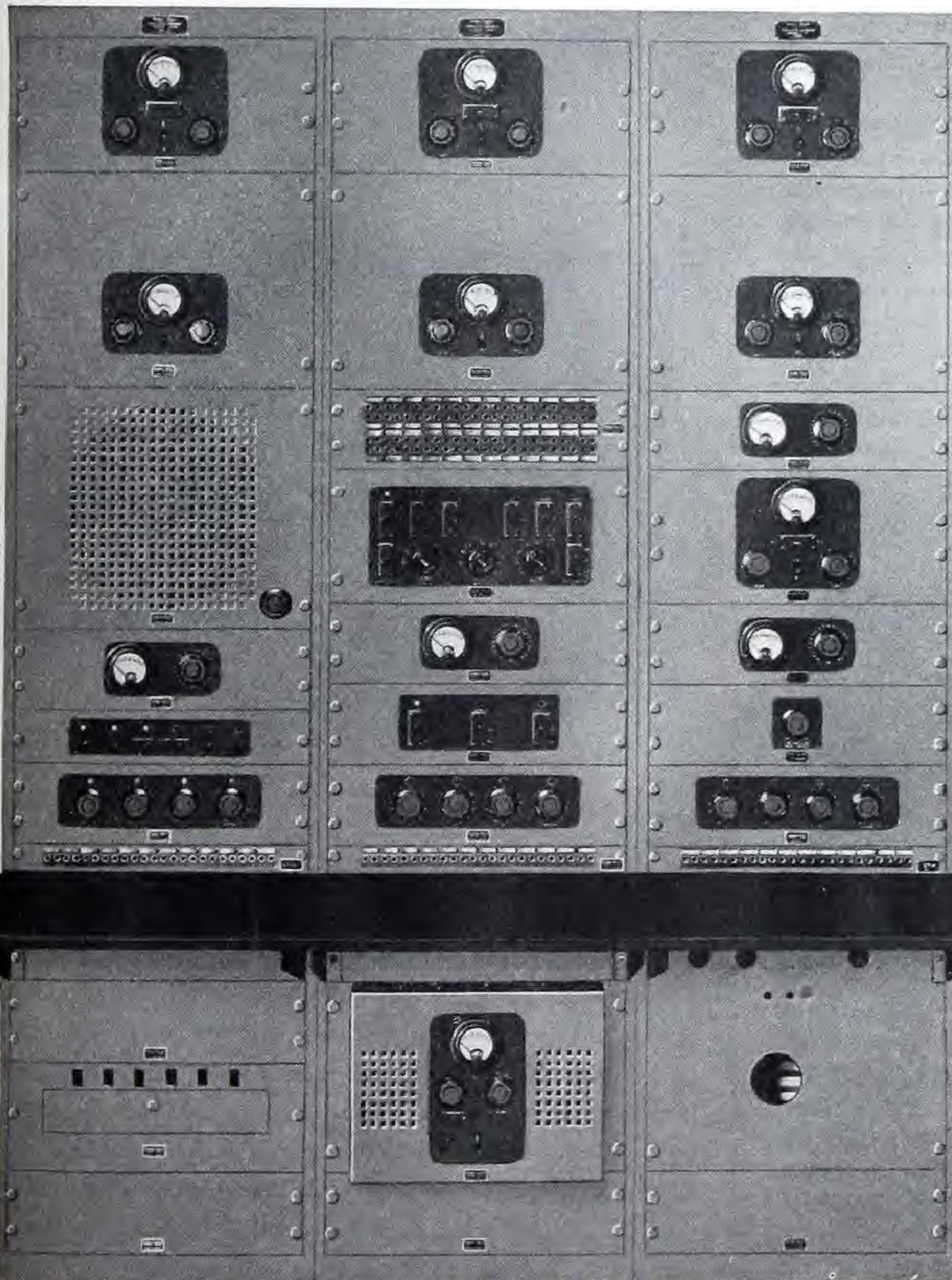
monitoring equipment, modulation meters, volume indicators, etc.

As the size of the station and the facilities required vary considerably, several different equipments have been standardized. In special cases where the standardized equipments do not meet the customer's requirements, new arrangements of the panels will be supplied.

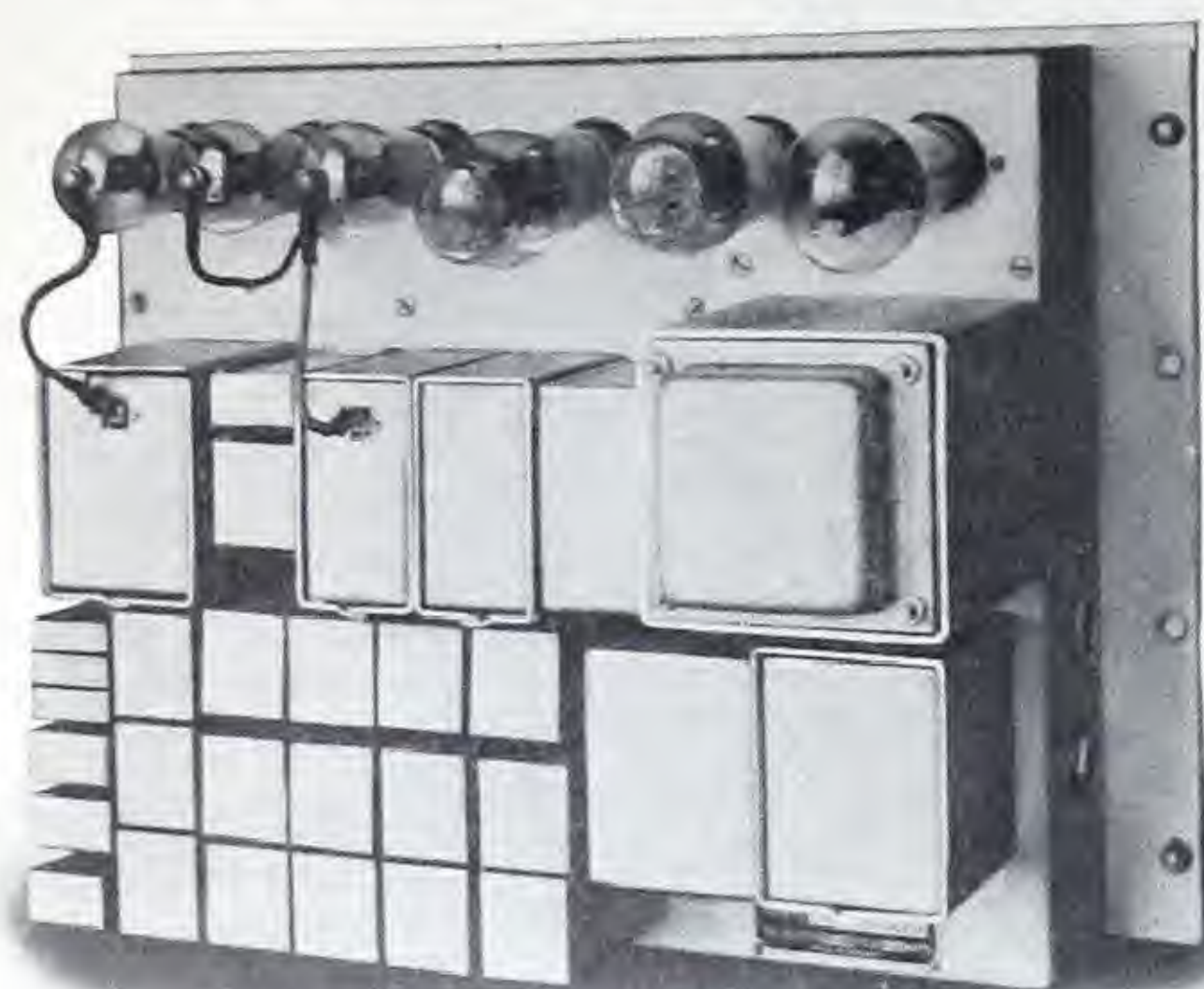
The amplifiers and other essential parts embody the latest design features which result in extremely low noise level and distortion percentages under the rated operating conditions. The assembling, wiring and testing of the apparatus before shipment from the factory result in reduced installation and first costs. The enclosed cabinet type rack mounting and careful arrangement of wiring and appearance greatly facilitate maintenance. Due to its neat appearance, the apparatus will make an attractive addition to the equipment of any radio broadcasting station.

The portable speech input equipment while having high quality transmission, is small, neat and compact for easy transportation and is capable of performing the functions demanded of modern stationary speech input equipment.

In the new depressed panel construction, the vacuum tubes, transformers and other large parts of apparatus are mounted on the rear of the panel; while the wiring, terminals and smaller parts are mounted in a recess on the front of the panel. A mat is provided for the face of each panel which is held firmly in place by thumb screws. The mats afford protection from dust and mechanical injury, and present a flush uniform front surface with the elimination of many of the usual dust collecting projections. All panels, amplifiers, etc., of the new depressed panel construction will be furnished with an aluminum grey finish.



SPEECH INPUT EQUIPMENT



R-4000 Amplifier—Rear view

R-4000 Amplifier

This is a general purpose amplifier incorporating both high gain and high output level, as well as including its own power supply, and can be used where the highest quality is required. The gain of 110 db. is adequate to permit use with dynamic or other low level microphones without preliminary amplifiers. It operates from either 25 or 60 cycle, 110 volt a.-c. power supply. The maximum output is +34 db., input impedance is 200 ohms, output impedance is 500 ohms and 8 ohms, and power consumption is 175 watts. This amplifier is a compact four-stage unit assembled on a depressed panel type mounting plate, and requires 14" of mounting space on a standard 19" rack. It employs six of the improved new type long life vacuum tubes which must be ordered separately. A plate current meter and meter switch is provided to measure the plate currents of all the vacuum tubes.

**R-4001-A Amplifier**

This is a compact two-stage rack mounted monitoring and line amplifier, completely a.-c. operated from either 25 or 60 cycles, 105-130 volts power supply. It includes a volume control, a plate current meter and meter switch to measure individually the plate current of each of the vacuum tubes. It employs four of the improved new type, long life, vacuum tubes, which must be ordered separately. The maximum gain is 50 db. when matched, and 42 db. when working between 500 ohm circuits. The input impedance is 4000 ohms, the output impedance 500 ohms and 8 ohms, and the maximum output is +34 db. It is assembled on a depressed panel type mounting plate and requires 8 $\frac{3}{4}$ " mounting space on a standard 19" rack.

SPEECH INPUT EQUIPMENT



R-4001-B Amplifier—Rear view

R-4001-B Amplifier

This is the same as the R-4001-A Amplifier, except that it has an input impedance of 200 ohms instead of 4000 ohms.

**R-4002 Amplifier**

This is a d.c. operated four-stage chassis mounted portable audio-frequency amplifier for use in conjunction with dynamic microphones as a remote pickup amplifier in speech input equipments. The maximum gain is 85 db., maximum output is +8 db., output impedance is 500 ohms, and it is provided with two input circuits of 30 ohms impedance, each controlled by a mixer. It is contained in an aluminum carrying case 14" long, 10" wide, and 8" high. Cords and plugs are supplied as part of the amplifier, but the five 264-A vacuum tubes and necessary batteries must be ordered separately.

SPEECH INPUT EQUIPMENT



R-4003 Amplifier

This is an a.c. operated (except for "C" batteries) four-stage chassis mounted portable audio frequency amplifier intended for use as a remote pickup amplifier for radio broadcasting, in conjunction with a 618-A Transmitter (dynamic microphone) or similar transmitter. The maximum gain is 90 db., maximum output is +10 db., output impedance is 500 ohms and it is provided with two input circuits of 30 ohms impedance each, controlled by a mixer. It is contained in an aluminum carrying case 14" long, 10" wide and 9" high. Cords and plugs are supplied as part of the amplifier, but the "C" batteries and vacuum tubes must be ordered separately. It operates from 105-125 volts, 25 or 60 cycle power supply.



R-4009-A Amplifier—Rear View

R-4009-A Amplifier

This is a single stage a.c. operated rack mounted unit intended for use as a preliminary amplifier with a dynamic microphone. It is intended to be connected between the microphone and its associated mixer volume control in order to increase the level at which the control units operate and to reduce tube noise. It has a gain of 30 db., an output impedance of 200 ohms or 50 ohms, and an input impedance of 25 ohms. It is assembled on a depressed panel type mounting plate and requires 3½" of space on a standard 19" rack. One 262-A vacuum tube is required and must be ordered separately. This amplifier operates from 110 volts 25 or 60 cycle power supply.

SPEECH INPUT EQUIPMENT



R-4009-B Amplifier—Front View—Mat Removed

R-4009-B Amplifier

This is the same as the R-4009-A Amplifier except that it has an input impedance of 200 ohms instead of 25 ohms, and is intended for use in recording and music reproducing systems.



RPS-100 G Amplifier

This is a high quality A.C. operated three-stage chassis mounted audio-frequency amplifier intended for use as a broadcast pick-up amplifier in portable speech input equipments, using a 600-A transmitter (carbon microphone). It has a maximum gain of 65 db., a maximum output of +15 db., an input impedance of 200 ohms, and an output impedance of 500 ohms and 8 ohms. This amplifier includes tubes, power cord and plugs. It operates from 105-125 volts, 25 or 60 cycle power supply, and requires about 100 watts. The dimensions are 19½" x 9¼" x 9¾", and it weighs about 50 lbs.

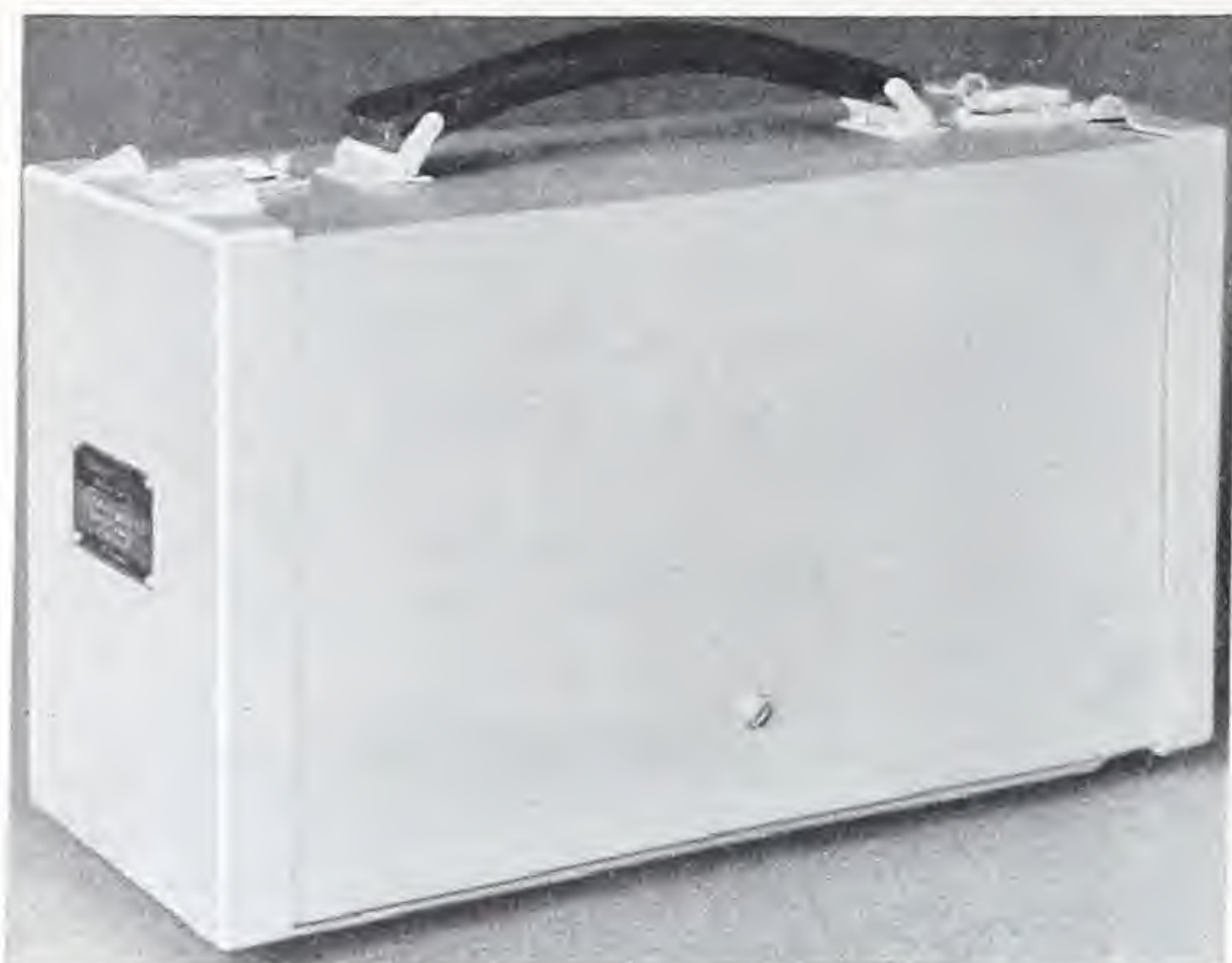


RPS-100-K Amplifier (Cover Removed)

RPS-100-K Amplifier

This is a high level A.C. operated three-stage speech input amplifier mounted in an aluminum case, for use with the Northern Electric 12A Radio Transmitter at the transmitter location. It has a maximum gain of 80 db., a maximum output of +30 db., an input impedance of 200 ohms, and an output impedance of 500 ohms and 8 ohms. It includes tubes, power cord and plug. It operates from 105-125 volts, 25 or 60 cycle power supply and requires about 100 watts. The dimensions are 19½" x 9¼" x 9¾", and it weighs about 50 lbs.

SPEECH INPUT EQUIPMENT

**RPS-154-A Amplifier**

This is a single stage high quality portable unit for use as a preliminary amplifier with a dynamic microphone in conjunction with a portable amplifier such as the RPS-100 type amplifier. The input impedance is 25 ohms, the output impedance is 50 or 200 ohms, and the gain is 30 decibels. This amplifier is contained in a sturdy aluminum case $7\frac{1}{2}$ " x 5" x $12\frac{1}{2}$ " with two removable covers and includes a power cord and the necessary plugs. One 262-A Vacuum Tube is required and must be ordered separately. The power supply required is 110 volts, 25 or 60 cycle A.C. and 135 volts, 1 mil. D.C. It weighs about 15 lbs. complete with cords and plugs.

**R-5029 Control Cabinet**

This is a portable four channel mixer for use with dynamic microphones. It can be supplied for two or three channels instead of four, but the number of channels required should be specified when ordering for less than four channels. It is designed for operating directly out of dynamic microphones ahead of all amplifiers, and has an output impedance of 200 ohms. It is contained in an aluminum finished steel carrying case and equipped with receptacle. The cabinet is 20" long, 6" high and 8" deep. It weighs about 20 lbs.

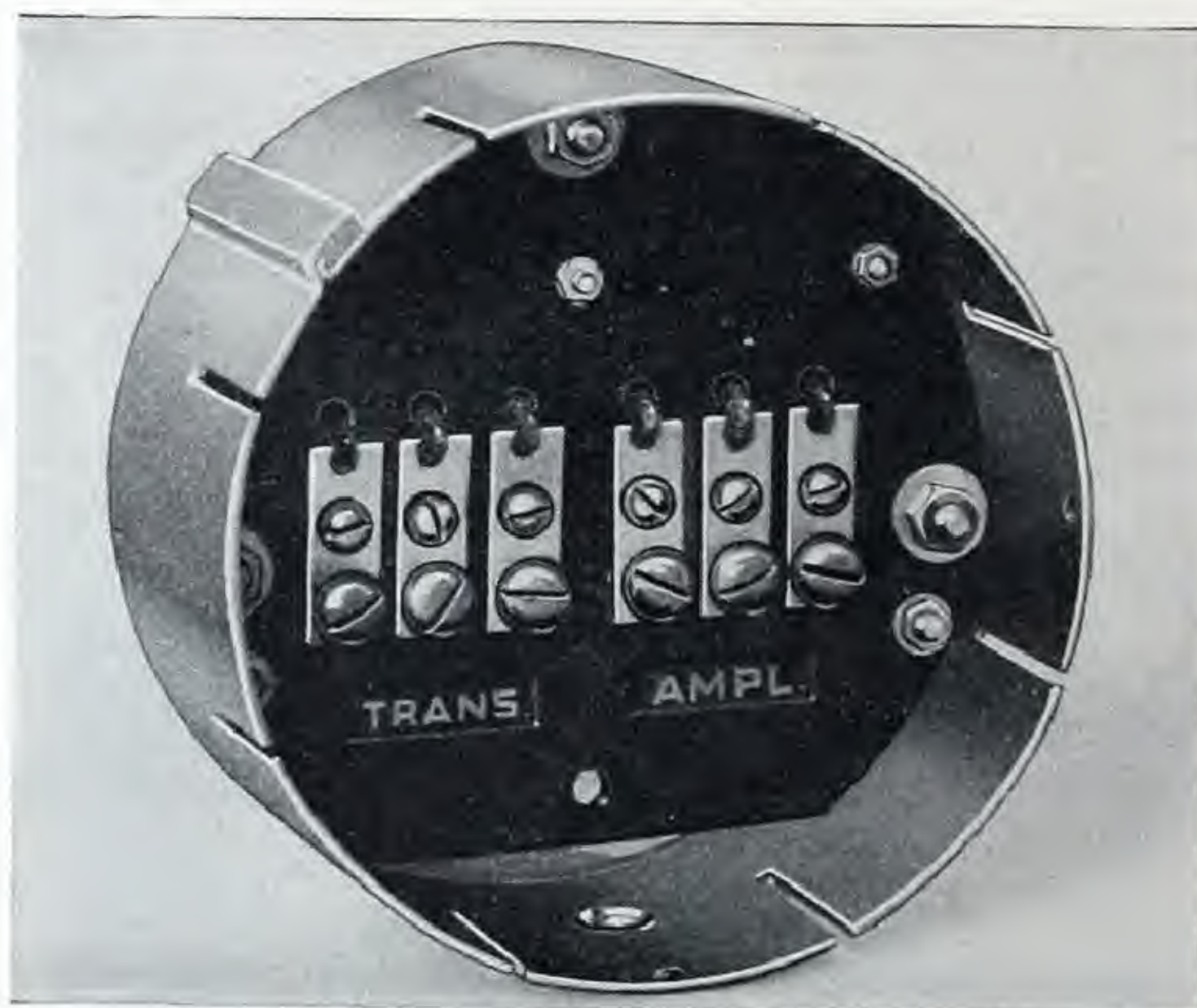
**R-5300 Equalizer**

This is a shunt type rack-mounted equalizer intended to correct the attenuation distortion for the frequency range of 35 to 8000 cycles per second, of non-loaded cable circuits used for programme transmission. It is uniformly variable by means of a control appearing on the front panel. It requires $3\frac{1}{2}$ " of mounting space on a standard 19" rack.

SPEECH INPUT EQUIPMENT

**R-5028 Control Cabinet**

This is a portable high-quality four-channel mixer for use with carbon microphones, and has a self-contained power unit operating from 110 volts, 25 or 60 cycle power for supplying microphone current. The carrying case is 20" long, 9" high, and 8" deep. A 20 ft. power cord is supplied as part of this equipment, and the complete unit weighs 50 lbs. One TA-4115 Condenser is required for operation and must be ordered separately.

**R-5452 Filter**

This filter is arranged to mount directly on the back of the 600-A Transmitter and is designed to prevent packing of carbon. It consists of a retardation coil and two condensers mounted on a phenol fibre disc, and is assembled in a nickel finished brass cover $3\frac{1}{2}$ " in diameter and $1\frac{1}{2}$ " deep. It includes one M-1-E and two T-1-A Cords.

**R-7752 Mixer Panel**

This is a three channel mixer with a master gain control intended to mix the output of three dynamic microphones, and to control the combined output. Signal lights are provided to show when each circuit is in operation and an automatic switch shuts off the signal light when the potentiometer is in the zero position. These signals are intended to be operated in series with external signal lights from an external 24 volt supply. The output impedance is 200 ohms. It is arranged for panel mounting and requires $5\frac{1}{4}$ " of space on a standard 19" rack.

SPEECH INPUT EQUIPMENT



R-6-E Headset

This is a standard 3000 ohm headset for use with radio receiving sets. The cases of the individual receivers are of brass, nickel plated. The inductance of each of the coil windings in the receivers is held within exceedingly close limits, thereby assuring uniform tone in both earpieces. The headband consists of two separated spring wires covered with a soft brown web tubing, affording a comfortable bridge to support the receivers on the head.



R-7778 Control Panel

This is a microphone control panel to supply current for one carbon microphone and to control the output when operating into an amplifier. The output impedance is 4000 ohms and is primarily intended to work into an R-4001-A Amplifier. The microphone current is supplied by a self-contained power unit which operates from 110 volts 25 or 60 cycle power supply, and a meter is provided to measure the microphone current. This panel is arranged for rack mounting and requires 5 1/4" on a 19" rack. One TA-4115 Condenser is required for operation but must be ordered separately.



R-7789 Input Control Panel

This input control panel provides three keys for switching three incoming telephone lines to the amplifier input, or to the subscriber set, as required. A master telephone line switch is provided, also a key for turning "Off" and "On" a dynamic microphone for local announcements. Both circuits are equipped with volume controls. The microphone key also disconnects the monitoring loudspeaker when turned to the "On" position. This panel requires 7" of mounting space on a standard 19" rack.

SPEECH INPUT EQUIPMENT

R-7754 Output Control Panel

This output control panel provides volume control and switching for two monitor circuits and an output "On-Off" key. It requires 5 1/4" of mounting space on a standard 19" rack. It is designed for use in conjunction with radio transmitters such as the Northern Electric 100 watt 12-B Radio Transmitter.



R-7777 Control Panel

This control panel is intended for use at a transmitting station where the transmitter is remote from the studio, and provides input and output switching facilities. On the input side it provides switching between two lines, a variable line equalizer, a repeating coil and line pads. On the output side it provides an "On-Off" key for the transmitter, and a volume control for a 500 ohm monitoring circuit. It requires 3 1/2" of mounting space.



R-7755 Voltage Control Panel

This panel consists essentially of a tapped auto-transformer, tap switch, and an a.c. voltmeter. The switch provides line voltage adjustment in ten 3 volt taps. It requires 5 1/4" of mounting space, and operates from 100-130 volts, 25 or 60 cycles. It will provide a 15 volt correction for a 1 KW. load.

R-7798 Terminal Panel

This is a rack mounted depressed panel type terminal panel primarily intended for terminating power circuits on speech input bays. It provides forty screw type terminals and requires 7" of mounting space on a standard 19" rack.



R-7783 Jack Panel

This jack panel consists of a black phenol fibre panel fitted to a mounting plate and is drilled for mounting a maximum of ninety-six 218-J or similar type jacks. The jacks are grouped in pairs, thus providing forty-eight circuits for amplifiers, telephone lines, volume indicators, etc. The jacks required are not supplied as part of this panel and must be ordered separately. It requires 5 1/4" of mounting space on a standard 19" rack. A convenient arrangement is to connect the jacks so that the normal setup of the circuits with which the jacks are associated is continuous when plugs are not inserted in the jacks, because the circuits are connected through the jack contacts. This provides a flexible arrangement since an amplifier or other unit may be readily isolated and then patched in at another point in case of emergency.

SPEECH INPUT EQUIPMENT

R-7792 Jack Panel

This is similar to the R-7783 jack panel except that it provides for forty-eight 218-J or similar type jacks instead of ninety-six. It requires $3\frac{1}{2}$ " of mounting space and provides for two rows of jacks grouped in pairs, thus providing twenty-four circuits for amplifiers, telephone lines, volume indicators, etc. The jacks required are not supplied as part of this panel and must be ordered separately.



R-7753 Jack Panel (fully equipped)

R-7753 Jack Panel

This jack panel provides for twenty-four 218-J or similar type jacks and requires $1\frac{3}{4}$ " of mounting space on a standard 19" rack. The jacks are grouped in pairs thus providing twelve circuits for amplifiers, telephone lines, volume indicators, etc. The jacks required are not supplied as part of this panel and must be ordered separately.

Jacks

218-J Jacks. These are heavily insulated, single mounted tip and sleeve jacks $3\frac{1}{2}$ " long, with a nickel finished sleeve arranged for use with 241-A plugs, and have a single break contact on the tip.



R-7787 Monitor Panel, Front Mat Removed.

R-7787 Monitor Panel

This monitoring panel consists of a 10" dynamic speaker mounted on a steel mounting plate. The panel is equipped with a volume control and "On-Off" key. It has its own field supply for operation from 110 volts, 25 or 60 cycle circuits. It requires $12\frac{1}{4}$ " of mounting space on a standard 19" rack. One 274-A Vacuum Tube is required as a rectifier, but must be ordered separately.

**R-7780 Volume Indicator Panel**

This is a rack mounted volume indicator for measuring the output energy levels of amplifiers and speech input equipments. It consists essentially of a rectifier voltmeter type volume indicator. It will indicate levels from 0 to +40 decibels in 2 db. intervals. It is primarily intended to operate across a circuit having a 500 ohm impedance in each direction from the bridging point. This volume indicator requires $5\frac{1}{4}$ " of mounting space on a standard 19" rack.

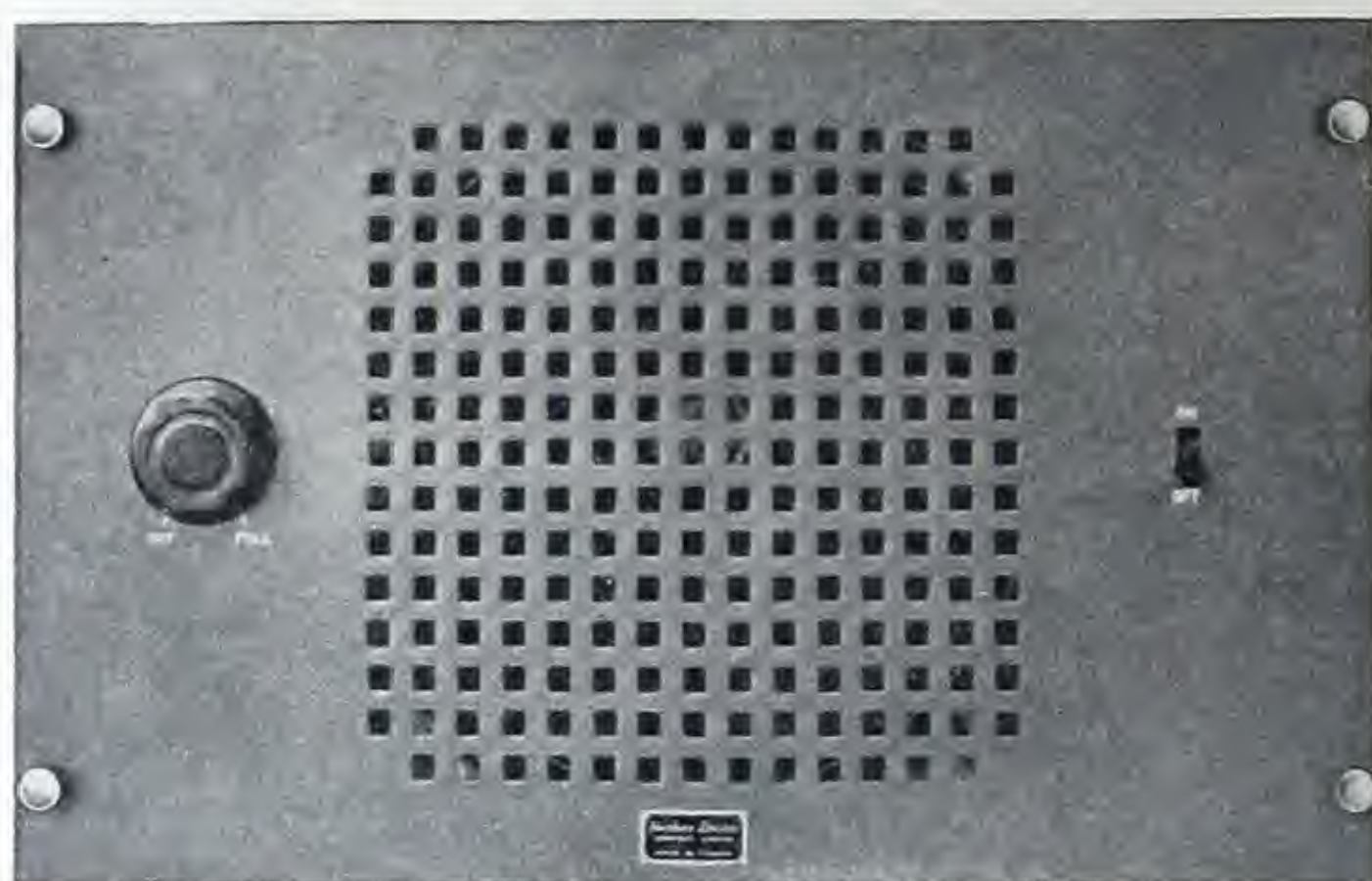
R-7790 Volume Indicator Panel

This is the same as the R-7780 volume indicator except that it reads from -10 to +30 decibels instead of from 0 to +40 decibels.

SPEECH INPUT EQUIPMENT

R-7796 Monitor Panel

This monitor panel consists of a Z-595-A loudspeaking telephone mounted on a depressed panel, and a three point switch to switch the loudspeaking telephone to any one of three circuits. It requires $15\frac{3}{4}$ " of mounting space on a standard 19" rack. A field supply capable of delivering 2.4 amperes at 12 volts is required to operate the loudspeaking telephone.

**R-7779 Monitor Panel**

The R-7779 Monitor Panel consists essentially of a high quality 10-inch dynamic loudspeaker mounted on a depressed panel. A potentiometer provides means for controlling the volume and a snap switch controls the external field supply for the speaker exciting coil. It requires $12\frac{1}{4}$ inches of mounting space on a standard 19-inch rack. A field supply capable of delivering 0.75 amperes at 24 volts is required to operate the loudspeaker.

R-7788 Telephone Panel

This is a rack mounted panel for furnishing telephone communication between studio and transmitter locations in speech input equipments. The apparatus is assembled on a depressed panel type mounting plate, and requires $5\frac{1}{4}$ " of space on a standard 19" rack. One 206-A-3 Hand Telephone Set is required for use with this panel, but must be ordered separately.

**R-7781 Mixer Panel**

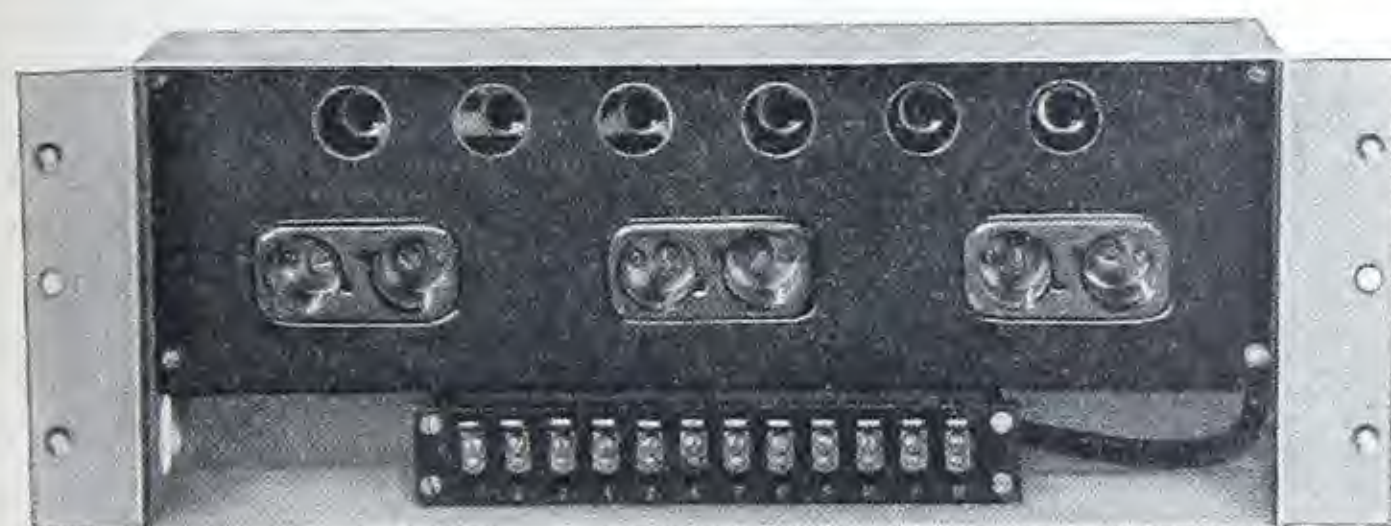
This is a rack mounted four channel mixer intended for use with dynamic microphones, and requires $5\frac{1}{4}$ " of mounting space on a 19" rack. This mixer panel can be supplied for two or three channels instead of four, but the number of channels required should be specified when ordering a mixer for less than four channels. This mixer is designed for operating directly out of dynamic microphones ahead of all amplifiers, and has an output impedance of 200 ohms.

SPEECH INPUT EQUIPMENT



R-7786 Mixer Panel

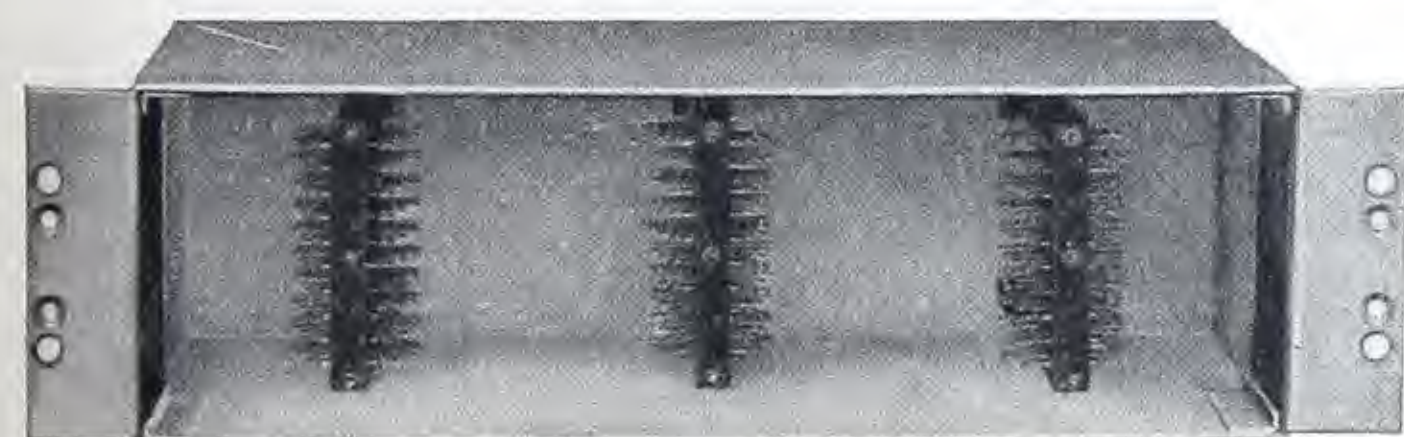
This is a rack mounted high quality four channel mixer for use with carbon microphones. Four potentiometers are provided for controlling the volume and mixing the output of the microphones. The microphone current is supplied by a self-contained power unit which operates from 110 volts 25 or 60 cycle power supply, and a meter is provided to measure the microphone current. It requires $8\frac{3}{4}$ " of mounting space on a 19" rack. One TA-4115 Condenser is required for operation but must be ordered separately.



R-7775 Terminal and Fuse Panel, mat removed

R-7775 Terminal and Fuse Panel

This is a rack mounted panel designed to protect the power circuits of amplifiers and rectifiers, and requires 7" of mounting space on a 19" rack. It provides fuses for six power circuits, either a.c. or d.c. Signal lamps are provided which indicate when the fuse is blown. It also has twelve separate terminals. Six plug fuses are required for operation, but must be ordered separately.



R-7785 Terminal Panel

This is a rack mounted panel for terminating the local cable on speech input bays and interconnecting it to external circuits. It consists of three terminal strips, each having forty punchings, giving a total of 120 terminals. The terminal strips are widely separated preventing interference between high level and low level circuits. Ample space is provided on each side of this panel to bring in the cables. It requires $5\frac{1}{4}$ " of mounting space on a 19" rack.

SPEECH INPUT EQUIPMENT



R-7791 Output Control Panel

This output control panel provides facilities for controlling the volume, and switching the input of the monitoring amplifier to either of the three monitor output circuits on large radio transmitters, such as the Northern Electric 15 K.W. Transmitter, or the audio input to the radio transmitter. An "On-Off" key is provided for the audio input to the radio transmitter. It requires $5\frac{1}{4}$ " of mounting space on a standard 19" rack.



R-7793 Blank Panel

Blank panels have been designed to fill in the unequipped positions of speech input bays or other such mounted equipments, to match the other panels on the racks so that the completed front of the equipment presents a pleasing and compact appearance. These panels are made of heavy gauge steel with vertical fillers at the edge to bring them out flush with the equipped panels on the rack, but should not be used as mounting plates. These blank panels can be supplied in any width in multiples of $1\frac{3}{4}$ " in width in order to suit the requirements of each rack layout. Two metal strips are located on the rear of the blank panels adjacent to each end which combine with the standard duct details furnished with enclosed cabinet type racks to form a completely enclosed duct system.



R-7804 Power Unit

The R-7804 Power Unit is a rectifier-filter unit designed to operate from a 110 volt 25 or 60 cycle a.c. power supply, and to supply a maximum load current of 50 milliamperes at 180 volts d.c. and 2 amperes at 10 volts a.c. It is intended to supply plate and filament current to amplifiers, oscillators and other similar equipment whose total load requirements come within the limit of the unit. It consists essentially of the necessary power transformer, a full wave high vacuum rectifier tube, and a filter circuit. It requires 7" of mounting space on a standard 19" rack. One 274-A Vacuum Tube is required but must be ordered separately.

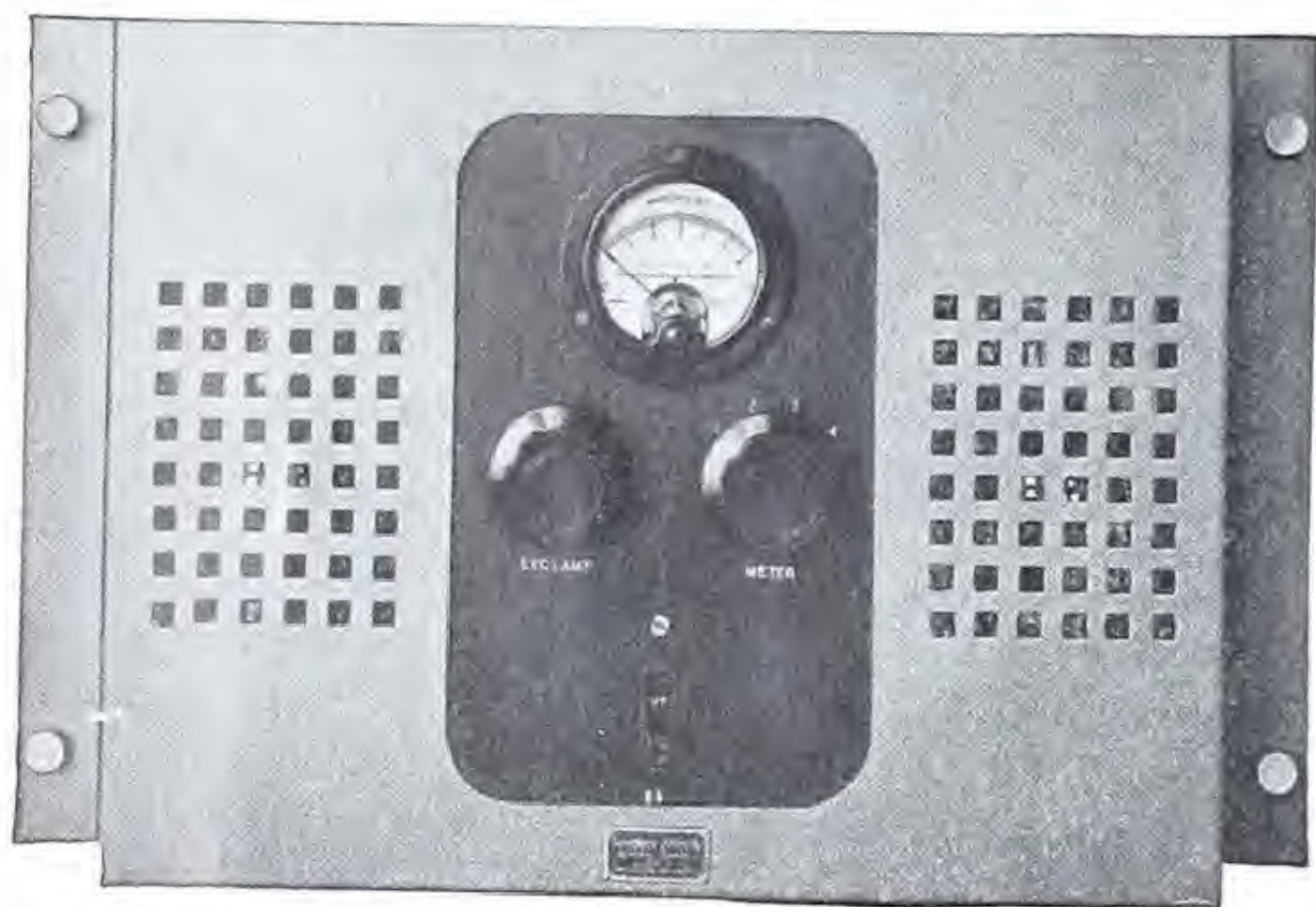
SPEECH INPUT EQUIPMENT



R-7820 Power Unit—Mat Removed

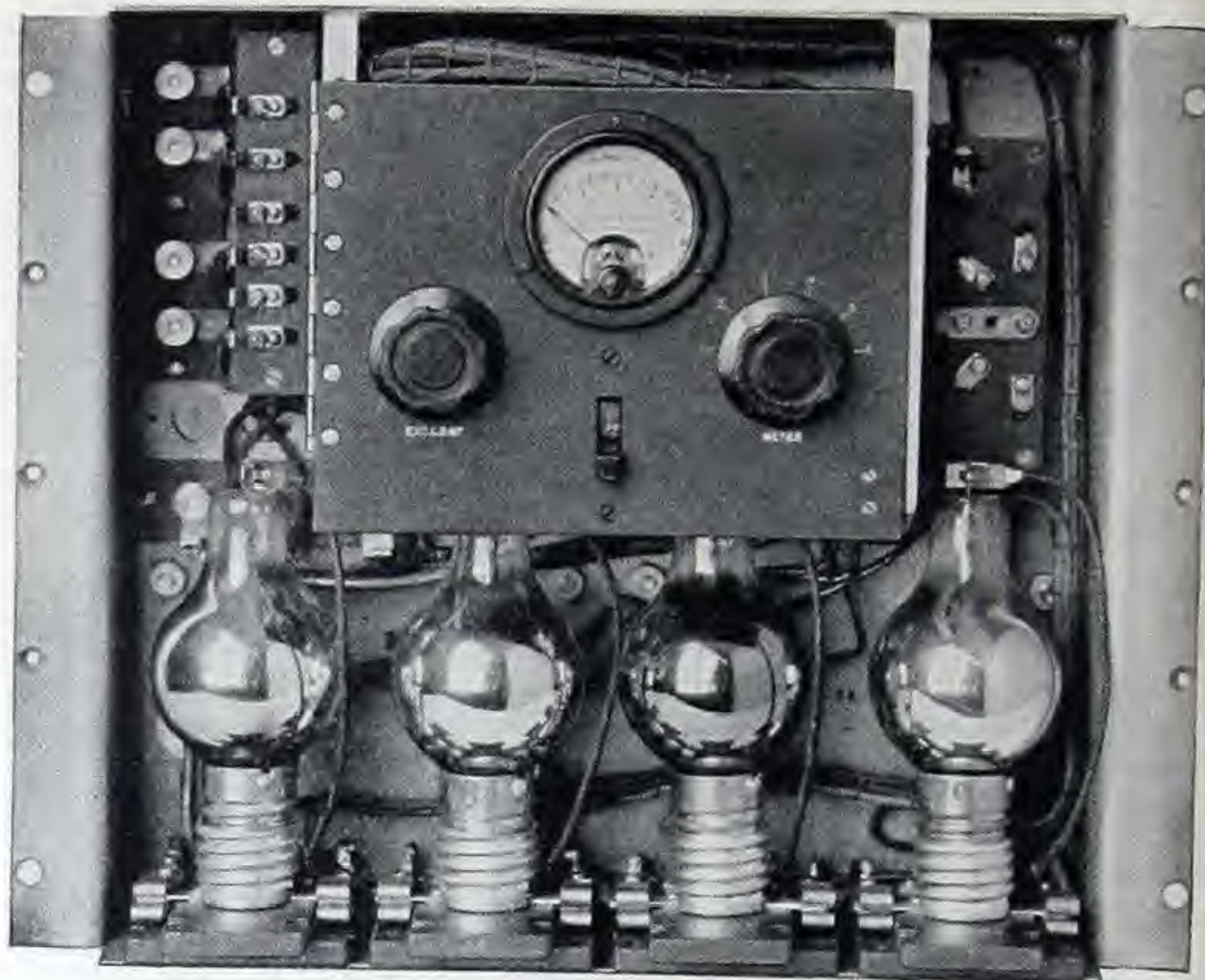
R-7820 Power Unit

This is a rack mounted power unit primarily intended as a power supply for energizing speaker fields. It will supply 24 volts at 1.25 amperes, or 12 volts at 2.5 amperes of filtered d.c. It consists of two full wave rectifier circuits, using copper sulphide rectifiers, each delivering 12 volts at 1.25 amperes, arranged so that they can be connected in series or parallel to give 24 or 12 volts; and a single section filter. Taps are provided on the power transformer to take care of line voltage variations. It requires $5\frac{1}{4}$ " of mounting space on a standard 19" rack, and operates from 110 volts, 25 or 60 cycle power supply. One TA-4115 Condenser is required for operation, but must be ordered separately.

**R-7803 Power Unit**

This is a rack mounted unit consisting of a full wave rectifier and a double filter unit. It will deliver 6 amperes at 24 volts from one filter circuit, and 4 amperes at 24 volts from the other circuit. The 6 ampere circuit consists of a single stage filter which provides sufficient filtering for field supply, signal circuits, and other uses not requiring a high degree of filtering. The four ampere circuit consists of a two stage filter and provides sufficient filtering for use as filament supply to amplifiers, microphone current, exciting lamps and other uses requiring a high degree of filtering. Two rectifier bulbs are employed, mounted in removable sockets which allow them to be readily changed by simply removing the front mat. A spare socket is also provided in which to mount a spare bulb for quick replacement. A meter and meter switch permit the direct current in each rectifier bulb and each output circuit to be read separately. Taps are provided on the power transformer to take care of line voltage variations and drop in output due to aging bulbs. It requires $12\frac{1}{4}$ " of mounting space on a standard 19" rack and operates from 110 volts, 25 or 60 cycle power supply. Two No. 189048 Tungar Bulbs and four TA-4115 Condensers are required for operation, but must be ordered separately.

SPEECH INPUT EQUIPMENT

**R-7807 Power Unit—Mat Removed**

This is a rack mounted power unit and consists of two full wave rectifier circuits and three filter sections. It will deliver 12, 6 and 4 amperes respectively, at 24 volts from the first, second, and third circuits of the triple filter unit. It is essentially an R-7803 Power Unit with the addition of a 12 ampere, 24 volt circuit. The 12 ampere circuit is filtered comparably to the 6 ampere circuit, and can be used for loudspeaker fields, signal circuits, etc. A meter and meter switch permit the circuit in each bulb and each output circuit to be read separately. Taps are provided on the power transformer to take care of line voltage variations. It requires $15\frac{3}{4}$ " of mounting space on a standard 19" rack and operates from 110 volts, 25 or 60 cycle power supply. Four No. 189048 Tungar Bulbs and four TA-4115 Condensers are required for operation, but must be ordered separately.

**RPS-117-A Volume Indicator**

This is a rack mounted volume indicator for measuring the output levels of amplifiers in speech input equipments. It consists of a copper oxide rectifier voltmeter type volume indicator, and will indicate levels from 0 to +40 decibels in 2 db. intervals. It is primarily intended to operate across a circuit having a 500 ohm impedance in each direction from the bridging point. The frequency response is uniform within one db. from 35 to 10,000 cycles per second. It requires $5\frac{1}{4}$ " of mounting space on a standard 19" rack, and has a black japan mat and back cover finished in aluminum.

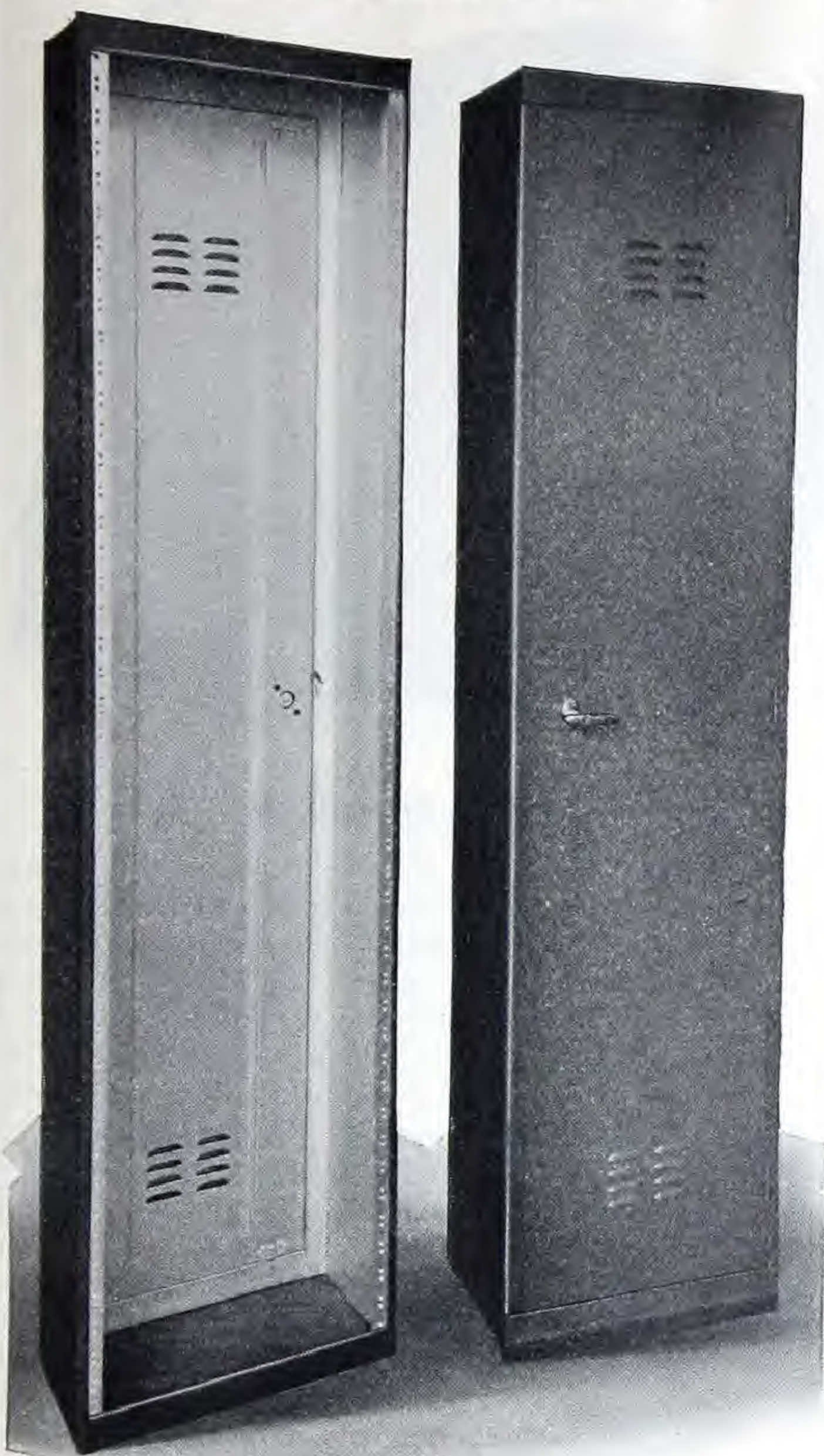
RPS-117-C Volume Indicator

This is the same as the RPS-117-A Volume Indicator except that it reads from -10 to +30 decibels instead of from 0 to +40 db.

R-7799 Volume Indicator

This is a small portable unit and is contained in a small carrying case about 5" x 3" x 3", and weighs approximately 3 lbs. It indicates levels from -10 to +30 decibels in 5 decibel steps.

SPEECH INPUT EQUIPMENT



Racks—Enclosed Type

Three different standard enclosed type racks are available for use in mounting the new depressed type panels in Speech Input, Music Reproducing and Public Address Systems; they consist essentially of a metal cabinet which is open at the front, and is equipped with a hinged door at the rear in order to provide a means of access to the rear of the panels. The door is equipped with a three point locking device which is operated by means of a handle. The rack is drilled to mount a set of wiring ducts.

THE R-7951 RACK: Is 5'8 $\frac{3}{4}$ " high, 1'8 $\frac{1}{2}$ " wide and 12 $\frac{1}{2}$ " deep. The front of the rack provides approximately 64 $\frac{3}{4}$ " of available space for mounting panels.

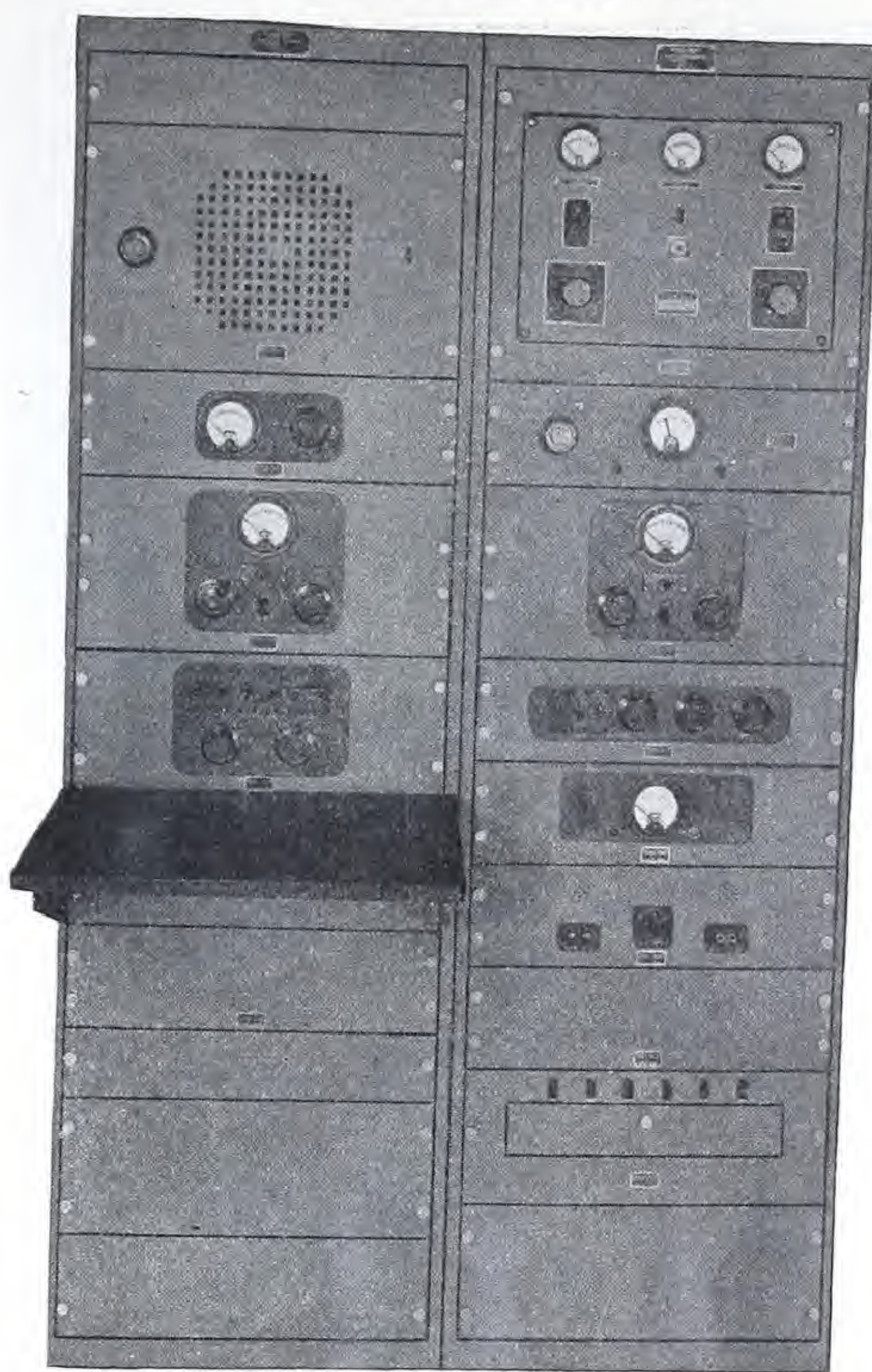
THE R-7952 RACK: Is 6'11" high, 1'8 $\frac{1}{2}$ " wide and 12 $\frac{1}{2}$ " deep. The front of the rack provides approximately 79" of available space for mounting panels.

THE R-7954 RACK: Is the same height as the R-7951 rack, but is 4 $\frac{1}{2}$ " deeper, to enable a frequency monitoring equipment to be mounted in it.

R-8650 SHELF

This writing shelf consists of a black ebonized wood top 20 $\frac{3}{8}$ " wide and 16" deep, with metal mounting brackets drilled to mount on a standard enclosed type rack for use in Speech Input Equipments.

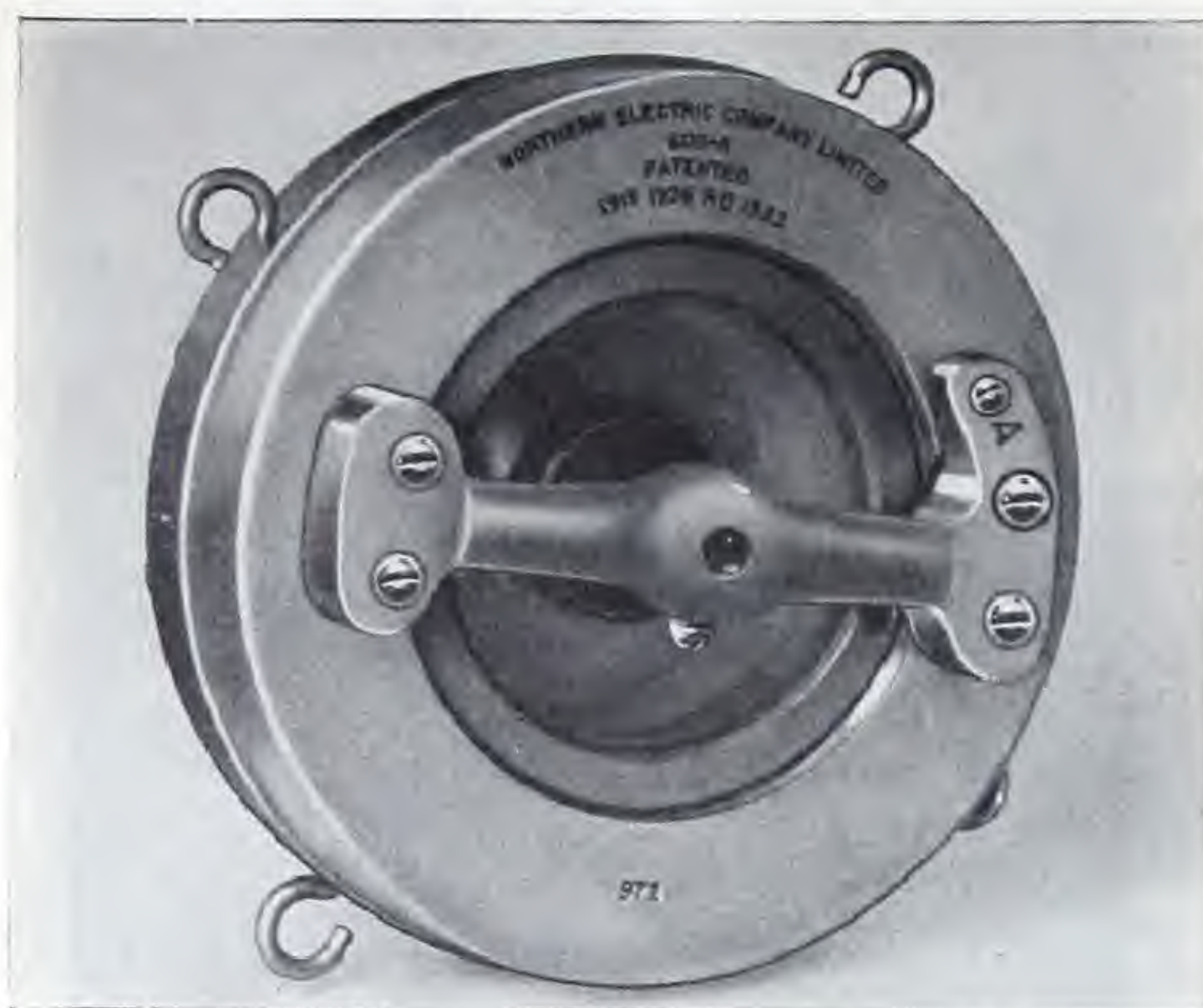
SPEECH INPUT EQUIPMENT



R-8608 Speech Input Equipment

This speech input equipment is a self-contained completely a.c. operated unit for use with a radio transmitter situated at a distance from the studio. The equipment consists principally of an R-4358 type speech input bay which is an assembly of amplifiers; control, switching, telephone and monitor panels; volume indicators, potentiometers and other circuit accessories for one programme channel. It is designed to accommodate three incoming telephone lines, one of which is the programme circuit, one an emergency programme circuit and the other an order wire circuit. Keys are provided for switching in these telephone lines to the input of the amplifiers, or to the telephone panel. A line equalizer has been provided for compensating for any transmission loss encountered in non-loaded programme circuits. It employs a 600-A Transmitter for announcing purposes at the radio transmitter location. Space is provided to mount an R-5501 frequency monitoring equipment and an R-7202 Modulation Meter, which however, do not form a part of the bay, and must be ordered separately. This complete speech input bay is 5'8 $\frac{3}{4}$ " high, 3 $\frac{1}{2}$ ft. wide and 17" deep.

SPEECH INPUT EQUIPMENT



600-A Transmitter

This is a double button high quality microphone, in which the harmonics are materially reduced as compared with the single button type. It is of the push-pull type, consisting of two heavy metal rings clamping a thin stretched duraluminum diaphragm which actuates two carbon buttons mounted one on each side. Each button is mounted over a gold-plated spot in the center of the diaphragm.

It has a nickel finish and is approximately $3\frac{1}{2}$ " in diameter and 2" deep.

CORDS—FOR USE WITH CARBON MICROPHONES
(600-A TRANSMITTERS)

T-3-A CORD: This is a brown cotton covered cord equipped with No. 92 cord tips on one end and arranged for a No. 7055 Hubbell cap at the other end, and is supplied in 12 ft. and 25 ft. lengths.

R-4872 CORD: This is a brown cord consisting of two tinsel conductors having cotton and silk insulators and a tinsel shield which forms a third conductor, having a silk covering, and is supplied in lengths of 12 ft.

CORDS—FOR USE WITH DYNAMIC MICROPHONES
(618A TRANSMITTERS)

M-3-K CORD: This is a brown cotton covered cord equipped with a 285-A plug and 406-A jack. Supplied in lengths of 12 and 25 feet.

M-3-J CORD: This is a black rubber covered cord equipped with a 285-A plug and 405-A jack. Supplied in lengths of 100 feet.

R-4865 CORD: This is a brown cotton covered cord equipped with a 285-A plug for the microphone end, and a 7311 Hubbell Plug on the other end. Supplied in lengths of 12 and 25 feet.

P-350692 CORDAGE: This is a two conductor shielded brown cotton covered cord. Order as required.

KS-7133 CORDAGE: This is a two conductor shielded rubber covered cordage as used in the M-3-J cord for outdoor use. Order as required.

SPEECH INPUT EQUIPMENT



618-A Transmitter

This dynamic microphone is entirely free from all sources of distortion, has a low noise level, is compact and rugged and is not affected in its performance by changes of temperature, humidity and barometric pressure. Embodying the most recent advances in electro-acoustic design, it represents a distinct advance over other pick-up equipment in use at the present time. The frequency response is uniform for the complete range of audible frequencies. The rugged and simple construction insures a long and satisfactory life. Protection for the diaphragm is provided by a perforated metal grid covered with silk and held in the face of the transmitter by a threaded ring. The grid and the metal shell which forms the housing of the transmitter are insulated from the moving coil and constitute a shield which may be connected to ground. A three conductor jack is mounted on the back of the housing. The dynamic microphone is approximately $3\frac{1}{4}$ " in diameter, is about 3" deep and weighs $2\frac{1}{2}$ pounds. It will be furnished in an oxidized bronze finish, unless a black crackle finish is required.

PLUGS AND JACKS FOR 618-A TRANSMITTER

285-A-13 PLUG: This is an oxidized bronze finished plug as supplied on the M-3-K Cord, to fit a 405-A Jack on the 618-A Transmitter.

286-B-13 Plug: This is an oxidized Bronze finished plug mounted on a brass escutcheon plate for standard outlet box for connecting the M-3-K Cord to a wall outlet.

406-A-13 JACK: This is an oxidized bronze finished jack as supplied on the M-3-K Cord to fit the 286-B Plug.

CORDS—PATCHING

R-4869 CORD: This is an 18" two conductor white cord used for patching purposes on jack panels. This cord is essentially a P2AA cord equipped with two 241-A plugs, each conductor of the cord being brought out to the tip contact of the plug. The plugs are double plugs and have black insulating shells.

SPEECH INPUT EQUIPMENT



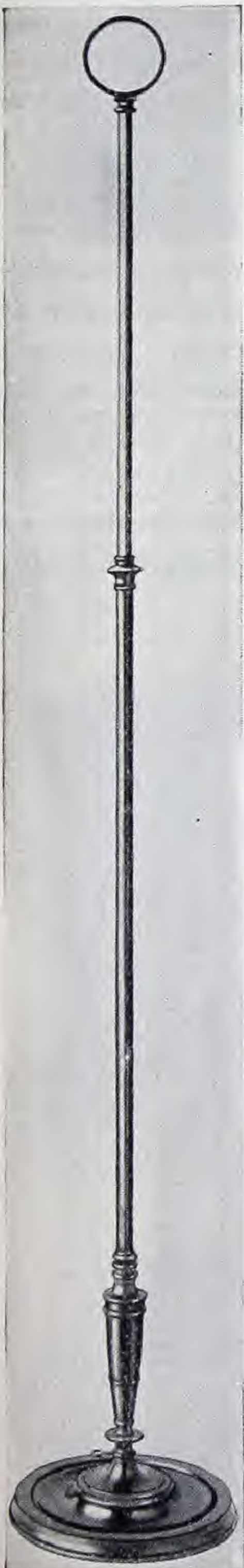
17-A-13 Transmitter Mounting

17-A-13 Transmitter Mounting

This is a suspension mounting for the dynamic microphone, adapted for suspending over an orchestra or audience when a table or floor mounting would not be appropriate.

19-A-13 Transmitter Mounting

This is a floor type mounting for the dynamic microphone, which can be varied in height between 3'8" and 5'10". Designed for use when a person is standing and speaking into the microphone.



19-A-13 Transmitter Mounting



18-A-13 Transmitter Mounting

This is a table mounting for the dynamic microphone with a fixed height of 13"; usually used when a person is sitting at a table and speaking into the microphone.

R-8859 Transmitter Mounting

This is an extension table mounting for the dynamic microphone, which can be varied in height between 26" and 35". Suitable when a person is standing at a table and speaking into the microphone, such as at banquets, and it is desired to place the microphone stand on the table.

SPEECH INPUT EQUIPMENT



18-Z-13 Transmitter Mounting

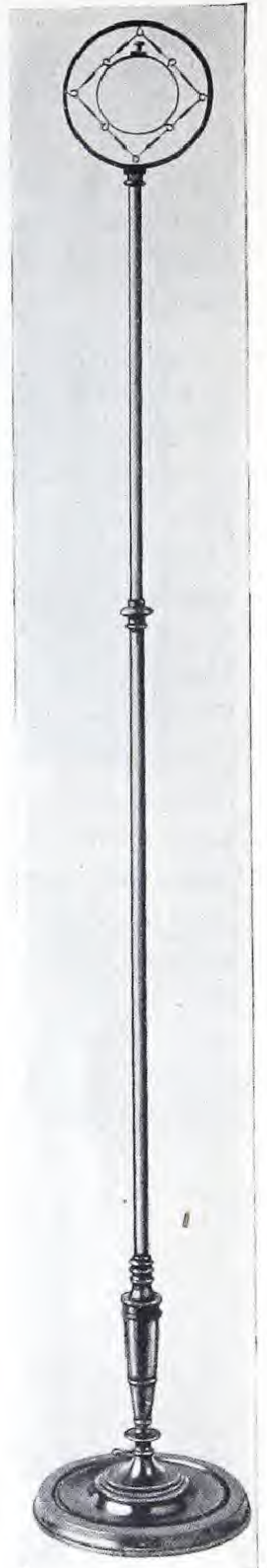
This is a table mounting for the 600-A transmitter with a fixed height of 16", usually used when a person is sitting at a table and speaking into the microphone.

19-Z-13 Transmitter Mounting

This is a floor type mounting for the 600-A transmitter which can be varied between 3'11" and 6'1". Designed for use when a person is standing and speaking into the microphone.

R-8860 Transmitter Mounting

This is an extension table mounting for the 600-A transmitter, which can be varied in height between 29" and 38". Suitable when a person is standing at a table and speaking into the microphone, such as at banquets, and it is desired to place the microphone stand on the table.



19-Z-13 Transmitter Mounting

Northern Electric

AIRCRAFT RADIO EQUIPMENT

Travel by air has been safeguarded and facilitated greatly by Aircraft Radio Equipment which affords rapid and dependable means of communication between planes and ground stations.

Radio gives to aircraft three important services, communication, advice and direction. The planes which fly daily over the air routes are in constant two-way communication with the ground stations situated at intervals of about two hundred miles along their routes. By this means they report progress at regular intervals, and in case of sudden changes of weather they receive warning and advice. In weather conditions which would normally make flying impossible, and for night flying, planes fly with comparative safety due to the reliability of the radio beacon.

Radio Telephone Equipment to cover the general communication needs of aircraft takes the form of two separate systems; a low frequency system for receiving radio beacon signals and weather reports, and a two-way high frequency radio telephone system which permits the plane to keep in constant touch both with other planes and with ground stations. The two-way telephone system enables pilots to receive dispatching and landing instructions in all kinds of weather. It also allows intercommunication between points within the plane itself.

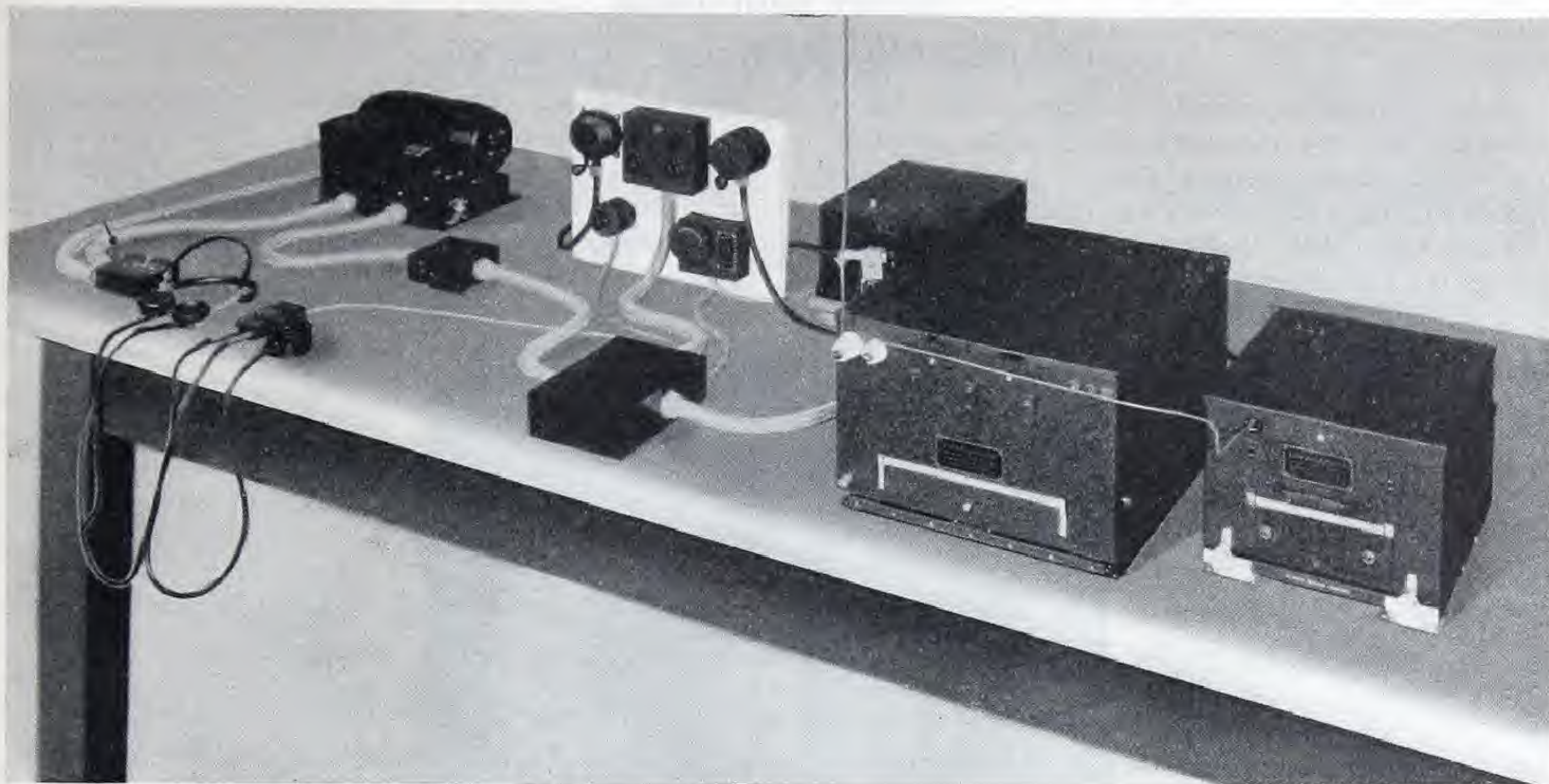
The Northern Electric Company now introduces new radio telephone equipment for use in transport planes. This improved equipment has been evolved as the result of continuous and exhaustive research combined with the experience acquired through intimate contact with the field. Many fundamental improvements have been made including a preselected frequency, superheterodyne receiver, and a new radio transmitter, both of which are arranged for rapid shifting to either the day or the night frequencies. A reduction to a minimum of the number of apparatus units, complete conduit wiring, and the inclusion of an improved side tone circuit by means of which the pilots may converse with each other, are other outstanding features.

The Equipment is arranged so that the beacon receiver can be operated separately from the two-way communication system. This permits one pilot to listen to the beacon while the other is listening to the ground station. However, the circuit is arranged so that either one or both pilots may listen to both receivers as they may desire.

For ground stations several Radio Telephone Equipments are available, which are capable of supplying from 10 to 400 watts of unmodulated carrier power.



AIRCRAFT RADIO EQUIPMENT



50 Watt Radio Telephone Equipment

This equipment provides two-way high frequency radio telephone communication with other aircraft or ground stations having suitable equipment. It also provides for receiving beacon signals and weather reports from ground stations. The transmitter is capable of supplying about 50 watts of carrier power to a suitable airplane antenna, and is capable of substantially complete modulation. Quartz crystals control the frequencies of the radio transmitter, and mechanical means are provided to change the adjustment of

the radio transmitter to any one of the three frequencies determined by the quartz plates.

Two Superheterodyne Radio Receivers form a part of this equipment. One receiver is a low frequency receiver for reception of beacon and weather reports. The other is a high frequency receiver for telephone or continuous wave reception, and utilizes quartz crystal controlled oscillator circuits. This equipment operates from a 12 volt storage battery and a power unit consisting of two dynamotors.



New Aircraft Receiver

AIRPORT RADIO RECEIVER

This is a superheterodyne radio receiver primarily intended for use at airports for the reception of radio signals from aircraft. It consists of three distinct units; a radio frequency amplifier, an intermediate frequency amplifier, and an audio frequency amplifier. These units are mounted together on a frame, which in turn is mounted in a steel cabinet. This cabinet also contains a power line and control line filter. This radio receiver requires 107 to 122 volts, or 215 to 245 volts single phase, 25 or 60 cycle a.c. power supply for operation. The weight of this receiver mounted in the cabinet is approximately 210 lbs.



Airport Radio Receiver

AIRCRAFT RADIO EQUIPMENT**Airport Equipment****10 WATT RADIO TELEPHONE EQUIPMENT**

This radio telephone equipment is intended for use in ground stations for the purpose of radio telephone communication to aircraft in the vicinity which are equipped with suitable transmitting and receiving equipment. This equipment consists of a radio transmitter and radio receiver, together with the necessary accessories such as vacuum tubes,

desk stand, etc. The transmitter is capable of supplying 10 watts of carrier power to a suitable antenna, and is capable of substantially complete modulation. A quartz plate controls the carrier frequency of the transmitter. This equipment operates on 110 volts, 25 or 60 cycles, single phase, a.c. power supply.

**400 WATT RADIO TELEPHONE EQUIPMENT**

This equipment is intended for use in ground stations for the purpose of radio telephone communication with aircraft. It employs a multi-frequency crystal controlled transmitter which may be pre-adjusted to any ten frequencies within the range of 2 to 18.1 megacycles. It is rated at 400 watts of carrier power at frequencies between 2 and 12 megacycles, and 300 watts at frequencies from 12 to 18.1 megacycles. Any one of these ten frequencies may be selected by a single digit operation of a telephone dial. Substantially complete modulation of the carrier by the voice frequencies is possible over its whole range. It employs a full complement of Northern Electric Air-cooled Vacuum Tubes. Frequency stability is maintained by means of a thermostatically controlled quartz plate for each of the frequencies to which the transmitter is adjusted. A power source of 4 kva, 200 to 240 volts

3 phase, 25 or 60 cycles a.c. is required for operation. The radio transmitter and its associated rectifier are housed in individual metal cabinets 83" high, 24" wide and 29" deep.

The radio receiver is a superheterodyne set having an unusual degree of sensitivity and of intermediate radio frequency selectivity. It is arranged for continuously variable tuning and designed for use with coaxial radio frequency transmission lines of about 70 ohms impedance. It employs a full complement of Northern Electric Air-cooled Vacuum Tubes. A 25 or 60 cycle single phase a.c. power supply is required for operation. This radio receiver is contained in a metal cabinet 83" high, 21¼" wide, and 12¾" deep. It weighs 300 to 500 lbs. depending upon the combination of panels employed.

Prices on request.

Northern Electric

POINT-TO-POINT RADIO EQUIPMENT

Reliable radio communication can be obtained over moderate distances by using relatively low power transmitters, and frequencies in the short wave band. "Point-to-Point" radio communication as it is called, is becoming popular in several fields on account of certain advantages that it has over other types of communication. By using short wave frequencies, longer distances can be covered with lower powered transmitters, and static interference can be reduced. Transmitters capable of operating on more than one frequency become a most reliable means of communication for the reason that reception on some frequencies is nearly always better than on others, depending on the time of day, and various other conditions.

Telephone companies make use of radio communication in their long distance circuits where for either physical or financial reasons it is impracticable to install toll lines. In deep forests for instance, telephone circuits would be likely to become broken at a remote point when it is most needed, due to falling trees, lightning, storms, fires, etc. Also cable lines cannot always be maintained across a channel on account of flood and ice conditions.

Radio communication is a great contribution to the problem of conserving the timber wealth of the nation. Radio equipped lookout towers enable warnings to be broadcast by fire rangers at the first sign of a fire, and enable thousands of acres of forest land to be saved.

Pulp and Paper companies utilize radio communication between power generating stations and mills. These are a few of the instances of improved communication, and avoid inconvenience and loss to the persons dependent upon them.

Northern Electric Point-to-Point Equipment has been developed to make use of these advantages and to provide reliable communication for marine, forest patrol, Point-to-Point Telephone and other uses, and has been giving reliable service in different parts of Canada for several years now.

The Northern Electric can supply short wave transmitting equipment rated at 20, 50 and 400 watts output for the transmission of radio telephone, or telegraph communication over short and medium distances for Point-to-Point application. Specially designed radio receivers can be supplied for use with these equipments.



400-Watt Transmitting Equipment

POINT-TO-POINT RADIO EQUIPMENT

20 WATT TRANSMITTING EQUIPMENT

This radio transmitting equipment incorporates facilities for telephone, tone telegraph, and continuous wave transmission over relatively short distances, and is equipped for quick change-over to either one of two predetermined frequencies, from telephone to tone telegraph, or CW. The carrier output for telephone transmission is rated at 20 watts, and is capable of complete modulation. Approximately 30 watts is available for continuous wave telegraph transmission. The carrier frequency is maintained within close limits of the assigned value by quartz crystal frequency control units. Additional features of this transmitter include remote control and automatic ringing facilities. A power source of approximately 300 watts, 107 to 122 volts, 25 or 60 cycles is required for operation; or in such places where no commercial power is available, power may be supplied from a dynamotor. The complete equipment including the power unit arranged for operation from commercial lighting circuits; is assembled in a metal cabinet attractively finished in aluminum grey 19" x 14" x 21" high and weighs approximately 100 lbs. It can be mounted either on a standard 19" rack or can be supplied as a portable unit completely enclosed in a sturdy carrying case.



20 Watt Radio Transmitter
(Front cover removed)

50 WATT TRANSMITTING EQUIPMENT

This transmitting equipment provides for radio telephone transmission, and if necessary can be modified for continuous wave and tone telegraph communication. The transmitter has an output of 50 watts unmodulated radio frequency power, and is capable of complete modulation. The carrier frequency is maintained within close limits of the assigned value by a quartz crystal frequency control unit for each frequency. The transmitter is equipped for a quick change-over to any one of a maximum of three predetermined frequencies, but unless specified it is normally equipped for only one frequency. It is designed to operate from an ordinary 110 volt a.c. power supply, 25 or 60 cycles, single phase, and consumes approximately 1 k.w. If a.c. power is not available it may be operated from a dynamotor, or a gas engine driven generator. This equipment is assembled in a small metal cabinet approximately 24" wide, 18" deep, and 40" high, attractively finished in black crystalline lacquer.

Prices on request.

POINT-TO-POINT RADIO EQUIPMENT

400 WATT RADIO TELEPHONE EQUIPMENT

This radio telephone equipment employs a multi-frequency crystal controlled transmitter which may be preadjusted to any ten frequencies within the range of 2 to 18.1 megacycles. It is rated at 400 watts of carrier power at frequencies between 2 and 12 megacycles, and 300 watts at frequencies from 12 to 18.1 megacycles. Any one of these ten frequencies may be selected by a single digit operation of a telephone dial. Substantially complete modulation of the carrier by the voice frequencies is possible over its whole range. It employs a full complement of Northern Electric Air-cooled Vacuum Tubes. Frequency stability is maintained by means of a thermostatically controlled quartz plate for each of the frequencies, to which the transmitter is adjusted. A power source of 4 kva, 200 to 240 volts, 3 phase, 25 or 60 cycles a.c. is required for operation. The radio transmitter and its associated rectifier are housed in individual metal cabinets 83" high, 24" wide and 29" deep.



Radio Receiver For 400 Watt Transmitting Equipment

The radio receiver is a superheterodyne set having an unusual degree of sensitivity. It is arranged for continuously variable tuning and designed for use with coaxial radio frequency transmission lines. It employs a full complement of Northern Electric Air-cooled Vacuum Tubes. A 25 or 60 cycle single phase a.c. power supply is required for operation. This radio receiver is contained in a metal cabinet 83" high, 21 1/4" wide and 12 3/4" deep. It weighs 300 to 500 pounds depending upon the combination of panels employed.

Special radio transmitters of higher power can be supplied on request.

Prices on request.

Northern Electric

PUBLIC ADDRESS AND MUSIC

REPRODUCING EQUIPMENT

Since the development of the vacuum tube made possible the amplification of the human voice so that a speaker without raising his voice could address large assemblies of listeners, the principle has been applied to Public Address and Music Reproducing Systems for the wide projection of sound and music from some central point such as at hotels, auditoriums, schools, exhibitions, sports gatherings, etc. Such strides have been made in the art of sound reproduction that today the quality of the output from the loudspeaker is comparable to the sounds of voice originally picked up by the microphones.

The Northern Electric Company with the past experience of having manufactured and installed the largest installations of public address and music reproducing equipment in Canada, offers a complete line of apparatus including microphones, amplifiers, reproducers, receivers, projectors, transmitter mountings, power amplifiers, mixer and control panels, loudspeakers, etc., and can supply equipment covering every commercial need that may arise in the field.



PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT



RPS-100-F Amplifier

This is a high quality completely A.C. operated three-stage chassis-mounted audio-frequency amplifier, intended for use in an average size public address system without the necessity of using additional amplification, and is intended for use with a 600-A Transmitter (Carbon microphone). It has a maximum gain of 80 db, a maximum output of +30 db, an input impedance of 200 ohms, and output impedances of 500 ohms and 8 ohms. It includes tubes, power cord and plug, and operates from 105-125 volts, 25 or 60 cycle power supply and requires about 100 watts. It is contained in a sturdy sheet steel aluminum finished case with a carrying strap. The dimensions are 19½" x 9¼" x 9¾", and it weighs about 50 lbs.



RPS-120-A Amplifier

This is a single-stage, high-quality, completely A.C. operated portable power-amplifier, which has an undistorted power output rating of 15 watts. It has a maximum gain of 25 db, working out of 500 ohm circuits, and a maximum output of +34 db. The input impedance is 4000 ohms, and the output impedances are 500 ohms and 8 ohms. It is contained in a sturdy sheet steel aluminum finished carrying case 19½" x 9¼" x 9¾", and weighs about 50 lbs. It operates from 110 volts 25 or 60 cycle power supply and requires 120 watts for 60 cycle operation, or 165 watts for 25 cycle operation. Two 252-A and one 274-A Northern Electric Vacuum Tubes are required for operation, but must be ordered separately.



R-4000 Amplifier

The R-4000 Amplifier is a general purpose amplifier incorporating both high gain and high output level as well as including its own power supply, and can be used where the highest quality is required. The gain of 110 db. is adequate to permit use with dynamic or other low level microphones without preliminary amplifiers. It operates from either 25 or 60 cycle, 110 volt A.C. power supply. The maximum output is +34 db, input impedance is 200 ohms, output impedances are 500 ohms and 8 ohms, and power consumption is 175 watts. This amplifier is a compact four-stage unit assembled on a depressed panel type mounting plate, and requires 14" of mounting space on a standard 19" rack. It employs six of the improved new type long life vacuum tubes, which must be ordered separately. A plate current meter and meter switch is provided to measure the plate currents of all the vacuum tubes.



R-4006 Amplifier

This is a single-stage A.C. operated rack-mounted power amplifier primarily intended for use in public address or theatre systems where it will operate out of any low powered amplifier into loudspeaker circuits. It has a maximum gain of 20 db; a maximum output of +35 db; an input impedance of 4000 ohms, and an output impedance of 8 ohms. It requires 7" of mounting space on a standard 19" rack. It operates from 105-130 volts 25 or 60 cycle power supply. Two 300-A and one 274-A Northern Electric Vacuum Tubes are required for operation, but must be ordered separately.

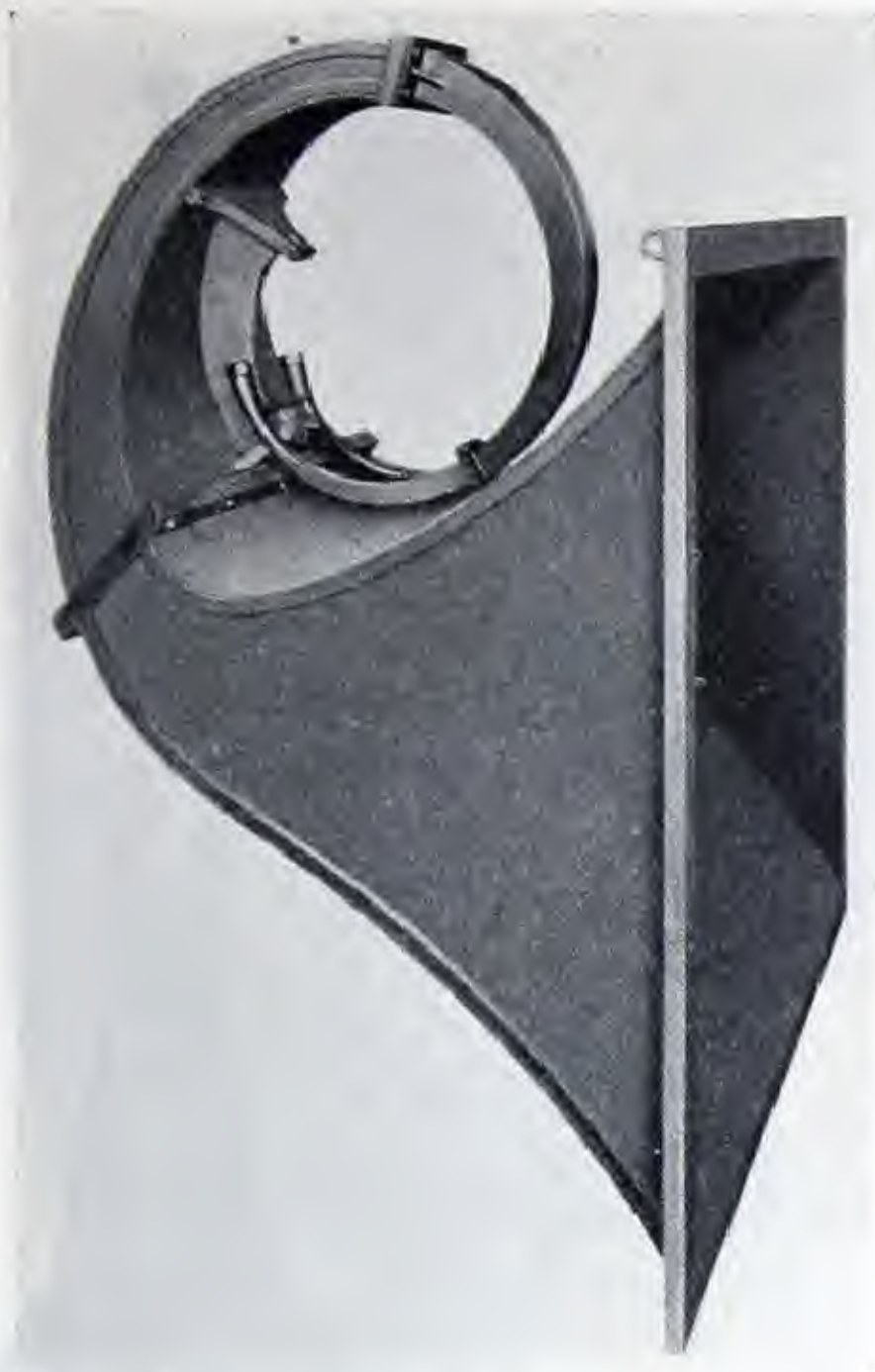


R-4007 Amplifier

This is a single-stage A.C. operated rack mounted power amplifier for use in public address or theatre systems. It has a rated maximum output power of 100 watts (+42 db) and is intended to operate out of an R-4000 type amplifier into a loudspeaker system. It has an input impedance of 500 ohms, an output impedance variable between 4 and 90 ohms; and a maximum gain of 20 db. It consists of two 284-B Vacuum Tubes as an over-biased push-pull Class "A" Amplifier. It operates from 110 volts 25 or 60 cycle power supply and requires about 300 watts. The plate supply is obtained through a rectifier-filter consisting of four 253-A Vacuum Tubes in a bridge circuit. A 274-A Vacuum Tube and an associated filter supply the grid biasing voltage for the amplifier tubes. This amplifier requires 15¾" of mounting space on a standard 19" rack. The seven vacuum tubes required for operation are not supplied as part of this amplifier and must be ordered separately.

Prices on request.

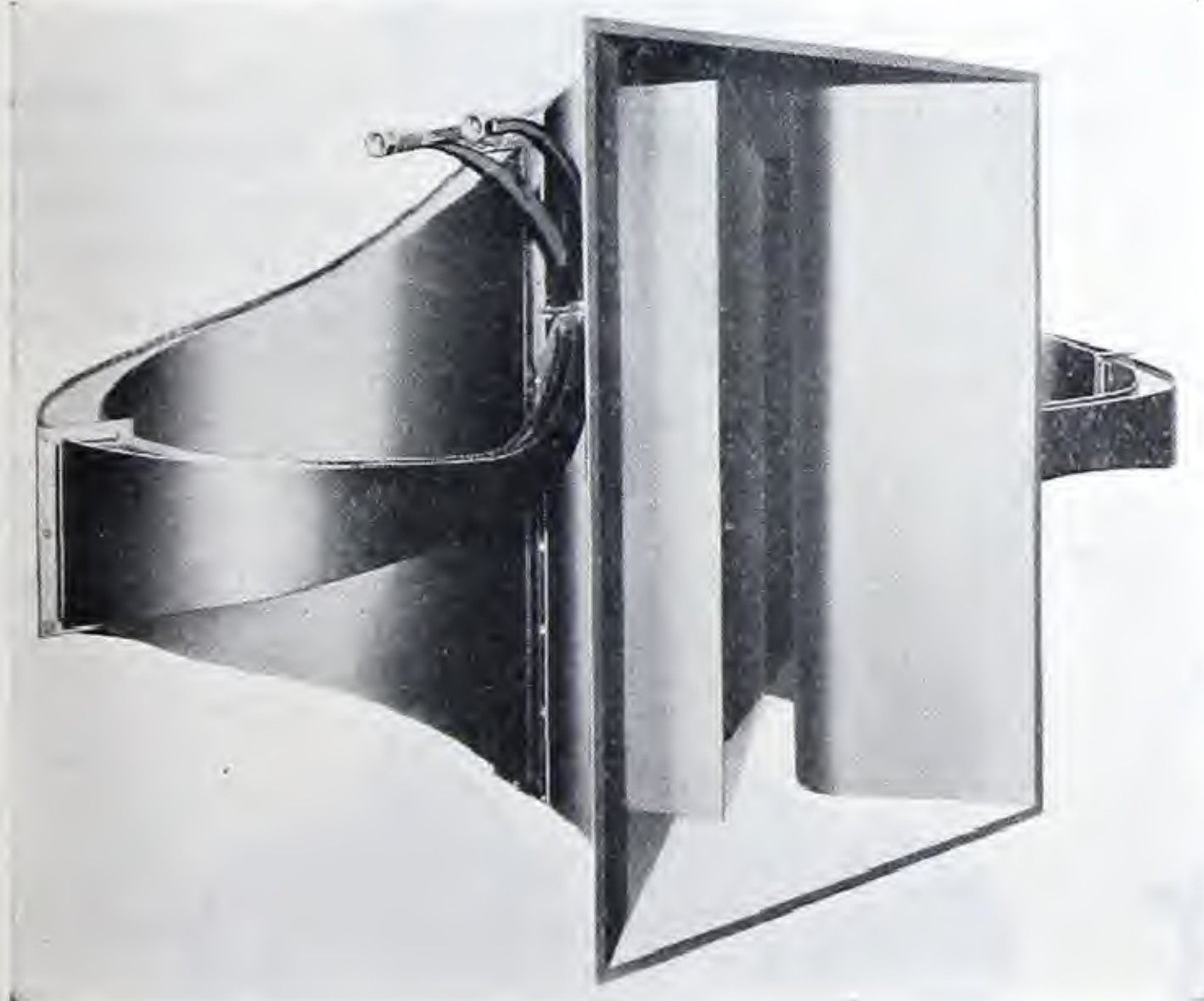
PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT



15 Type Horn

The 15-A Horn is a wooden exponential horn for speech and music reproduction, having a spiral profile and a rectangular cross-section. It is adapted for the attachment of a 555 Receiver, and fittings are fastened to the horn to permit suspension. It has a low frequency cut-off of 57 cycles. The mouth opening of this horn is 4' 4" square and the over all height is 6'. The developed length is 14'. It has a black finish and weighs about 140 lbs.

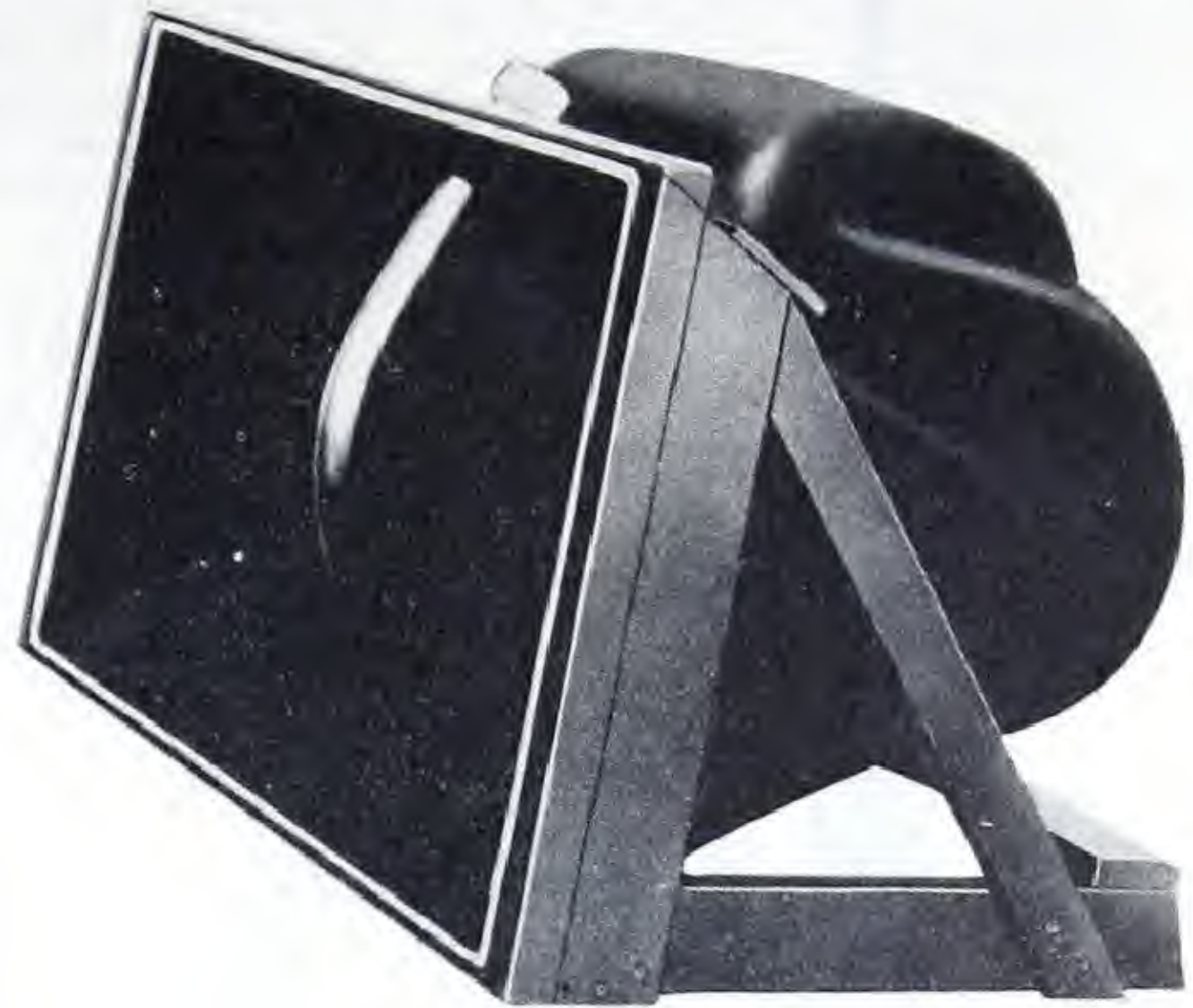
The 15-B Horn is similar to the 15-A Horn except that it is equipped with a receiver attachment for attaching two 555 Receivers to produce double the volume of sound obtained from the 15-A Horn.



16-A Horn

This is a sheet steel divided horn and is intended for speech and music reproduction where available space is shallow. The sound passage is rectangular in section and exponential in shape, and is divided into two independent parts a short distance back from the mouth. The extreme ends of the sound passages are flanged to mount to receiver attachments, each of which is suitable for attaching two 555 Receivers. Fittings are provided to permit suspension of the horn. It has an approximate low frequency cut-off of 57 cycles. The mouth opening of this horn is 3' 8" wide and 5' high. The over all width is 8' 10 3/4". It has a developed length of 9' 11". This horn weighs about 400 lbs.

RACON HORNS



513 Type Horn

Bell 18 in. x 24 in. Depth 23 1/2 in.

Overall dimensions 21 1/2 x 26 1/2 x 23 1/2 in.

Air column 7 1/2 feet.

Equipped with cast aluminum throat, patented self-supporting frame, bronze loose coupling.

Particularly adapted for auditoriums, light portable equipment, and public address systems, where small size and light weight are desirable.

A departure in standard horn design, giving excellent musical, as well as speech reproduction out of proportion to the size of the horn.

Weight 23 1/2 pounds including frame.

Stormproof type guaranteed for all climates and weather.

Code: 513-A Outdoor Type—Stormproof.

Code 513-B Indoor Type—De Luxe.



511 Type Monitor Horn

Bell 10 in. x 20 in. Depth 13 1/2 in. Air column 48 in.

Equipped with bronze loose coupling.

This horn has been particularly developed for monitor service and for paging systems and similar requirements where a small, compact, efficient projector is required. Excellent for all speech service. Supplied with universal mounting bracket.

Weight 4 pounds.

Code: 511-A Stormproof.

Code: 511-B De Luxe.

PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT
RACON HORNS



415-A Horn

Unbreakable 6-Foot Reinforced Horn

Bell, 30 inches diameter. Length, 6 feet.

Demountable into three sections. Equipped with cast aluminum throat, cast aluminum joints, reinforced bell rim and loose coupling for unit attachment.

Made of Racon Acoustic Stormproof Material, reinforced throughout. Guaranteed unbreakable. The last word in trumpet design and particularly adaptable where high quality and high efficiency is required, with the ability to withstand the roughest handling without breakage.

Weight, 19 lbs.

414-A Horn

Bell, 30 inches diameter. Length, 6 feet.

Stormproof. Equipped with metal rolled-on beaded edge, reinforced cast aluminum throat and 4 inch suspension ring. Guaranteed for outdoor use in all climates and weathers. Loose coupling for unit.

Weight, 21 lbs.

Note. These horns are used in conjunction with No. 555 Receivers.

STORMPROOF TYPE GUARANTEED
WEATHERPROOF INCLUDING
IMMERSION IN WATER



417-A Horn

All Aluminum 6-Foot Horn

Bell, 30 inches diameter. Length, 6 feet. Demountable into four sections. Equipped with cast aluminum throat, sturdy clamping edges, reinforced bell rim and loose couplings for unit attachment. Proper acoustic design to reproduce the full range response.



411-A Horn



416-A Horn

Portable 6-Foot Stormproof Horn

Bell, 30 inches diameter. Length 6 feet.

Demountable into three sections for portability. Equipped with metal beaded edge, cast aluminum throat, cast aluminum sections at all joints and loose coupling for unit.

Weight, 27 lbs.

A Public Address Horn adapted for use on sound trucks, where portability is essential and storage space limited.

411-A Horn

Bell, 22 inches diameter. Length, 3½ feet.

Stormproof. Equipped with rolled-on metal beaded edge, reinforced cast aluminum tone arm, and suspension ring. Loose coupling for unit. Guaranteed for outdoor use in all climates and weather.

Weight, 11 lbs.

ALL HORNS FURNISHED WITH
GRAY FINISH UNLESS
SPECIFIED BLACK

PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT



595 Type Loudspeaking Telephone

This is a 12" moving coil loudspeaker, the frequency response of which is from 50 to 7000 cycles. The impedance of the voice coil is 16 ohms. Field excitation is required, and the loudspeakers can be supplied for the following field windings:

Z-595A	2.4 amperes at 12 volts d.c.
595A	1.2 amperes at 24 volts d.c.
595B	0.6 amperes at 45 volts d.c.

This 595 type Loudspeaking Telephone may be mounted either in a cabinet or on a baffle.



596 Type Loudspeaking Telephone

Prices on request.

The 596 Type Loudspeaking Telephone is a high frequency moving coil horn type unit, having a frequency range from 3000 to 12000 cycles. The horn is very small being only $4\frac{3}{4}$ " long and $2\frac{5}{16}$ " in diameter at the opening. The impedance of the voice coil is 20 ohms. Field excitation is required, and loudspeakers can be supplied for the following field windings:

596-A	1 ampere at 7 volts d.c.
596-B	0.3 ampere at 24 volts d.c.

This loudspeaking telephone may be mounted either in a cabinet or on a baffle. On account of the fact that frequencies below 3000 cycles will overload this loudspeaker, an R-7401 Network must be used when connecting to the output of an amplifier. The Z-133 Bracket is designed for mounting this loudspeaker to a baffle, but must be ordered separately.



555 Receiver

This is an electro-dynamic or moving coil type receiver of high efficiency (about 35%), and when connected to a horn is used as a general purpose loudspeaker. The impedance of the voice coil is 16 ohms; and it requires 1.5 amperes d.c. at 7 volts for field excitation. On account of the efficiency of this receiver the output volume is greater than most loudspeakers, and lower power amplifiers may be used than with other commonly used types of speakers, to obtain the same volume. The 555 Receiver may also be used in conjunction with the 595 and 596 type Loudspeakers to obtain the improved distribution of sound which is obtained with the 555 Receiver connected to a horn.



RPS-176-A Loudspeaking Telephone

This is a 12" dynamic loudspeaking telephone with self-contained field supply, and can be mounted on a baffle or in a suitable cabinet. It requires a 110 volt 60 cycle a.c. power supply for operation. One Northern Electric 274-A Vacuum Tube is required for operation, but must be ordered separately.

When required for 25 cycle operation, it should be ordered as the RPS-176-B Loudspeaking Telephone.

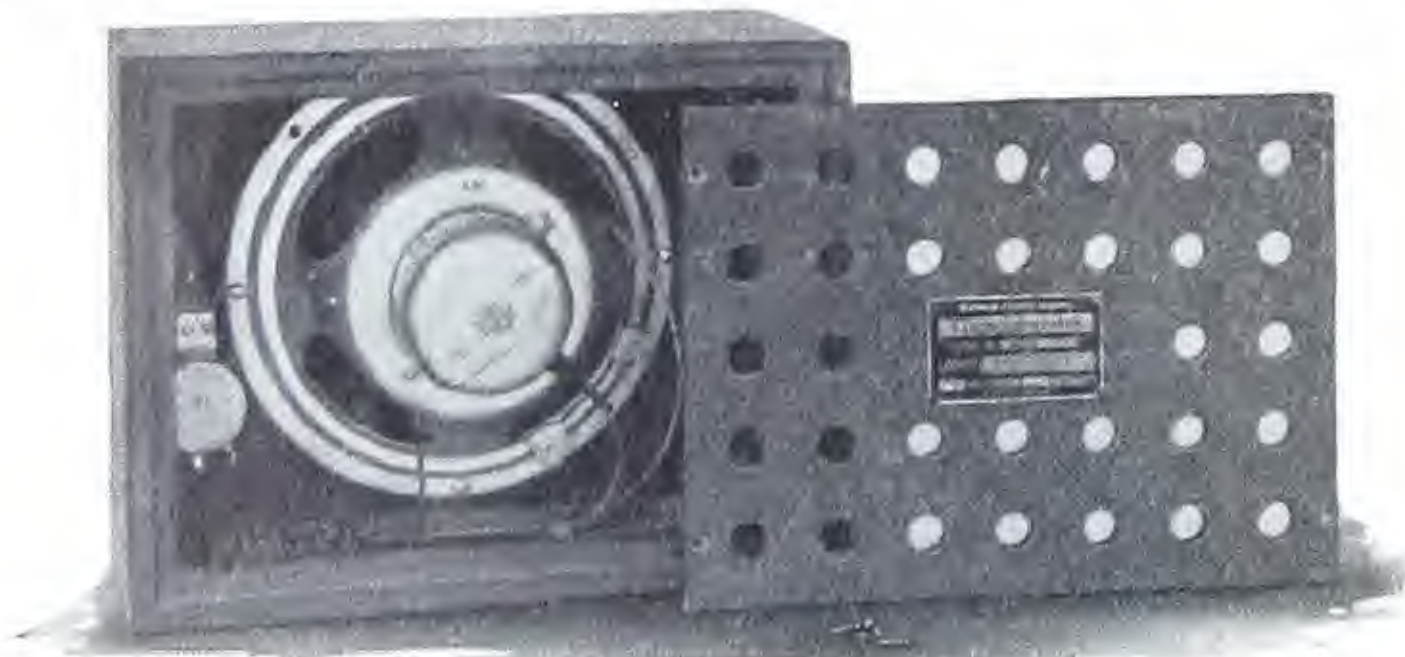
PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT



R-6912 Type Loudspeaker with Front Cover Removed

This Loudspeaker consists of a 12" RPS-176-A Dynamic Loudspeaking Telephone mounted in a carrying case 20" x 20" x 11", and weighs about 60 lbs. The carrying case is made of reinforced plywood covered with black leatheroid fabric, and has two removable covers which are held in place by trunk fasteners. A power cord 15' long and a three-prong plug for the voice circuit are also supplied as part of this loudspeaker. This loudspeaker works in conjunction with the RPS-100-F Amplifier in small public address systems for auditoriums, schools, halls, etc.; and can also be used as an extension to a radio receiving set loudspeaker. It requires a 110 volt 60 cycle a.c. power supply for operation. One Northern Electric 274-A Vacuum Tube is required for operation but must be ordered separately.

When required for 25 cycle operation, it should be ordered as the R-6912-B Loudspeaker.



R-6905 Loudspeaker—Rear View

This Loudspeaker is intended for use in announcing systems and consists essentially of an 8" dynamic speaker mounted in an ornamental wooden cabinet approximately 9" high, 5½" deep and 12" wide. The voice coil has an impedance of 4 ohms. It requires .05 amperes d.-c. at 24 volts for field supply.

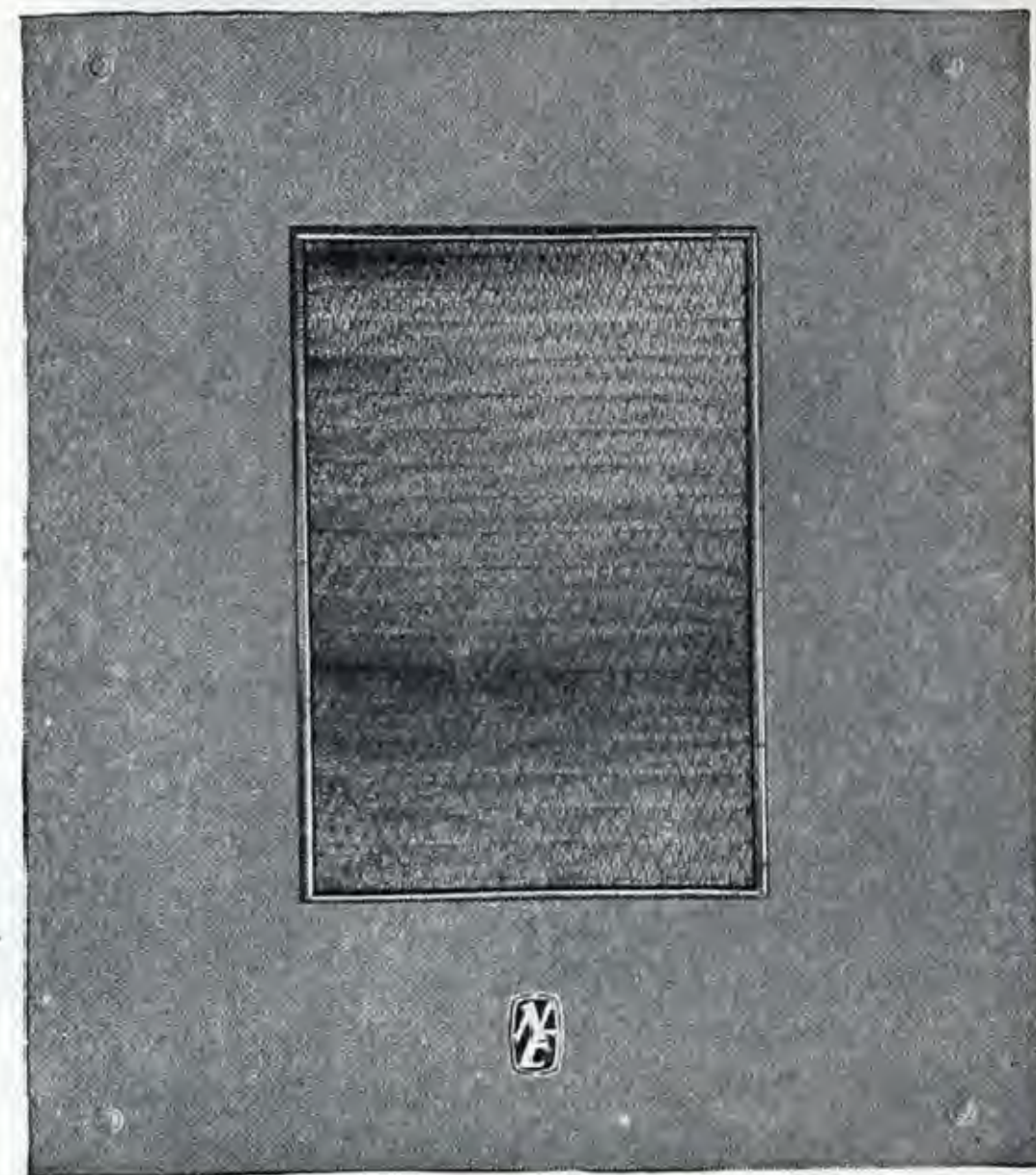


R-6905
and
R-6914
Loudspeakers

The R-6914 Loudspeaker is intended for use in small music reproducing systems and consists essentially of an 8" magnetic speaker mounted in an ornamental wooden cabinet approximately 9" high, 5½" deep and 12" wide. The input impedance is 4000 ohms. In appearance the cabinet is the same as the R-6905 Loudspeaker.

R-6917 Loudspeaker

This loudspeaker is primarily designed as a high quality monitoring speaker for use in public address and music reproducing systems. It consists of a Z-595-A Loudspeaking Telephone and an R-7820 Power Unit, mounted on a floor type walnut finished cabinet. It has a volume control, power "On-Off" switch, and operates from 110 volts 25 or 60 cycle power supply. The input impedance is 8 ohms.



R-6918 Loudspeaker—Front View

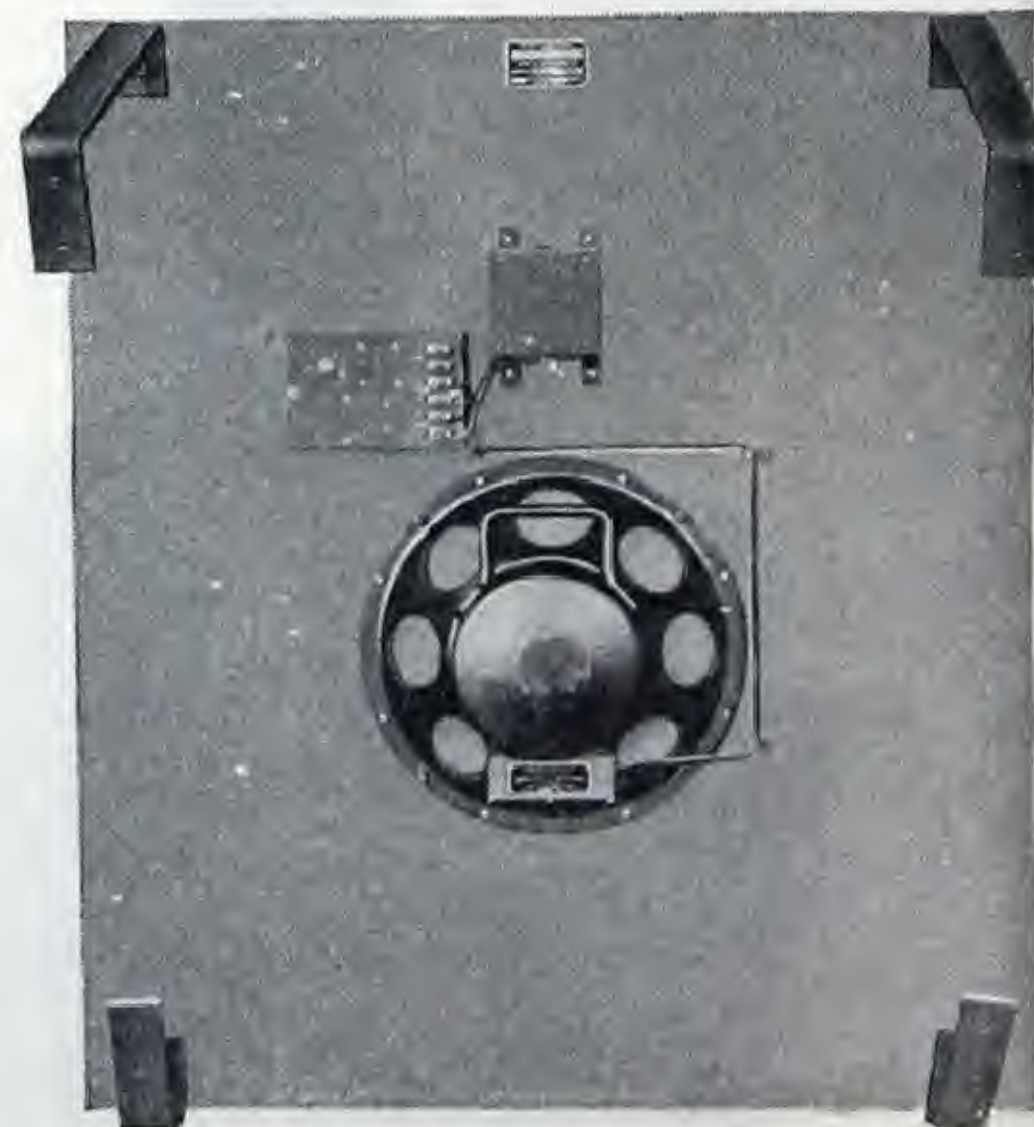
The R-6918 loudspeaker is a high quality monitoring speaker for use in public address and music reproducing systems. It consists of a 595-A and a 596-B Loudspeaking Telephone mounted on a 3' x 3'6" wooden baffle for wall mounting. Acoustic cloth is fitted over the mouth of the Speaker, and the front of the unit is finished in aluminum grey. An R-7401 Coupling Network is mounted on the back of the baffle, and a 24 volt 1.6 amperes d.c. supply is required for the field supply. This unit is complete with mounting brackets.

R-6919 Loudspeaker

The R-6919 loudspeaker is a high quality monitoring speaker for use in public address and music reproducing systems. It consists of a 595-A Loudspeaking Telephone mounted on a 3' x 3' wooden baffle intended for wall mounting. Acoustic cloth is fitted over the mouth of the speaker and the front of the unit is finished in aluminum grey.

A 24 volt 1.2 ampere d.c. source is required for field excitation. This unit is complete with mounting brackets.

Prices on request.



R-6918 Loudspeaker—Rear View

PUBLIC ADDRESS and MUSIC REPRODUCING EQUIPMENT



R-8401 type Reproducer Set—Cover Removed

This is a portable reproducer set designed for use in conjunction with music reproducing and public address systems for reproducing lateral cut disc records recorded at either $78\frac{1}{2}$ or $33\frac{1}{3}$ R.P.M. and up to 12" in diameter. It is made in two models, the R-8401-A for use on 60 cycle operation and the R-8401-B for use on 25 cycle operation. It consists essentially of a motor and turntable for driving the records, and an electro-magnetic reproducer equipped with a volume control. This apparatus is mounted in a sheet aluminum carrying case equipped with a removable cover. When closed for carrying it is approximately 1'3" wide, 1'6" long, and $7\frac{3}{8}$ " deep. It is finished in black crinkled lacquer with chromium plate trim, and weighs about 26 lbs.

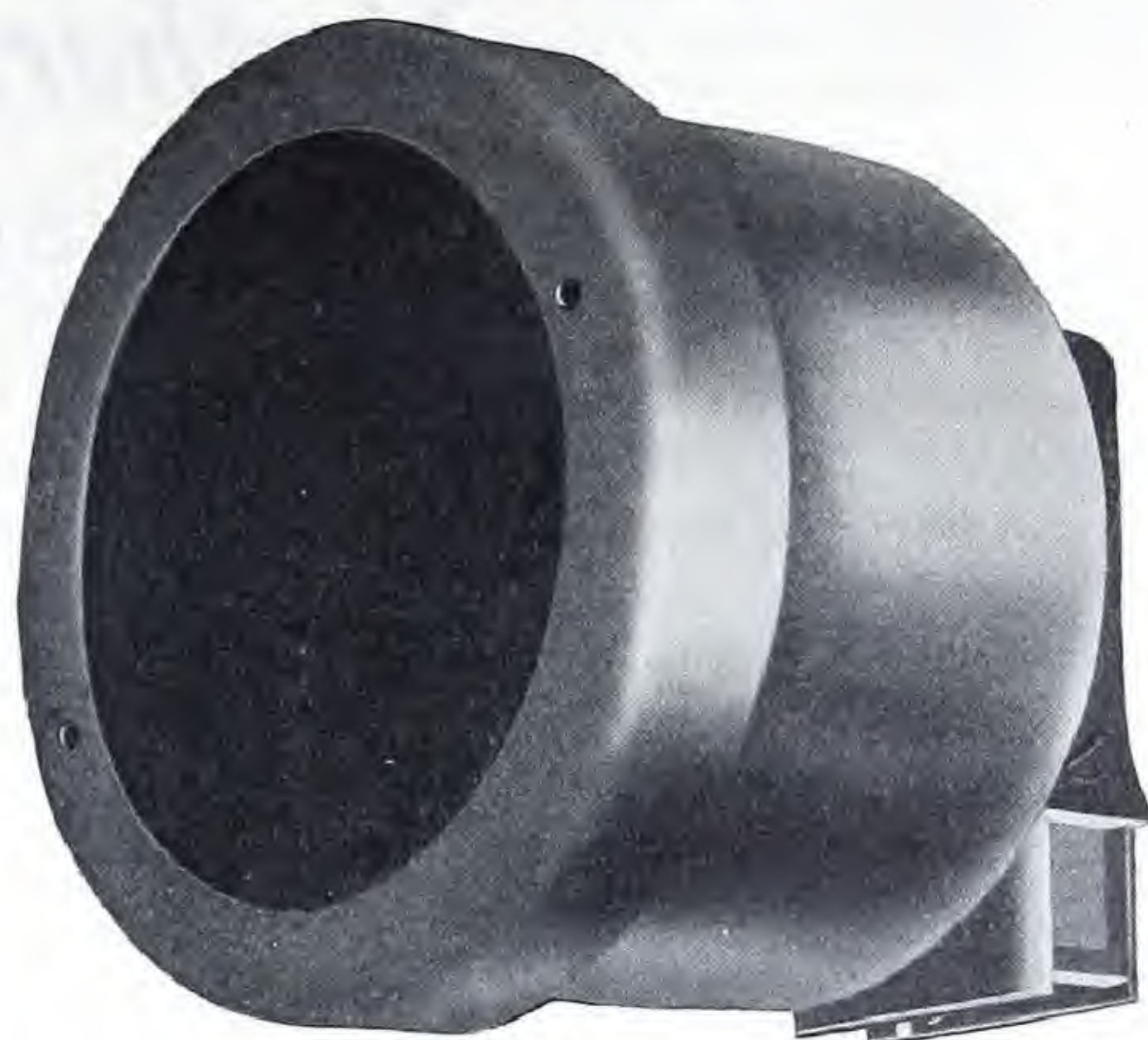


R-7550 Public Address System

This is a portable public address system completely a.c. operated, and entirely self-contained in a small attractive and compact carrying case 14" high, 12" wide and 8" deep. This unit includes an amplifier, vacuum tubes, loudspeaker, cords, and a microphone, and has sufficient volume for a small hall or auditorium. Provision is made for connecting this portable public address system to an R-8401 Reproducer Set. The weight of this unit is about 35 lbs., and it is supplied with a black crackle finish.

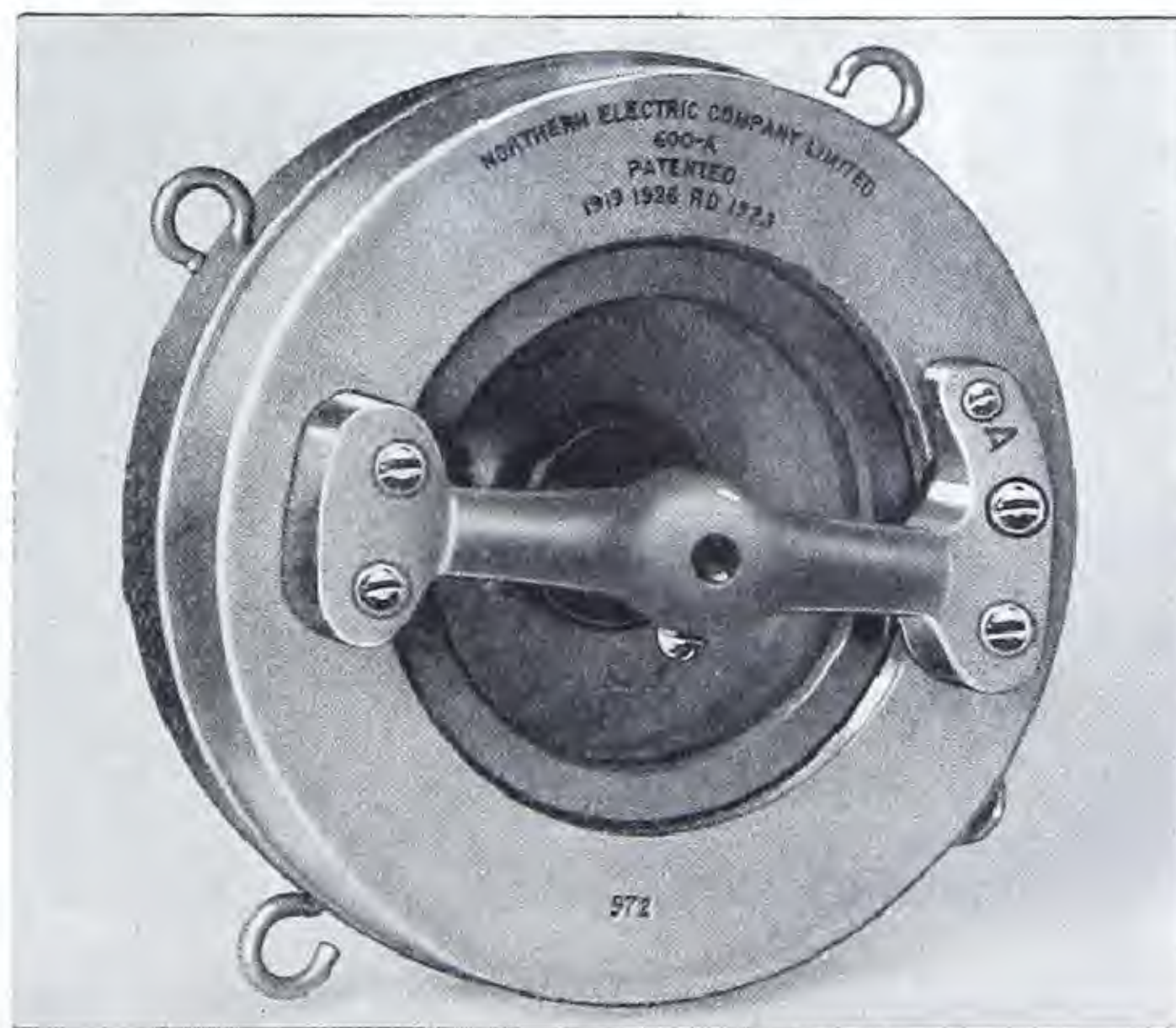
Note. For other associated apparatus see Speech Input Equipment Section.

Prices on request.



618-A Transmitter

This dynamic microphone is entirely free from all sources of distortion, has a low noise level, is compact and rugged and is not affected in its performance by changes of temperature, humidity and barometric pressure. Embodying the most recent advances in electro-acoustic design it represents a distinct advance over other pick-up equipment in use at the present time. The frequency response is uniform for the complete range of audible frequencies. The rugged and simple construction insures a long and satisfactory life. Protection for the diaphragm is provided for by a perforated metal grid covered with silk and held in the face of the transmitter by a threaded ring. The grid and the metal shell which forms the housing of the transmitter are insulated from a moving coil and constitute a shield which may be connected to ground. A three-conductor jack is mounted on the back of the housing. The dynamic microphone is approximately $3\frac{1}{4}$ " in diameter, is about 3" deep and weighs $2\frac{1}{2}$ lbs. It will be furnished in an oxidized bronze finish, unless a black crackle finish is required.



600-A Transmitter

This is a double button high quality microphone, in which the harmonics are materially reduced as compared with the single button type. It is of the push-pull type, consisting of two heavy metal rings clamping a thin stretched duraluminum diaphragm which actuates two carbon buttons mounted one on each side. Each button is mounted over a gold-plated spot in the center of the diaphragm. It has a nickel finish and is approximately $3\frac{1}{2}$ " in diameter and 2" deep.

Northern Electric

AUDIPHONES

After years of research the equipment which today is available to the hard of hearing enables them to be brought back into the world of sound, and take a normal place in business and social affairs. This is accomplished by the aid of a small microphone, an amplifier box and a tiny earpiece.

The distinctive character of these new hearing aids is quickly discernible. They are compact, light in weight, and neutral in color with all exposed metal surfaces attractively finished in blue-gray damaskeen. Every line is expressive of refinement. Three different types are available to meet individual tastes and requirements. Each type is suitable for adults and children. These Audiphones are designed so that they may be carried conveniently on the person. While they may be concealed easily, their pleasing appearance makes it

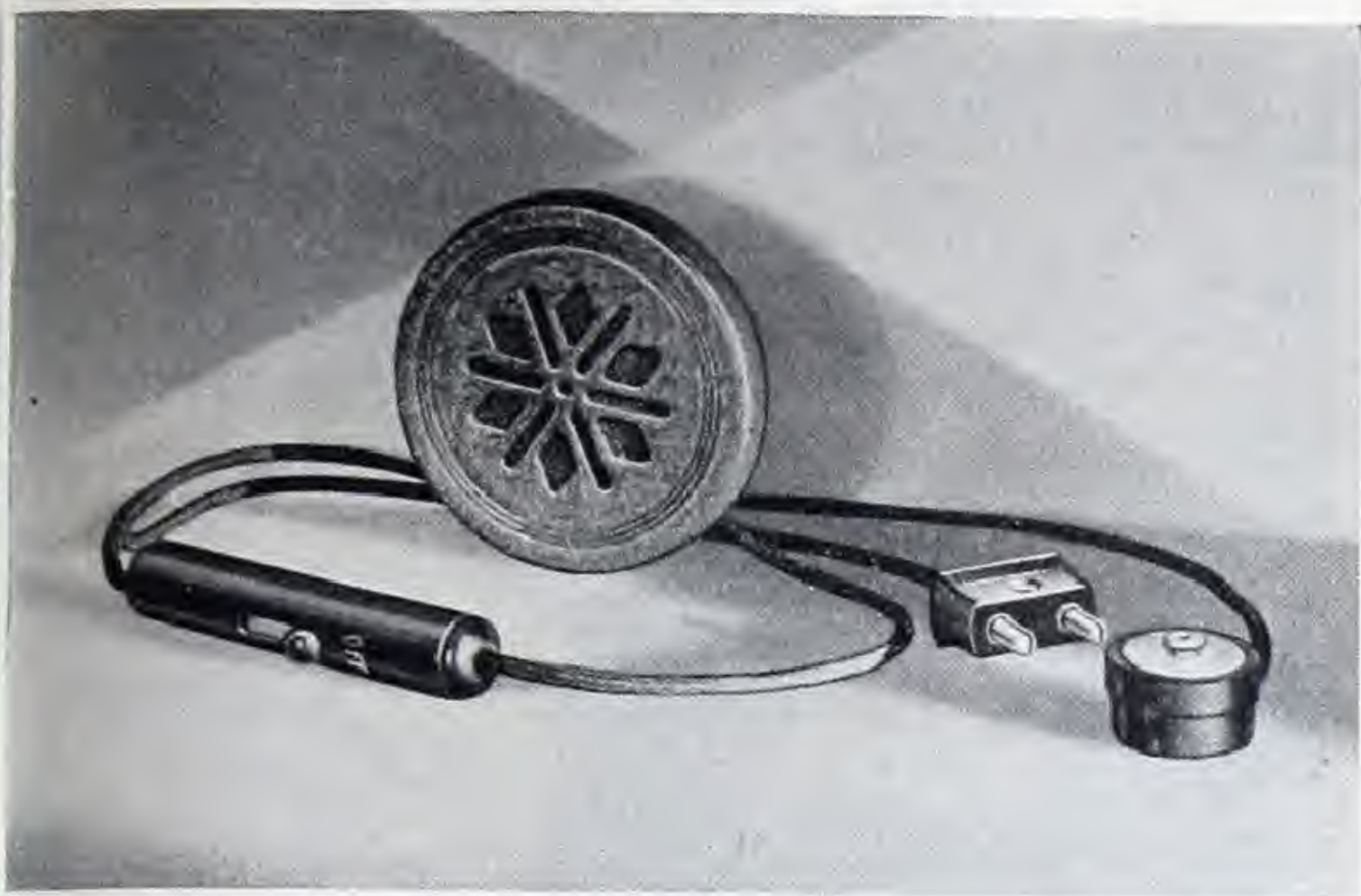
unnecessary to do so. You will be pleased with the neat appearance, the sturdy construction and the dependable performance of these new hearing aids.

Where the aural nerves are so affected as to prevent amplified sound being of material assistance, a new development known as the "bone-conduction" receiver may be used. By means of a headband, this is held close to the bone structure at the back of the ear, and sound vibrations actually passed through the bone can be detected by the affected person.

Special group audiphone equipments are available for use in churches, theatres and other public places, to enable deaf persons to hear the proceedings as clearly as persons whose hearing is normal.



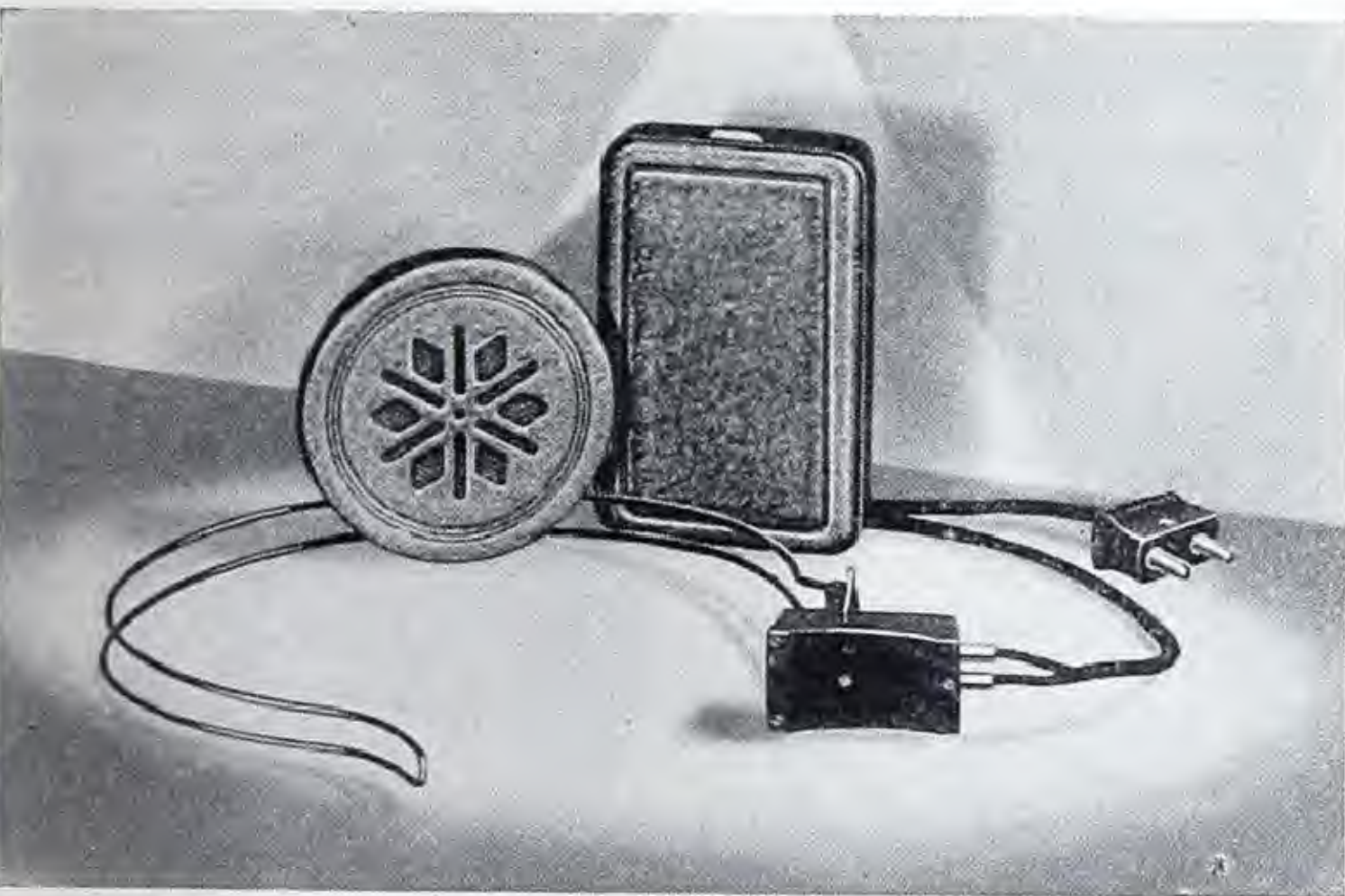
AUDIPHONES



36 Type Audiphone

The 36 Type Audiphone is suitable for adults or children whose hearing impairment is not of an extreme character. The instrument is provided with a control for regulating the volume of sound to meet individual requirements. The quality of sound reproduction is excellent.

No amplifier is used with this audiphone and because of its small size and neutral, gray color, the instrument is scarcely noticeable, even when worn on the outside of the clothing.



37 Type Audiphone with Bone Conduction Receiver

The 37 Type Audiphone includes an amplifier and is especially suitable for adults or children whose hearing impairment is of an extreme character, or for those persons who prefer a more powerful instrument than the 36 Type.

Either a bone or an air conduction receiver may be used.

It is designed for use for persons who wish to carry the microphone and amplifier in separate pockets or other convenient places about the clothing. A control is provided for regulating the volume of sound.

MICROPHONES

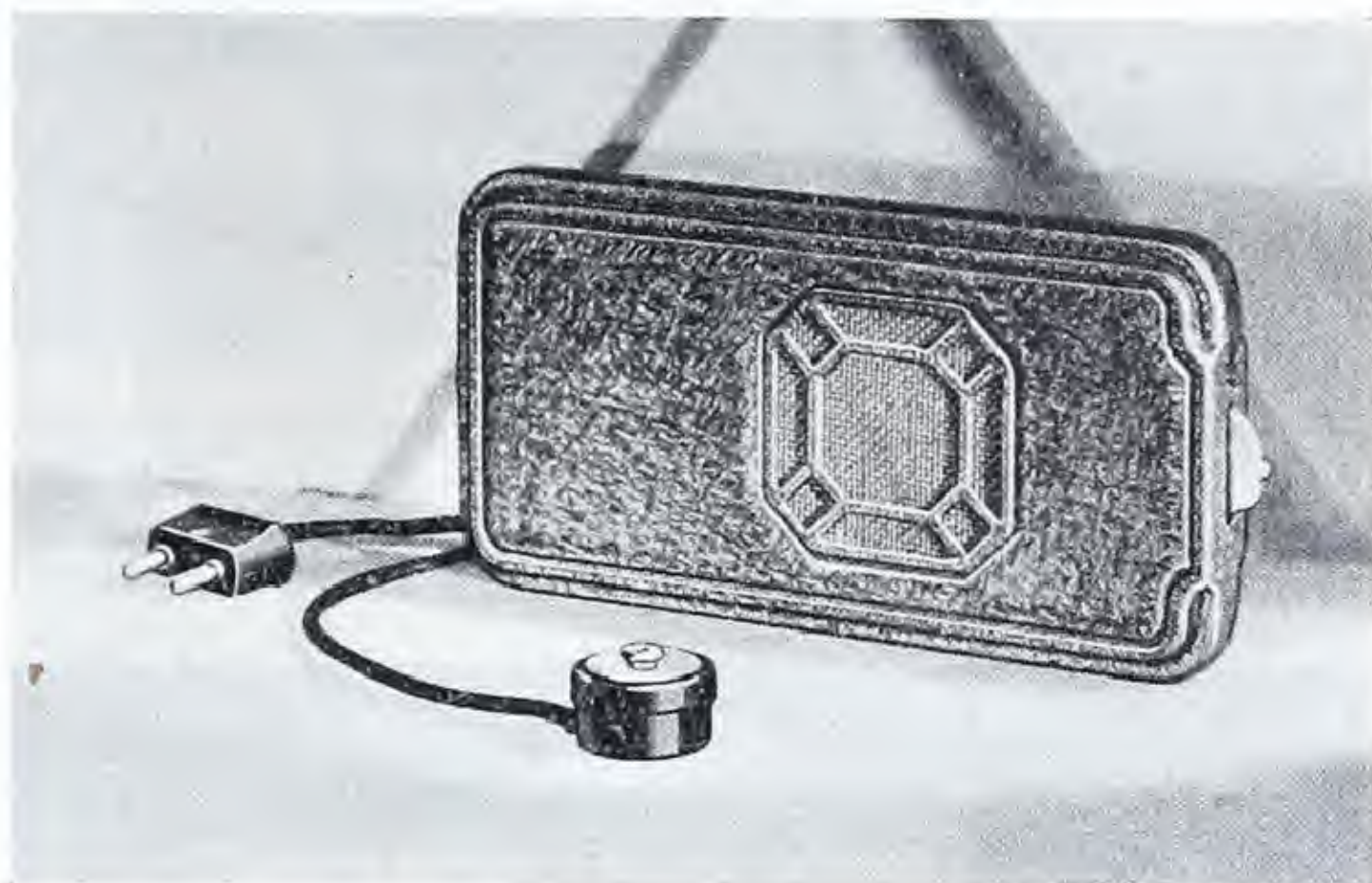
The microphones used in the 36, 37 and 38 Type Audiphones are small, thin discs measuring $2\frac{1}{2}$ inches in diameter and weighing but $2\frac{1}{2}$ ounces. The remarkable efficiency and high sensitivity of these microphones is largely responsible for the faithful reproduction of sound obtained with these Audiphones.

AUDIPHONES

The 38 Type Audiphone is designed for the benefit of those users who prefer the amplifier and microphone in a single unit. Many users also choose this instrument because it may be carried in a leather covered case.

The 38 and 39 Type Audiphones are equally powerful, but in the 38 Type the microphone, amplifier and control, instead of being separated, are assembled in a neat metal box somewhat similar in size and shape to a cigarette case. This case is finished in the same blue-gray as the exposed metal surfaces of the other audiphones.

Either a bone conduction or an air conduction receiver may be used with this audiphone.



38 Type Audiphone
Air Conduction Receiver

The air conduction receiver is small, inconspicuous, highly efficient and capable of reproducing a wide range of frequencies. It is designed to be held in the ear by a receiver attachment (earpiece). The diameter of the receiver is approximately $\frac{1}{8}$ of an inch, and the weight but $\frac{3}{4}$ of an ounce. Receiver attachments for use with this receiver are illustrated below.



Receiver Attachments

Two types of receiver attachment (ear pieces) are available for use with the air conduction receiver. At the left is the 5-A individually moulded, and at the right is a soft rubber, universal type ear piece, coded as the 14 Type Receiver Attachment.

BONE CONDUCTION RECEIVER

The new 700-A Bone Conduction Receiver is capable of transmitting a wide range of frequencies and is interchangeable with the air conduction receivers on 37 and 38 Type Audiphones. This receiver is light in weight, inconspicuous, and is form fitting in shape. The surface which makes contact with the head is concaved to conform to the shape of the mastoid bone with which it makes contact.

The bone conduction receiver is held in position by either one of two ways. It may be used with a light inconspicuous headband which is furnished, or it may be used with a lorgnette handle which may be obtained at a moderate additional cost.

AUDIPHONES



12-A Carrying Case

The metal, vanity-like carrying case, covered with dark blue leather, is designed for use with the 38 Type Audiphone. Its size is 6 inches long by $3\frac{3}{8}$ inches wide by $2\frac{3}{8}$ inches deep.



Nos. 7106, 7106B, 7107 and 7108 Batteries

When choosing a battery it is well to keep in mind that the audiphone operates equally well with any of these batteries but that in general the life of batteries varies with their size. In other words, a larger battery may be expected to have a longer life than a smaller one.

These batteries are of the highest quality, and when their sizes are taken into consideration, yield unusually long service.



No. 11C Battery Box

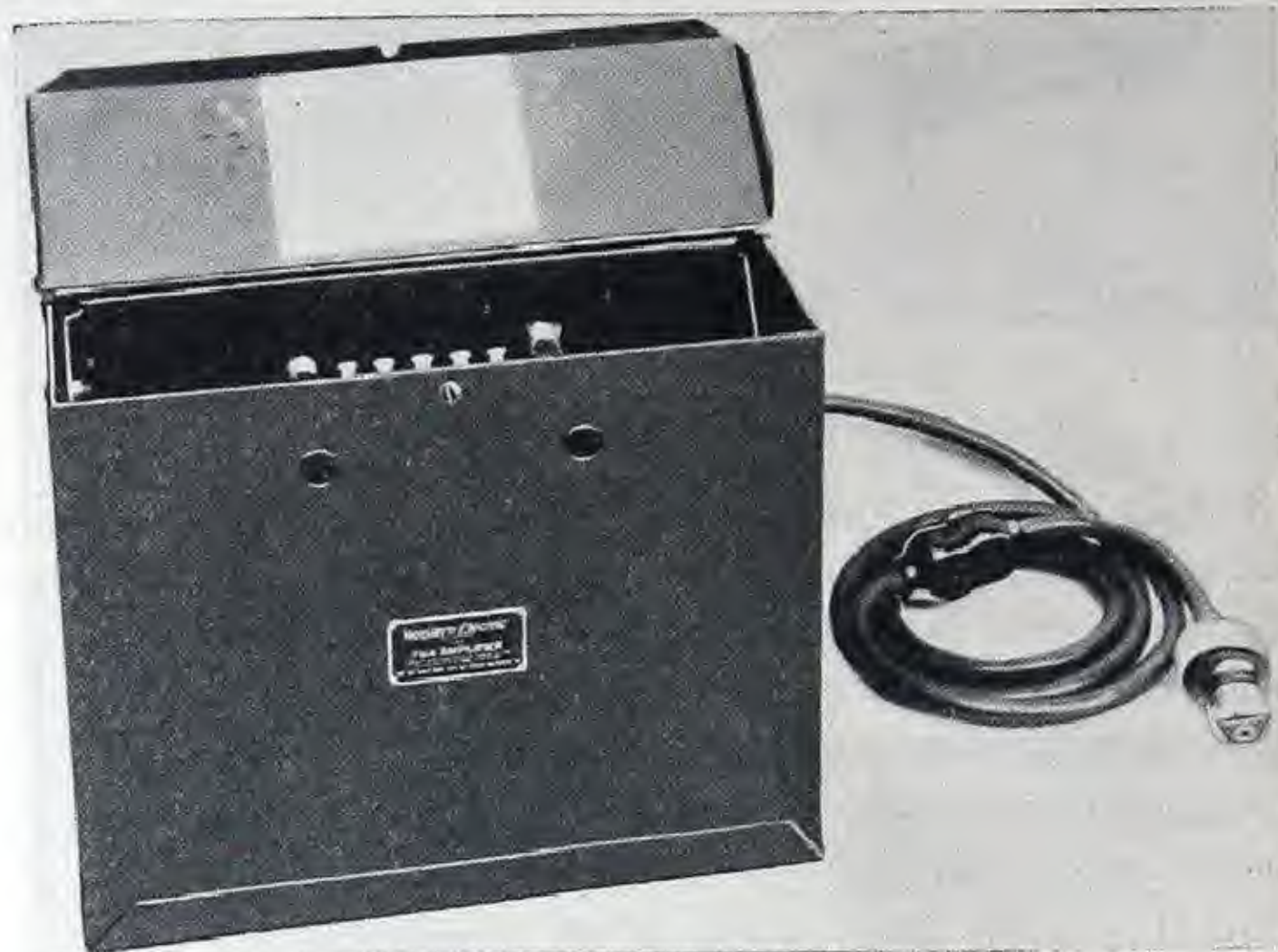
The No. 11C Battery Box provides a convenient method of carrying three ordinary flashlight batteries. A jack is provided in one end of the box for plugging the audiphone into the battery circuit.

AUDIPHONES

6041A Group Audiphone

This new audiphone, consisting of a small microphone, or transmitter and headsets, requires no batteries, operating entirely from 110 volt, 60 cycle alternating current obtained from any convenient outlet. The microphone, headsets, volume controls and cord are light in weight and attractively finished. They are constructed of materials which will withstand severe usage. They can be installed in theatres, churches, schools and other public buildings with very satisfactory results.

This equipment with the necessary wiring and jacks will serve from one to thirty headsets or receivers.



79-A Amplifier

The amplifying unit is of the single stage frequency type. Its dimensions are $11" \times 9\frac{3}{4}" \times 9"$. This amplifier is efficient in operation and is designed to connect directly to 110-120 volt, 25-60 cycle commercial power main. The current consumption is only that of a 40 watt electric light bulb. A connecting cord with an "ON" and "OFF" switch is provided. This switch is the only one required for the operation of the entire system.



616-C Transmitter mounted in a 20-A Transmitter mounting and equipped with a T2L Cord



6064-A Telephone Set which includes the 700-B Bone Conduction Receiver

A 6055-D Telephone Set should be ordered if an air conduction receiver is required. This telephone set differs from the 6064-A Telephone Set in that the 700-B Bone Conduction Receiver and 14-A Headband are replaced by the 528 Air Conduction Receiver.

Northern Electric

SOUND PICTURE EQUIPMENT

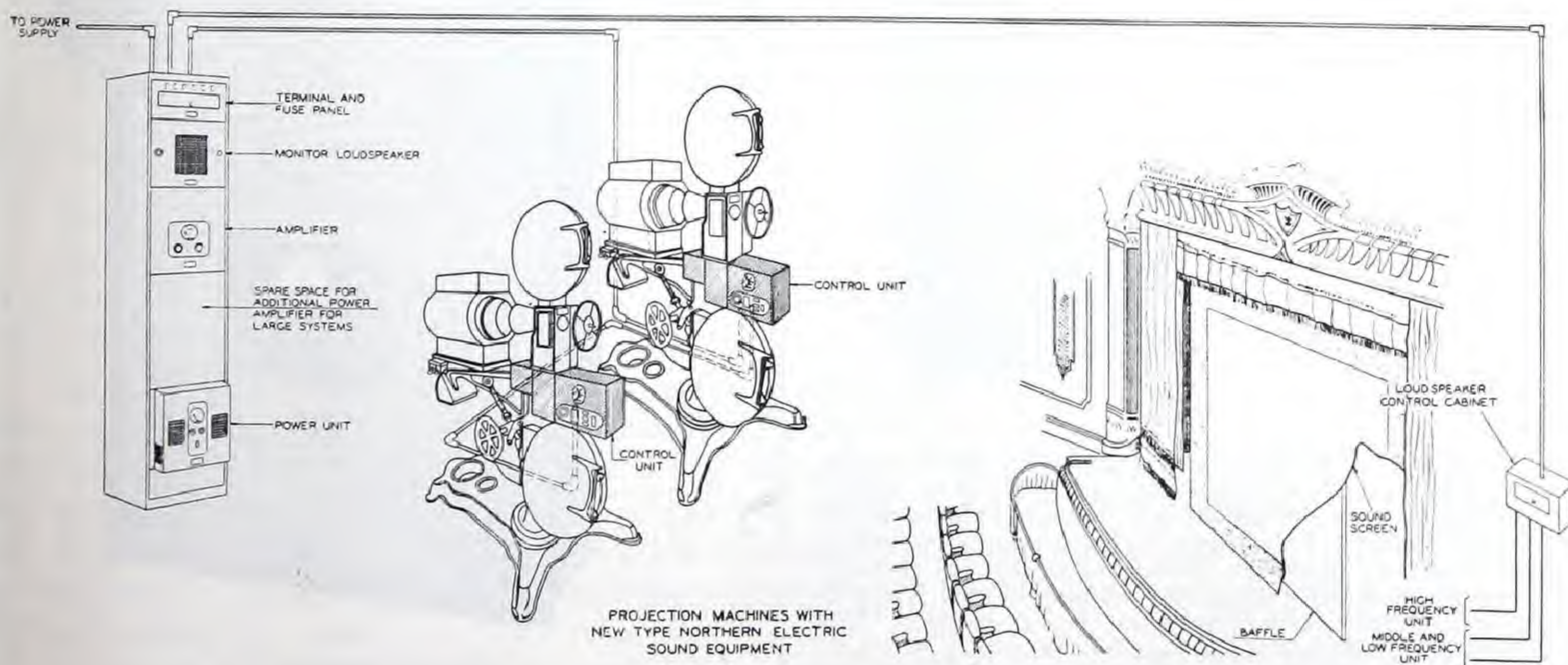
The Northern Electric Company pursuing their general policy of constantly improving their product, have developed and produced an entirely all new A.C. operated theatre sound system as an improvement of the former designs of sound picture equipment.

The Northern Electric engineers who have designed this new and improved equipment have had in view a sound picture system which would incorporate compactness, simplicity and better sound quality at the lowest price consistent with high quality. The result is the new No. 5 Series Northern Electric all A.C. operated Wide Range Theatre System, designed by Northern Electric engineers with the background and experience of the Bell Telephone Laboratories and their years of organized research in acoustic and electrical sound reproduction. It is manufactured entirely in Canada.

This system surpasses all previous sound equipments in compactness, sound quality, ease of operation and reliability. It incorporates the latest improvements in sound technique.

Its simplicity is apparent since batteries, battery-chargers and motor-generator sets are eliminated by all A.C. operation. It can be installed in much less time than previous systems, due to the fact that all the projector room equipment, except that mounted on the projection machines, is factory built into a single enclosed unit. The sound pick-up equipment employed assures the highest quality of reproduction. New type long life tubes are used which will give reliable operation over a long period. This equipment includes also the features of extended frequency range, high output power and low noise level which have made previous Northern Electric Wide Range Theatre Systems so successful.

The design and manufacture of this equipment has been carried out with the same precision and attention to detail that has characterized Northern Electric Theatre Systems from the inception of sound pictures, and every detail of assembly and finish is carefully checked and inspected.

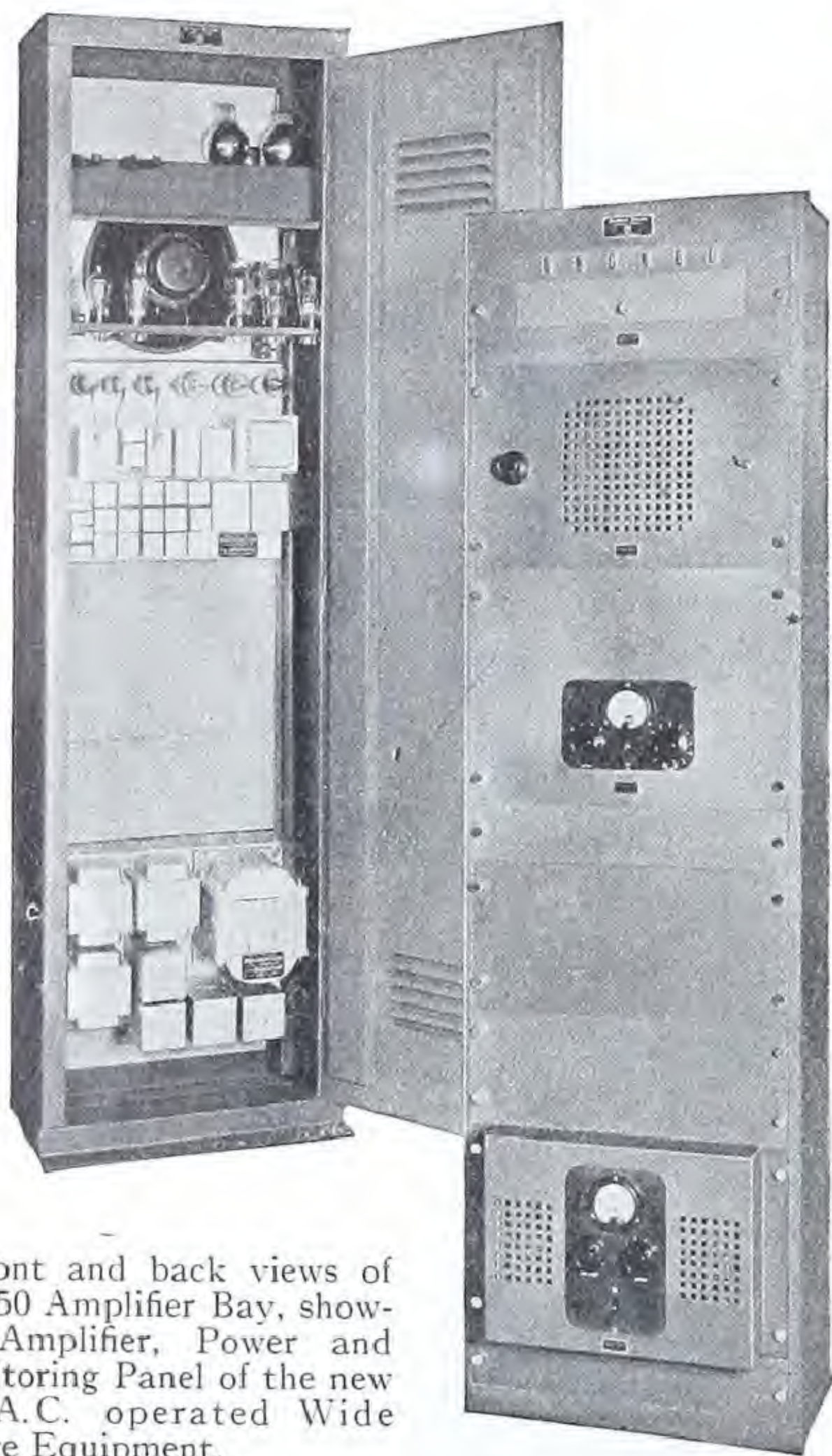


Wiring layout of a theatre using the New all A-C operated Wide Range Equipment

SOUND PICTURE EQUIPMENT

R-4350 Amplifier Bay

This amplifier bay includes the main amplifier, the rectifier-filter unit for supplying direct current to the exciting lamp and speaker field, the monitor loudspeaker, and the fuse and terminal panel. The various panels are mounted on a cabinet type rack which is completely enclosed, and has a three-point locking device for the rear door which is operated by means of a handle. The new depressed panel type of mounting is used for all apparatus, which makes wiring and terminals in each of the panels accessible from the front of the rack. This means that inspection and maintenance can be carried out very easily, and that all parts requiring attention can be seen from the front of the panel by simply removing the front mat. Shelves for holding spare tubes and fuses are set inside the rear door of the amplifier bay so that the spares are instantly available when required. This amplifier bay is all a.c. operated from either a 60 or 25 cycle, 110 volt supply. This unit is 6'0" high, 1'9" wide, 1'0" deep, and weighs approximately 425 lbs. It has an aluminum grey finish.



Front and back views of R-4350 Amplifier Bay, showing Amplifier, Power and Monitoring Panel of the new all A.C. operated Wide Range Equipment.

Only a single amplifier is employed in the whole equipment. This is a compact, four-stage unit with self-contained power supply, and is the highest quality commercial amplifier ever used in theatre sound systems, covering the complete range of audible frequencies without distortion. It employs six of the most recently designed Northern Electric Vacuum Tubes and operates directly from the 110 volt supply. This system is amply sufficient for average sized theatres with a seating capacity of 1000 seats. For larger theatres an additional power amplifier is required, and is included in the R-4352 Amplifier Bay.

Prices on request.

SOUND PICTURE EQUIPMENT

R-4352 Amplifier Bay

The R-4352 Amplifier Bay having an output rating of upwards of 100 watts has ample power to supply the largest theatres using sound equipment. This amplifier bay is the same size as the R-4350 Amplifier Bay and is similar to it except that it has a larger rectifier filter unit, and the addition of a single stage 100 watt power amplifier.

This amplifier bay is required when the seating capacity is in excess of 1000 seats.



R-4352 Amplifier Bay

For loudspeaker units, horns, etc., see Public Address and Music Reproducing Section.

Prices on request.

Northern Electric

VACUUM TUBES

The Northern Electric Company, associated with Bell Telephone Laboratories Inc. and the Western Electric Company, has pioneered in the development and manufacture of electronic tubes for all purposes. The following pages list the operating constants of all types—triodes and multi-element tubes, water-cooled power tubes, relay tubes, and photo-electric cells; also rectifiers of the high-vacuum, gas-filled, and mercury-vapor types.



300A Vacuum Tube



274A Vacuum Tube



267A Vacuum Tube



279A Vacuum Tube

There are three pre-eminent features of Northern Electric vacuum tubes:

First: High efficiency designs. The most recent theoretical and technical developments have been embodied in the designs, resulting in extremely desirable characteristics of tubes of every general type.

Second: Uniform characteristics. In order to ensure that equipment employing vacuum tubes will perform correctly it is essential that the tubes used have characteristics uniform between different tubes of the same type, and that this uniformity should be maintained throughout the useful life of the tubes. By rigid adherence to strict manufacturing tolerances, and careful inspection of every tube, the Northern Electric Company has been successful in obtaining a high degree of uniformity sufficient for practically any application in which vacuum tubes are used.

Third: As a result of precision manufacturing technique, long-period and accelerated life tests and other methods of control, unusually long life is obtained from Northern Electric tubes. This results not only in reduced tube operating costs, but also in freedom from breakdown and in continuity of service of the associated equipment.

VACUUM TUBES

CODE NO.	CLASSIFICATION	CATHODE TYPE	FILAMENT OR HEATER SUPPLY	NORTHERN ELECTRIC SOCKET	MAXIMUM OVERALL DIMENSIONS	
					HEIGHT	DIAMETER
205D 205E	General Purpose Triode..... General Purpose Triode.....	Oxide Coated Fil..... Oxide Coated Fil.....	A.C. - D.C. D.C.	100M - 115B 100M - 115B	4½" 4½"	2⅜" 2⅜"
212E 215A	General Purpose Triode..... General Purpose Triode.....	Thor. Tungsten Fil... Oxide Coated Fil.....	A.C. - D.C. D.C.	113A 125B	13⅝" 2-11/16"	3⅝" 11/16"
220B* 228A*	Water-cooled Power Amplifier..... Water-Cooled Power Amplifier.....	Tungsten Fil..... Tungsten Fil.....	A.C. - D.C. A.C. - D.C.	128A 126A	21½" 18"	3-9/16" 3½"
231D 232A*	General Purpose Triode..... Water-Cooled Power Amplifier.....	Oxide Coated Fil..... Tungsten Fil.....	D.C. A.C. - D.C.	130B - 131A 132A - 133A	4" 30"	1-3/32" 3¾"
236A* 239A	Water-Cooled Amplifier..... General Purpose Triode.....	Tungsten Fil..... Oxide Coated Fil.....	A.C. - D.C. D.C.	132A - 133A 130B - 131A	30" 4"	3¾" 1-3/32"
242A*	Power Amplifier.....	Thor. Tungsten Fil...	A.C. - D.C.	112A - 118 A	7-15/16"	2-5/16"
244A 245A	Audio Amplifier..... Screen-Grid H.F. Amplifier.....	Heater..... Heater.....	A.C. - D.C. A.C. - D.C.	134A - 137A 134A - 137A	4⅞" 5¼"	1-13/16" 1-13/16"
246A 247A	Screen-Grid H.F. Amplifier..... Audio Amplifier.....	Oxide Coated Fil..... Heater.....	D.C. A.C. - D.C.	130B - 131A 134A - 137A	5¼" 4⅞"	1-13/16" 1-13/16"
251A* 252A 254A	H.F. Power Amplifier..... Audio Amplifier..... Screen-Grid R.F. Amplifier, Harmonic Generator...	Thor. Tungsten Fil... Oxide Coated Fil..... Thor. Tungsten Fil...	A.C. - D.C. A.C. - D.C. A.C. - D.C.	142A 130B - 131A 130B - 131A	21-11/16" 6¾" 6-15/16"	6" 2-11/16" 2-7/16"
254B 257A 259A	Screen-Grid R.F. Amplifier, Harmonic Generator... Amplifier..... Screen-Grid H.F. Amplifier.....	Thor. Tungsten Fil... Oxide Coated Fil..... Heater.....	A.C. - D.C. D.C. A.C. - D.C.	130B - 131A 130B - 131A 134A - 137A	6-15/16" 4-9/16" 5¼"	2-7/16" 1-3/32" 1-13/16"
260A 261A* 262A	Screen-Grid R.F. Amplifier, Harmonic Generator... Power Amplifier..... Audio Amplifier.....	Thor. Tungsten Fil... Thor. Tungsten Fil... Heater.....	A.C. - D.C. A.C. - D.C. A.C. - D.C.	130B 112A 130B - 131A	8¾" 7-15/16" 5¼"	6⅝" 2-5/16" 1-13/16"
264A 265A* 268A	A.F. Amplifier Triode..... Water-Cooled Amplifier..... R.F. Oscillator, Amplifier.....	Oxide Coated Fil..... Tungsten Fil..... Thor. Tungsten Fil...	D.C. A.C. - D.C. A.C.	143A Special Mtg. 130B - 131A	4" 45-5/16" 6-15/16"	1-3/16" 9-9/16" 2-7/16"
270A* 271A 272A	Power Amplifier and Modulator..... Power Amplifier..... General Purpose Triode.....	Thor. Tungsten Fil... Heater..... Heater.....	A.C. - D.C. A.C. - D.C. A.C. - D.C.	Special Mtg. 134A - 137A 134A - 137A	17" 6¾" 4⅞"	4" 2-7/16" 1-13/16"
273A 275A 276A	Dectector Triode..... Power Amplifier..... Oscillator, Modulator.....	Heater..... Oxide Coated Fil..... Thor. Tungsten Fil...	A.C. - D.C. A.C. - D.C. A.C.	134A - 137A 130B - 131A 112A - 118A	5¼" 5⅝" 7-15/16"	1-13/16" 2-3/16" 2-5/16"
278A 279A* 281A	Screen-Grid H.F. Power Amplifier..... Power Amplifier..... Co-Planar Grid Amplifier.....	Thor. Tungsten Fil... Thor. Tungsten Fil... Oxide Coated Fil.....	A.C. - D.C. D.C. A.C. - D.C.	Special Mtg. 142A 134A - 137A	21-11/16" 21-11/16" 6¾"	6" 6" 2-11/16"
282A 283A 284A	Screen-Grid R.F. Amplifier, Harmonic Generator... Variable Mu, Screen-Grid H.F. Amplifier	Thor. Tungsten Fil... Heater..... Thor. Tungsten Fil...	A.C. - D.C. A.C. - D.C. A.C. - D.C.	130B - 131A 134A - 137A 112A - 113A	6-15/16" 5¼" 7-15/16"	2-7/16" 1-13/16" 2-15/16"
284B 284C 285A 286A	Amplifier, Modulator..... Amplifier, Modulator..... Power Pentode Power Amplifier..... Triple Grid, Variable Mu, H.F. Amplifier	Thor. Tungsten Fil... Thor. Tungsten Fil... Heater..... Heater.....	A.C. - D.C. A.C. - D.C. A.C. - D.C. A.C. - D.C.	112A - 113A 112A - 113A 134A - 137A 144A	8-7/16" 7-15/16" 5¼" 5¼"	2-5/16" 2-5/16" 1-13/16" 1-13/16"
290A 291A† 292A	Triple Grid Variable Mu, H.F. Amplifier	Heater.....	A.C. - D.C.	144A	5¼"	1-13/16"
	Pentagrid Converter, Oscillator-Modulator.....	Heater.....	A.C. - D.C.	None	5¼"	1-13/16"
	Duplex-Diode Triode, Double Half-Wave Rectifier, L.F. Amplifier.....	Heater.....	A.C. - D.C.	144A	5¼"	1-13/16"
293A 294A 295A	Power Output Pentode..... Power Output Pentode..... Oscillator, R.F. Amplifier.....	Heater..... Heater..... Thor. Tungsten Fil...	A.C. - D.C. A.C. - D.C. A.C. - D.C.	144A 137A 112A - 118A	4¾" 5¼" 7-15/16"	1-13/16" 1-13/16" 2-5/16"
296A 298A 300A	General Purpose Triode..... Double-Ended, Water-Cooled Amplifier..... Power Output Amplifier.....	Thor. Tungsten Fil... Tungsten..... Oxide Coated Fil.....	A.C. - D.C. A.C. - D.C. A.C. - D.C.	Special Mtg. Special Mtg. 130B - 131A	14⅜" 51-7/16" 6½"	4-1/16" 9-9/16" 2⅝"
303A	Duplex-Diode Triode, Double Half-Wave Rectifier, L.F. Amplifier.....	Heater.....	A.C. - D.C.	144A	5¼"	1-13/16"
304A	High Frequency Triode Generator.....	Thor. Tungsten Fil...	A.C. - D.C.	130B - 131A	6⅞"	2-7/16"

*The characteristics given for all Power Tubes designated by an asterisk are based on their use as Class "B" Amplifiers.

†The characteristics given in the table are for the modulator section of the tube with the oscillator control-grid voltage equal to -7.5 volts and the oscillator anode voltage equal to 180 volts. At the bottom of the next page are the characteristics for the oscillator section of the tube under the same conditions.

VACUUM TUBES

NORMAL FILAMENT OR HEATER CURRENT AMPERES	NORMAL FILAMENT OR HEATER VOLTAGE	NORMAL PLATE VOLTAGE	NORMAL GRID VOLTAGE	NORMAL SCREEN OR NET VOLTAGE	NORMAL PLATE CURRENT MILLI- AMPERES	AVERAGE AMPLIFI- CATION FACTOR	AVERAGE PLATE RESISTANCE OHMS	AVERAGE TRANS- CONDUCT- ANCE MICROMHOS	MAX. PLATE DISSIPA- TION WATTS
1.60 1.60	4.5 4.5	350 350	-22.5 -22.5		30 30	7.3 7.3	4000 4000	1820 1820	14 14
6.0 0.25	14.0 1.0	1500 60	-55 -3		167 1.8	16 5.8	2000 14000	8000 410	250
41.0 41.0	21.5 21.5	10000 5000	-250 -300		1500 1500	40 16	8000 2000	5000 8000	10000 5000
0.06 61.0	3.1 20.0	90 18000	-3 -450		2.0 2000	7.8 40	16000 7000	490 5700	25000
41.0 0.27	21.5 1.1	15000 100	-400 -8		1500 2.2	40 6.2	8000 14000	5000 440	15000
3.2	10.0	1000	-80		150	12.5	3500	3600	100
1.60 1.60	2.0 2.0	135 180	-6 -1.5	45	5.5 5.1	10 170	10000 220000	1000 770	
0.10 1.60	3.3 2.0	180 135	-1.5 -4.5	45	1.5 3.2	335 15	830000 16000	400 940	
15.6 2.0 3.2	10.0 5.0 5.0	3000 450 500	-300 -60 -40	175	500 60 60	10.3 5.1 80	2250 1500 80000	4550 3330 1000	1000 30 20
3.2 0.06 1.60	7.5 3.1 2.0	750 90 180	-60 -3 -1.5	150 75	75 2.0 5.5	100 7.8 550	75000 16000 400000	1330 490 1380	25
3.2 3.2 0.32	10.0 10.0 10.0	2000 1000 135	-100 -80 -4.5	300	100 150 2.8	200 12 15.5	175000 3500 17000	1150 3400 910	100 100
0.30 183.0 3.2	1.5 22.0 5.0	100 18000 500	-8 -550 -100		2.1 8000 60	7.0 32 5	13000 2250 5000	540 14000 1000	100000 20
9.75 2.0 0.32	10.0 5.0 10.0	2500 350 100	-150 -25 -7		200 36 6.3	16 8.5 6	1750 2900 6000	9000 2920 1000	350 20
1.60 1.2 3.0	2.0 5.0 10.0	135 200 1000	-1.5 -45 -80		0.15 45 125	102 2.9 12	320000 1050 3500	320 2850 3425	15 100
15.6 21.0 1.6	10.0 10.0 5.0	3000 3000 130	-125 -300 -50	500 60	400 800 35	400 10 5	85000 1800 3500	4700 5550 1430	800 1200 10
3.0 1.60 3.2	10.0 2.0 10.0	1000 180 1000	-100 -1.5 -165	200 75	100 5.9 85	100 585 4.8	70000 430000 1900	1430 1360 2500	70 85
3.2 3.2 1.60 1.60	10.0 10.0 2.0 2.0	1250 1000 180 180	-185 -147 -12 -1.5	150 75	80 75 8.8 6.2	5 5.3 135 850	2000 1900 153000 700000	2500 2800 880 1200	100 85
0.32 0.32	10.0 10.0	180 180	-1.5 -1.5	75 75	5.3 4.0	1160 180	950000 290000	1200 620	
0.32	10.0	135	-6		2.1	13.3	20000	665	
0.32 0.32 3.25	10.0 10.0 10.0	180 180 1000	-18 -18 -40	180 180	14.5 14.5 150	105 105 25	100000 100000 6000	1050 1050 4200	100
6.0 207.0 1.2	11.0 30.0 5.0	3000 18000 300	-160 -600 -62		180 8000 60	19 32 3.8	3200 1740 700	6000 18400 5400	350 100000 30
1.6	2.0	135	-6		2.0	12.5	20000	620	
3.25	7.5	1000	-85		100	11	4800	2300	50

‡Normal Plate Current.....3.1 Milliampères
Average Amplification Factor.....66
Average Plate Resistance.....110,000 Ohms
Average Transconductance.....600 Microhms

RECTIFIER AND SPECIAL PURPOSE TUBES

A. C. RATING		TWO HALF-WAVE OR ONE DOUBLE HALF-WAVE RECTIFYING WITH SINGLE PHASE A.C. SUPPLY, D.C. RATING		APPROX. ANODE-CATHODE POTENTIAL DROP VOLTS	MAXIMUM PEAK RATING					OPERATING AMBIENT TEMPERATURE RANGE	
FILAMENT OR HEATER CURRENT AMPERES	FILAMENT OR HEATER VOLTAGE	CURRENT MILLIAMPERES	VOLTAGE		PLATE CURRENT AMPERES	INVERSE POTENTIAL VOLTS	POTENTIAL BETWEEN ANODE AND CONTROL ELECTRODE VOLTS	POTENTIAL BETWEEN CATHODE AND HEATER VOLTS	INSTANT-ANEOUS POTENTIAL BETWEEN ANODES VOLTS	MAXIMUM °C.	RECOMMENDED °C.
3.2 6.0 41.0 41.0	10.0 14.0 21.5 21.5	150 250 3500 2000	750 1500 10000 20000								
3.9 61.0 7.0	11.0 20.0 2.5	1000 5000 800	2000 20000 2000	15	1.1	6500				0 - 50	10 - 40
7.5 3.0	2.5 2.5	1000 300	2300 1000	15 15	1.5 0.5	7500 3500				0 - 50 10 - 50	10 - 40 15 - 40
20.0 1.7	5.0 2.3	3000	6000	15 10 - 20	5 0.075	20000	325	12		15 - 40	30 - 36
7.5	2.5	1000	2300	15	1.5	7500				0 - 50	10 - 40
15.0 15.0	2.5 2.5	4000 6000	25 25	8 10	6 10				100 100	10 - 50	20 - 50
60.0 10.0	5.0 5.0	12000 1600	6000 2300	15 15	20 2.5	20000 7500				20 - 40 0 - 50	30 - 36 10 - 40
.55 2.0 2.8	2.2 5.0 5.0	150	500	16 - 24 10 - 20	0.02 0.5		275 350	12			
3.0 7.0	2.5 2.5	300	1000	15 10 - 20	0.5 1.0	3500	2500			10 - 50 10 - 50	15 - 40 15 - 40
19.0 19.0	2.2 2.2	12000 12000	60 90	5 - 10 6 - 11	10 10	300 375					
.35 157.0	1.75 5.5	40000	5000	22 15	0.1 75	16000	250			20 - 40	30 - 36
3.0	5.0	500	550	15	1.0	18000				10 - 40	

3A—PHOTO-ELECTRIC CELL

Nominal Anode Supply Potential - - - - - 90 volts
 Maximum Anode Supply Potential - - - - - 120 volts
 Maximum Anode Current - - - - - 10 microamperes
 Approximate Static Sensitivity at 90 volts with a light source at a color temperature of 2710°K. - - - - - 60 microamps. per Lumen
 Window area - - - - - 1.5 Square Inches

R-7850—PHOTO-ELECTRIC CELL—Same rating as the 3A but has a standard 4 prong-base.

Northern Electric

AUDIOMETERS

INSTRUMENTS FOR MEASURING THE ACUITY AND QUALITY OF HEARING

The Audiometer is made in several types designed for specific purposes, making an appropriate apparatus available to individual specialists, medical practitioners, hospitals, or commercial institutions, halls of learning, etc.

Where hearing of an employee may jeopardize the lives of hundreds of people, such as a railroad switchman, or incapacitate the individual for a certain occupation such as a telephone or telegraph operator, also for the health of pupils in school and college, periodical hearing tests should be compulsory, and for such tests one of the types of NORTHERN ELECTRIC Audiometers is adapted.

In the fields of transportation and industry it has been discovered that many "failures of the personnel," apparently due to dullness or slow thinking, are in reality due to impaired hearing.

Similarly in educational institutions, examinations frequently show that the so-called "dull student" is not dull at all, but is a victim of defective hearing that isolates him from much of the oral instruction.

The prevalence of these cases has led to the widely used practice of testing prospective employees and school pupils. Such tests tend to prevent the victim of impaired hearing being placed in jeopardy himself, becoming a personal hazard to others, or becoming a subject of unfair criticism.

The primary requirements for such tests of hearing are speed and accuracy. All should be quickly tested according to the same standards and by a means which cannot be influenced by the person undergoing the test.

The superiority of the audiometer method over the old methods of using tuning fork or monochord is so apparent to even the casual observer, that it requires only to be drawn to the attention of those who are interested for it to become generally recognized. The results obtained with the Audiometer are reliable and consistent, and it is possible to measure with absolute accuracy the acuity and quality of hearing and make possible the analyzing of any defects which are discovered, permitting of a correct diagnosis of the case and prescription for its remedy.

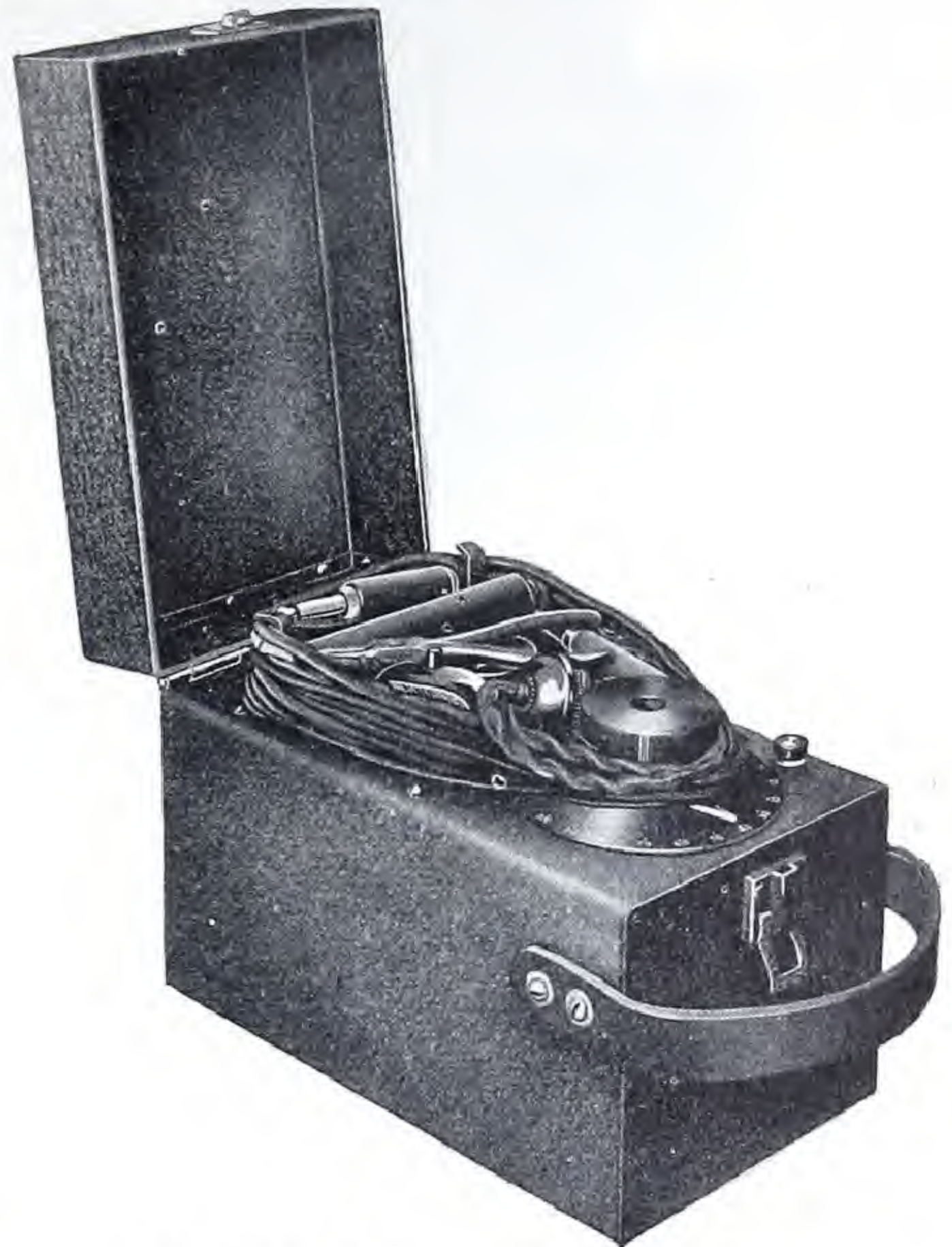


The No. 4-A Audiometer and a No. 4-A Receiver Holder, showing the eight compartments and the manner of nesting telephone head sets

AUDIOMETERS

4-A Audiometer

The 4-A Audiometer is intended primarily for use in measuring hearing sensitivity. Combined with one or more 4-A Receiver Holders as illustrated on the preceding page, it can be used to measure the hearing sensitivity of as many as forty persons at one time, and in this way is most often used in measuring the hearing sensitivity of school children. The 4-A Audiometer is similar to a portable phonograph except that the sound is heard through a receiver rather than through a horn. It consists essentially of a spring phonograph motor and turntable with the associated speed control and stop, a magnetic phonograph reproducer, a receiver and two specially made phonograph records.



No. 5-A Audiometer with cords, receiver and tools packed, ready for transportation

No. 5-A Audiometer

The No. 5-A Audiometer will quickly determine the percentage of hearing loss of those tested by examiners for automobile examining boards, school boards, employment departments of railroads and industrial organizations, and for the records of the examinations coupled with applications for insurance.

No. 2-B Audiometer

The No. 2-B Audiometer is suitable for general diagnostic use. This instrument possesses the following particular advantages and conveniences:

Accurate tests may be made not only by trained otologists but also by office assistants or nurses.

The data obtained may be recorded by means of graphs which are easily interpreted and make possible a tentative diagnosis even before making a fully complete examination of the patient.

The graphs visualize to the physician the defects in hearing and give an indication of the type of disease causing the deafness.

Comparison of sequent charts demonstrates actual improvement in function or the contrary.

The Audiometer makes possible speedy and accurate tests of distinct value in medico-legal cases.



No. 2-B Audiometer

ELECTRICAL STETHOSCOPE



No. 1-B Electrical Stethoscope showing batteries in compartments.

The Stethoscope has, since its discovery over a hundred years ago, proved indispensable in the study and diagnosis of pathological conditions of the heart and lungs. To a doctor, the stethoscope has become as much a part of his profession as a pen is to a banker. But the stethoscope has its limitations and the medical profession has awaited the development of electrical apparatus suitable to magnify the complicated tone frequencies of the heart and lungs.

This achievement has now been accomplished by the development of the No. 1-B "Electrical Stethoscope."

There are innumerable uses for this new instrument and already it is revealing new wonders of chest sounds to even the best informed medical men and offering new possibilities



The Electrical Stethoscope used in a consultation.

of diagnosis, making possible the hearing of sounds hitherto undetected, so sensitive is the instrument and so true and great the amplification of sound.

Any number of students may simultaneously hear the heart-beats of a single "case" and so obtain a true and uniform idea of the characteristics of each disease as the lecturer explains to them the various technicalities.

The outstanding features of the No. 1-B "Electrical Stethoscope" are precision, efficiency, compactness and portability. It is built into a cabinet on rubber tired wheels as shown in illustration above.

A special booklet explaining the apparatus in detail may be obtained upon application.

CATHODE RAY OSCILLOGRAPH TUBES

The No. 224-C Vacuum Tube is a low potential Cathode Ray Oscillograph Tube of the hot filament type.

A number of improvements give the new tube increased usefulness and durability; a fluorescent viewing screen of cylindrical section being the most significant. The screen is bright, highly visible and photographically active. In addition, since the viewing end of the tube is a cylindrical instead of spherical section, a photographic film placed on this surface lies in contact with the glass at all points. The photograph obtained by this procedure is uniform in intensity and definite in outline, a result virtually impossible with the conventional Cathode Ray Tube of spherical or parabolic section screen. The Cathode Ray Oscillograph Tube is the most direct means which can be used for graphically showing electrical oscillations of the higher frequencies for measuring the modulation in radio telephone transmitting sets, and is the most accurate means for determining electrical synchronization and frequency ratios. It is also the only device known with which the curves of hysteresis and dielectric losses can be plotted directly. The characteristics of apparatus producing fluctuating electric potential, currents or magnetic fields can be plotted against each other.

The 4060 Type Cathode Ray Oscillograph Tube and socket is a portable and very sensitive instrument for the study of electrical and magnetic phenomena for use by the scientific investigator. The apparatus consists of a vacuum tube in which the cathode rays or electrons are generated at one end of the tube and strike a fluorescent screen at the other end. The cathode is a heated filament and the anode or "gun" is a disc with a hole at the centre. The large end of the glass bulb is covered with a fluorescent material which forms the screen. The screen is a deposited mixture of calcium tungstate and zinc silicate, which renders the pattern traced by the electron stream visible and also photographically accurate.



No. 224-C Vacuum Tube in No. 122-A Vacuum Tube Socket

Northern Electric

POLICE RADIO EQUIPMENT

Northern Electric Police Radio Equipment is applicable to all towns and cities, and has a great many uses. As a weapon for the further suppression of crime it affords many possibilities. Descriptions of escaping criminals may be broadcast, making it possible to intercept them in their flight. The use of radio by the police will inspire considerable fear, even superstition in many criminal minds, due to the rapidity with which radio enables the police to cope with lawless activities. Radio transmission is instantaneous. Information which is broadcast from headquarters is received immediately by those of the police force provided with receiving sets, and all officers receive the information at the same time.

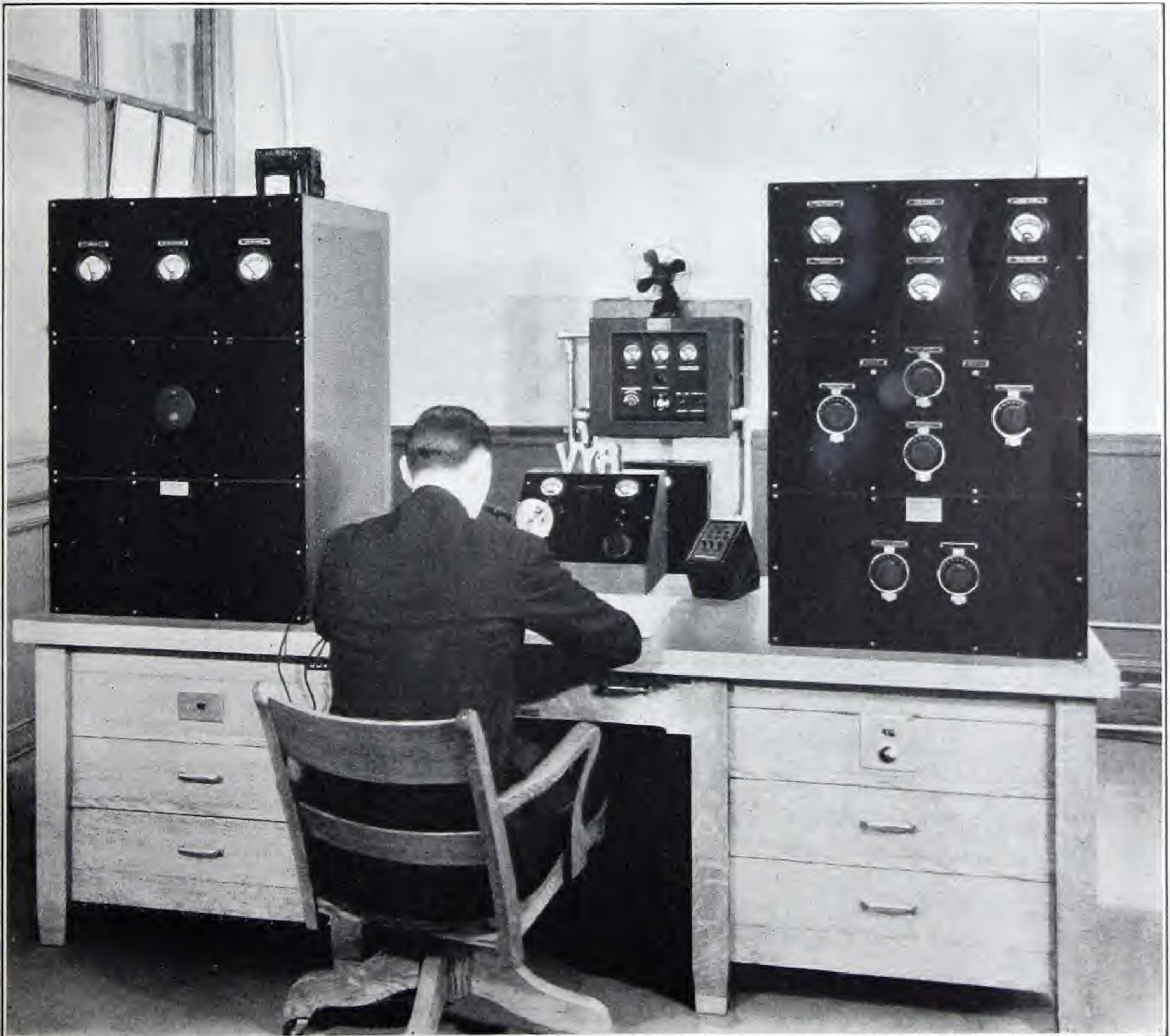
Radio affords one of the finest means of improving the service of the police department. In those cities where transmitters have been installed and cars equipped with receivers, tests under actual conditions have proved this fact conclu-

sively. By means of radio, districts which before gave infinite trouble are being controlled quickly.

Cruising cars or motorcycles may be directed quickly to a certain spot or locality for:

- The apprehension of criminals,
- The prevention of burglaries,
- Locating stolen cars,
- Locating missing persons,
- Investigating fires,
- Investigating accidents,
- Investigating riots,
- Investigating other disturbances.

By the same means forces may be concentrated, or by directing information to certain cars, a definite beat may be patrolled, or a single station assigned some particular duty.



POLICE RADIO EQUIPMENT

The Northern Electric Company can supply transmitting equipment rated at 20, 50, 100 and 400 watts for the transmission of messages by Police Departments for the dispatching of information from a central office to patrolling automobiles, motorcycles or Police Stations equipped with radio receivers. These equipments are entirely a.c. operated.

**20 WATT TRANSMITTING EQUIPMENT**

This radio transmitting equipment provides police radio telephone, or telegraph communication for cities having a population of less than 75,000. It is rated at 20 watt, unmodulated radio frequency output, is capable of complete modulation and employs a full complement of Northern Electric Air-cooled Vacuum Tubes. This transmitting equipment together with the necessary accessories, such as antenna, ground system, subscribers set and telegraph key forms a flexible, complete, efficient and reliable systems suitable for many different applications. Frequency stability is maintained by means of a quartz plate and its associated vacuum tube oscillator. A power source of 300 watts at 107 to 122 volts, 25 or 60 cycles single phase is required for operation, or direct current supply by a motor generator set. This equipment is assembled in a small metal cabinet attractively finished in aluminum grey lacquer, and weighs approximately 100 lbs., complete with its associated a.c. power unit.

Prices on request.

POLICE RADIO EQUIPMENT**50 WATT RADIO TRANSMITTING EQUIPMENT**

This radio transmitting equipment provides police radio telephone communication for cities having a population of less than 100,000. It is rated at 50 watts unmodulated radio frequency output, is capable of complete modulation, and employs a full complement of Northern Electric Air-cooled Vacuum Tubes. This transmitting equipment together with the necessary accessories such as antenna, ground system and microphone, which is not included in the equipment, forms a complete, efficient and reliable system. Frequency stability is maintained by means of a thermostatically controlled quartz plate. A power source of approximately 1 kva at 105 to 125 volts, single phase, 25 or 60 cycles is required for operation. This equipment is assembled in small metal cabinets attractively finished in black crystalline lacquer.

100 WATT RADIO TRANSMITTING EQUIPMENT

This radio transmitting equipment provides for police telephone communication for cities having a population of between 100,000 and 200,000. It is rated at 100 watts unmodulated radio frequency output, is capable of complete modulation, and employs a full complement of Northern Electric Air-cooled Vacuum Tubes. This transmitting equipment together with the necessary accessories, such as antenna, ground system and microphones which is not included in the equipment, forms a complete, efficient and reliable system. Frequency stability is maintained by means of a quartz plate associated with a Vacuum Tube Oscillator. A power source of approximately 1.1 kva at 105 to 125 volts, single phase, 25 or 60 cycles is required for operation. The transmitter is contained in a metal cabinet 6' high, 28" wide and 16" deep. Less tubes it weighs about 500 lbs.

400 WATT RADIO TRANSMITTING EQUIPMENT

This radio transmitting equipment provides police radio telephone communication for cities having a population of between 200,000 and 800,000. It is rated at 400 watts unmodulated radio frequency output, is capable of complete modulation, and employs a full complement of Northern Electric Air-cooled Vacuum Tubes. This transmitting equipment together with the necessary accessories, such as antenna, ground system and microphone, which is not included in the equipment, forms a complete, efficient and reliable system. Frequency stability is maintained by means of a thermostatically controlled quartz plate. A power source of approximately 4.5 kva at 200 volts, 3 phase, 25 or 60 cycles is required for operation.

The Northern Electric Company can also supply receiving sets specially designed for police cars, motorcycles, or police headquarters.

Prices on request.

Northern Electric

POLICE SIGNAL SYSTEMS

The Northern Electric Police Signalling System consists of signalling boxes mounted on pedestals, poles, or buildings at various points within municipal or other premises. These boxes contain signalling mechanisms and telephones which are connected by wire with a police headquarters desk, on which is mounted a recording set consisting of a register, a time stamp and a paper take-up reel; also keys and switches for manipulating the other service features of the system.

A Radio Cruiser officer, or a patrolman reporting from their beat or post, opens the signal box door and pulls down a lever to send the box number to police headquarters where the number and time of its receipt is automatically recorded on registered paper, and then recoiled by a take-up reel. Removal of the telephone receiver at the box also signals police headquarters and indicates that telephone communication is desired; the number signal proves where the officer is; the time record proves at what minute he has reported; and by conversation he proves his identity. Every officer therefore acts as his own sergeant operating from a distance.

The system consists further of recall units comprising flashlights or bells, or both flashlights and bells. These units are distributed at different prominent points where they can best be seen and heard, and are connected by wire to the police central desk on which is mounted a flashlight transmitter for sending out general and special signals. In modern police work, occasions of importance constantly arise requiring means for the central station to select and signal any one, or all of the members of the force, wherever they may be. This is accomplished by means of the re-call units.

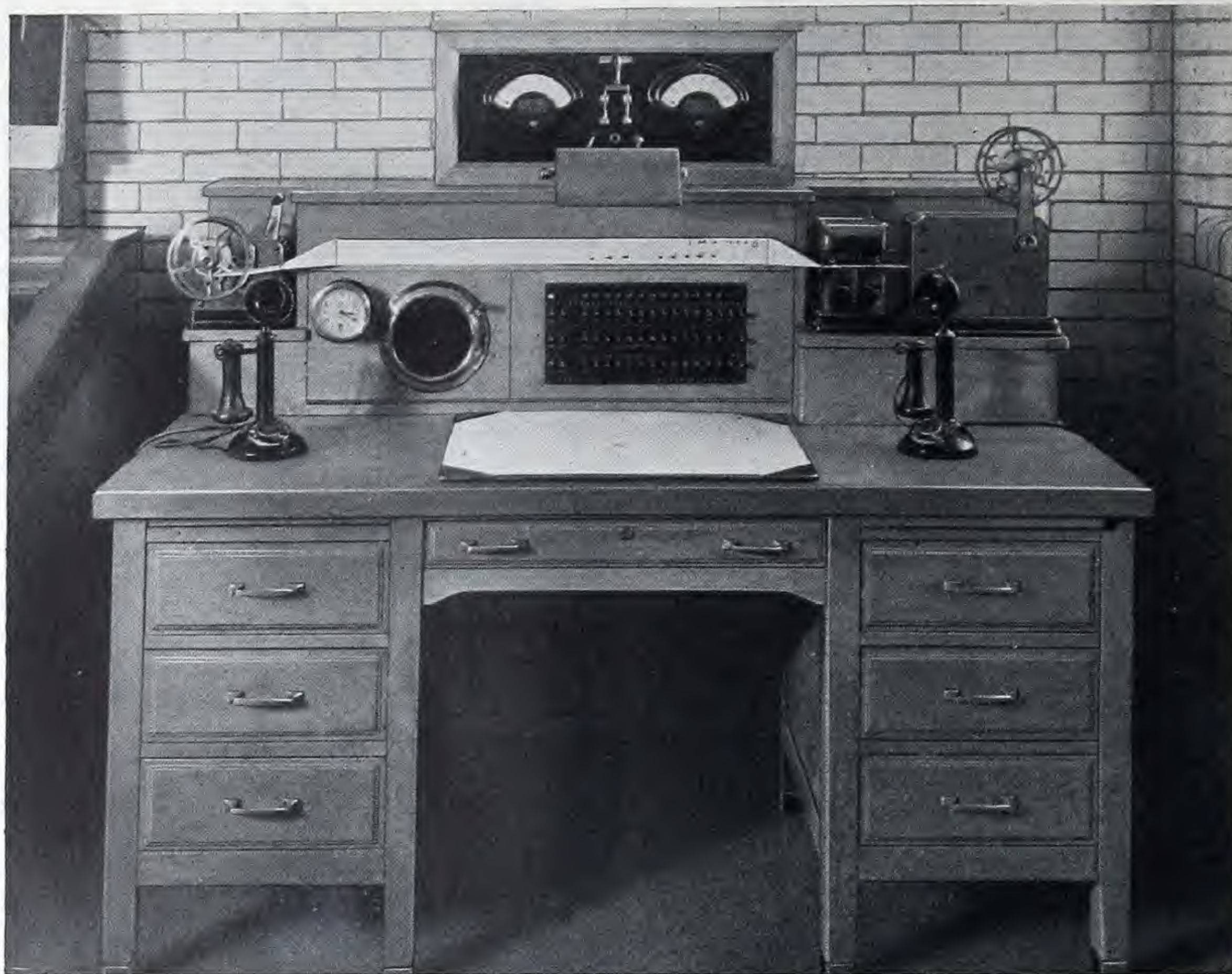
No Signalling System is complete that does not provide means for the following:

- (1) Telegraph report and emergency signalling from outlying stations to headquarters.
- (2) Telephoning between headquarters and outlying stations.
- (3) Audible signalling to men from headquarters.
- (4) Selecting and signalling to any single patrolman.
- (5) Signalling to all of the force simultaneously.

A System carrying all of these features is as essential to the perfect work of the police force no matter how small, as the telephone and telegraph is to the perfect work of an army signal corps; and full measure of service cannot be expected from any police force unless such a system is furnished for their use.



POLICE SIGNAL SYSTEMS



Police Desk

NORTHERN ELECTRIC GAMEWELL PRIVATE
AUXILIARY POLICE BOXES FOR THE
PROTECTION OF BANKS, HOTELS,
JEWELLERY STORES, ETC.

A direct silent connection with police headquarters is the best and surest protection against criminals. If you are

able to summon police assistance instantly you are able to deal with criminals on an equal footing. If you cannot, the criminals have an advantage which may cost you thousands and thousands of dollars. Municipal authorities are invariably willing to co-operate with banks, stores, hotels, or owners of other property that offers temptation to criminals, by permitting a Northern Electric-Gamewell auxiliary police box to be connected directly to police headquarters on the nearest police signalling circuit.



Auxiliary Police Box

The advantage of being able to summon instantly and automatically the services of the organized police force, is, manifestly of great value. Criminals will take chances of holding up a bank; they will rob safes, steal furs, jewellery or other valuables and practically the only protection against such losses is to be able to summon instantly, the assistance of the police department.

Prices on request.

METROPOLITAN
COMBINATION
PEDESTAL

This pedestal accommodates a police box on one side, and fire alarm box on the other. The Bell light unit at the top is used for re-calling the policeman when on his beat. The interior of the pedestal base accommodates the terminal strips to suitably terminate the underground cables.

Metropolitan
Combination Pedestal

Northern Electric

TRAFFIC SIGNAL SYSTEMS

To regulate the movement of traffic so that tieups and congestion at intersections are eliminated; and to have traffic flowing smoothly at all times; the Northern Electric Company has available two distinct signalling systems for the adequate controlling of city or district traffic by means of electric traffic signals.

One system is known as the Traffic-Actuated Control System, and is based on the principle of traffic signals actuated by means of the traffic

itself. This system consists of three major parts, the traffic signals, the traffic detectors, and the control mechanism. The traffic detectors are placed in all approaches to each signalized intersection to record approaching traffic. The control mechanism receives the information from the detector and assigns the right-of-way by means of standard traffic signals to the different streets in accordance with the traffic flow as registered by the detectors.

The other system known as Fixed-Time Control is divided into four classifications, which are described as follows:

(A) Simplex. The operation of the signal in this system is not related to the operation of any other signal.

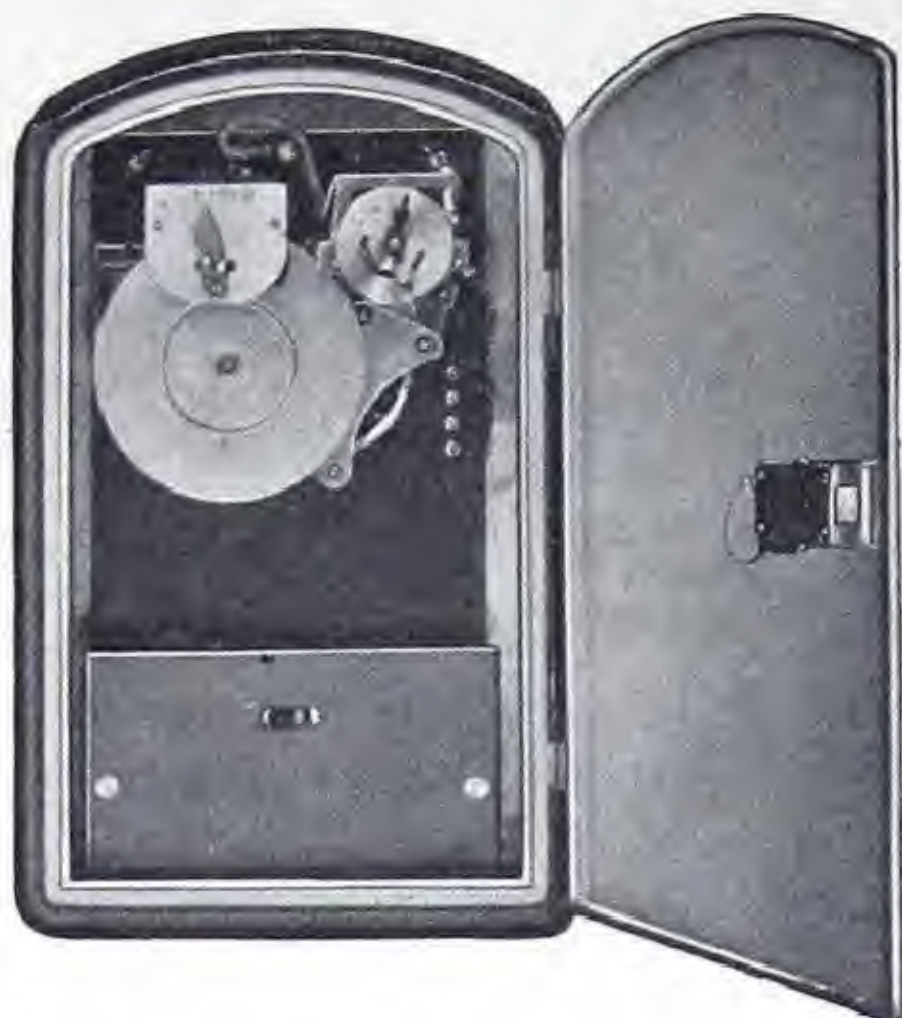
(B) Synchronized. This is a type of co-ordinated control in which all signals show the same colour in the same direction simultaneously.

(C) Limited Progressive. This is a form of progressive system in which the signals are grouped, the alternate groups showing opposite colours in a given direction, and all signals changing simultaneously.

(D) Flexible Progressive. This is a form of progressive system in which the operation of each signal is determined by the traffic requirements of the intersection, and which in addition provides for the continuous movement of traffic.



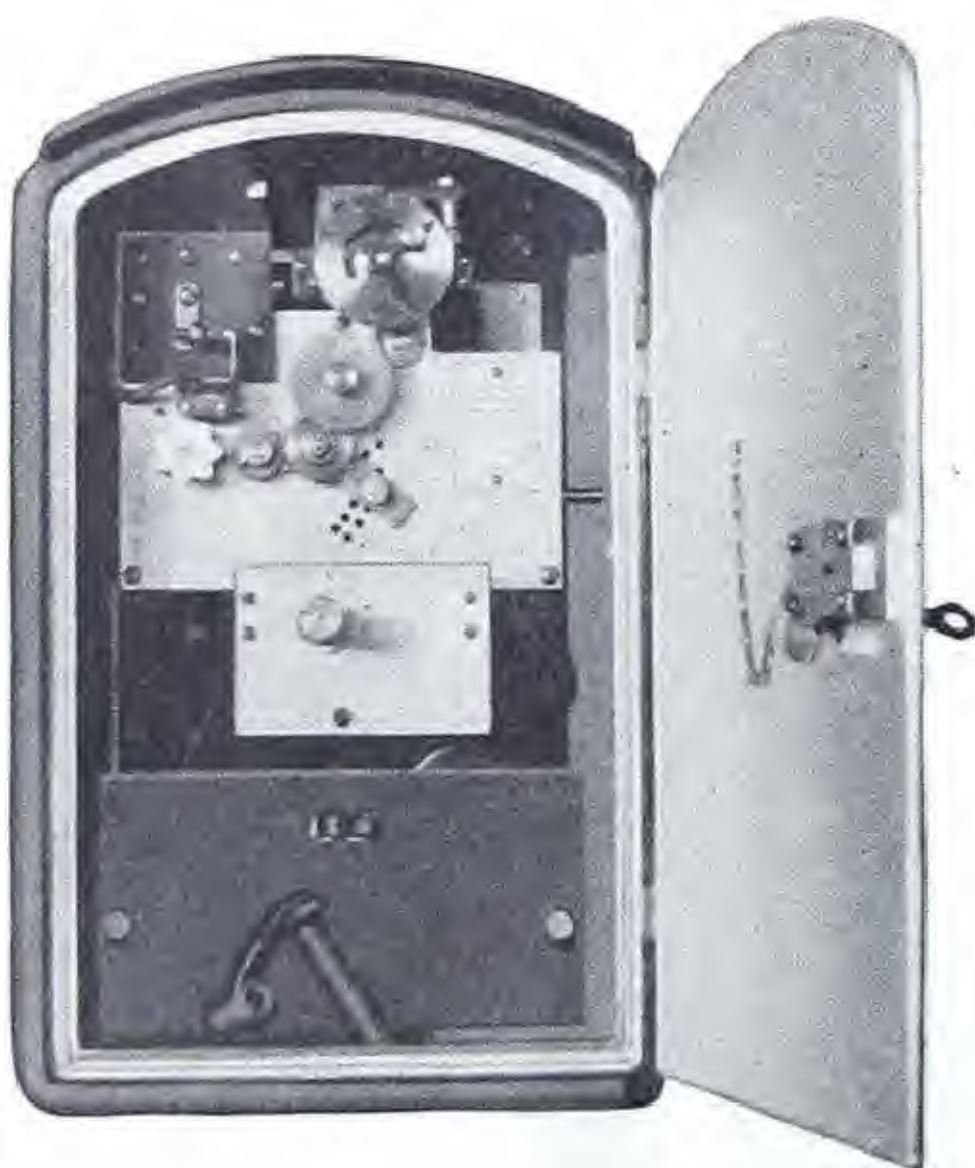
EAGLE CONTROLLERS For Fixed Time Signals



Automatic Simplex Timer enclosed in aluminum cabinet

For ordinary street intersections which are at such a distance from other intersections equipped with traffic signals that coordinated action between the signals at the two intersections is impractical.

This controller can also be equipped for Manual Control either with door open or closed. No transfer switch has to be thrown when going from automatic to manual operation.



Automatic and Manual Synchro-Simplex Controller Enclosed in Cast Aluminum Cabinet

Whenever street intersections within 1500 feet of each other are equipped with signals, the signals should maintain a definite time relation with respect to each other. This can be accomplished at minimum expense without the use of special inter-connecting wires between the controllers, by the use of Eagle Synchro-Simplex Controllers. These Controllers are equipped with flashing night light facilities. The time cycle may be varied over a wide range by changing of gear on the front of the controller, an operation which requires less than a minute. Mounting supports within cabinets and signal connections permit interchanging the Synchro-Simplex Controllers with Eagle (Induction type) Simplex Controller.

These controllers can be equipped for Manual control also as illustrated above.

EAGLE CONTROLLERS

Eagle Senior Controllers are used in flexible progressive systems to provide flexibility to a degree that is not available in any other type. They may be purchased in their simplest form, and as conditions demand, other features, such as hand control, remote shutdown, emergency signals, flashing lights, special cycles, etc.; may be added at nominal expense.

These Eagle Senior Controllers may be operated at isolated intersections with no regard for coordination with other controllers. They may be coordinated with other controllers in a limited progressive system by means of one interconnecting wire; or may be connected to an Eagle Master Controller and thereby control from a central point as a unit in a flexible progressive system.



Eagle-Senior Controller Equipped with Local Right Arrow Switch.

Co-Ordiplex Controllers

These Co-Ordiplex Controllers may be used independently at intersections which are to be later interconnected. They may also be interconnected with one or two wires and kept positively in step with each other. These Co-Ordiplex Controllers if used in a genuine progressive system must be supervised by a master controller at a central point. From the master controller signals may be started into operation or shutdown, or they may be switched to an emergency condition during which all signals show red, or to night flashing combination, during which amber or red lights flash. The master controller keeps all signals in step with each other, and provides the means of adjusting the cycle length from a central point.



Co-Ordiplex Traffic Signal Controllers

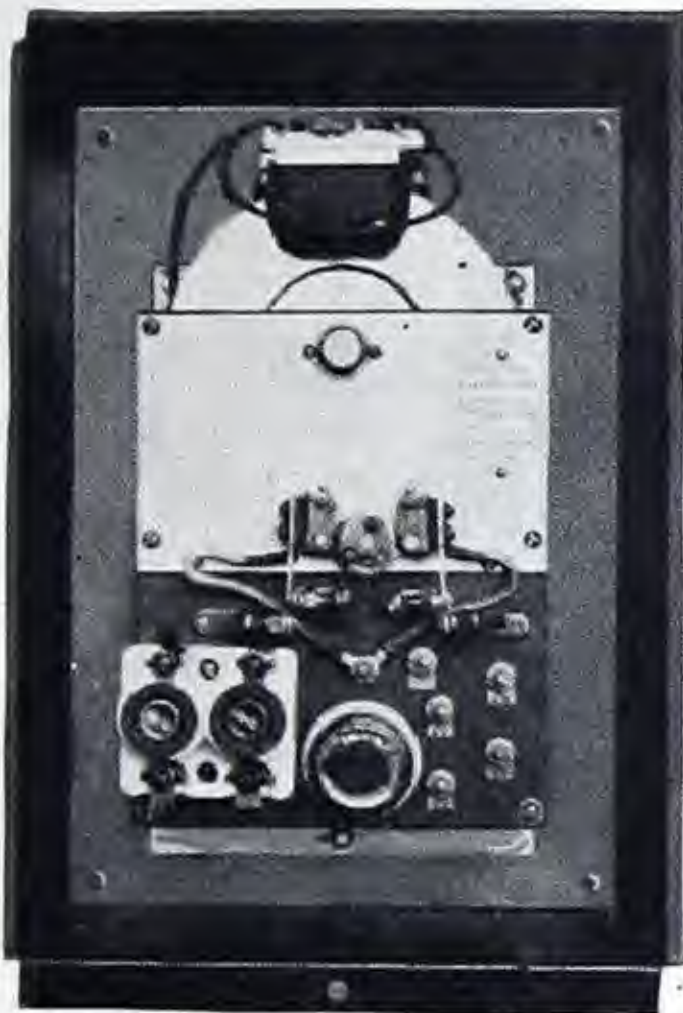
Prices on request.

EAGLE CONTROLLERS



Interior View of Master Controller in Aluminum Cabinet

These Master Controllers range in size from 15 to 100 intersection capacity and are used for supervising Flexible Progressive Systems employing Co-Ordiplex or Eagle Senior Controllers.



Eagle Midget Controller in Sheet Metal Box with sliding door without lock

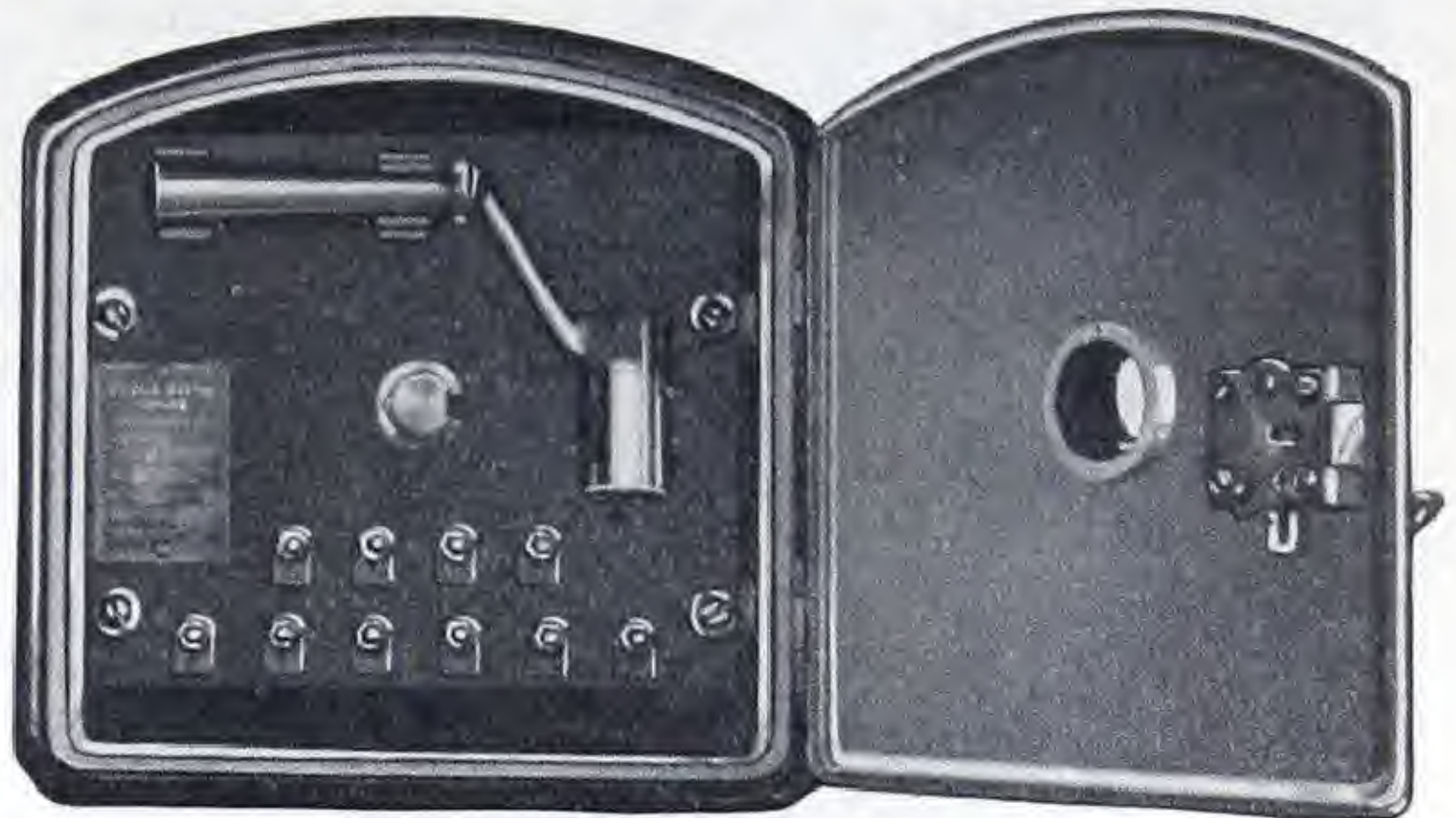
This Eagle Midget Controller is ball-bearing throughout. Its extremely low cost is due to the fact that its component parts are employed in large quantities in the manufacture of similar products. If greater flexibility is required the Eagle Simplex or Co-Ordiplex Controller should be ordered.



Eagle Duplex Controller in aluminum Cabinet

Eagle Duplex Controllers provide two conditions of signal timing. Condition No. 1 is for traffic at peak hours. Condition No. 2 is for average traffic. The change from Condition No. 2 to Condition No. 1 and back again may be set to occur at one, two or three times each day. At a special hour of the night the Controller automatically discontinues the "Stop-and-Go" operation and goes to flashing amber. The reverse takes place in the morning.

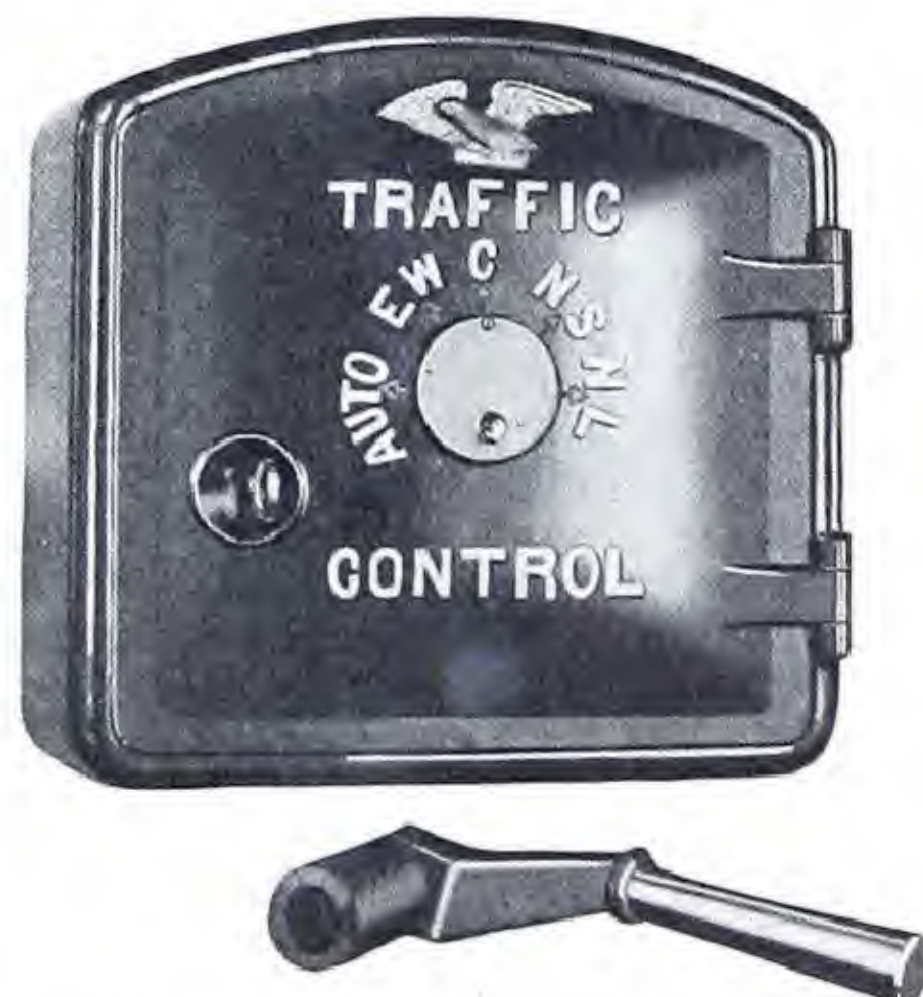
EAGLE CONTROLLERS



Auxiliary Manual Controller

While traffic control systems are designed to operate primarily from an automatic controller, it is advantageous on certain occasions to control a signal or group of signals by hand control independently of the remainder of the system, to take care of abnormal traffic conditions.

The hand controls are arranged to give the same change period as that provided by the Automatic controller. In addition to this sequence of operation there is also provided a night light or auxiliary switch. This cabinet is arranged to operate the hand control with the cabinet door closed by means of an operating handle, which is inverted through an opening in the door. When not in use the handle is kept within the cabinet.



Eagle Aluminum Weatherproof Control Cabinets

These Cabinets present an attractive appearance. They are strong and durable. An extensive assortment has been developed to accommodate many types of traffic signal controllers. These cabinets are of cast aluminum. They are equipped with a substantial brass lock. The door is hinged to the cabinet body by heavy members cast in the door and body casting. Studs and wing nuts are provided for clamping controllers into place.



Control Cabinet

Designed to mount on wall or wood pole, if used without brackets.

EAGLE TRAFFIC SIGNALS**For Fixed Time or Traffic Actuated Signals**

Four-Way Three-Color Signal Arranged to Slip Over a Column Having 4½" Outside Diameter

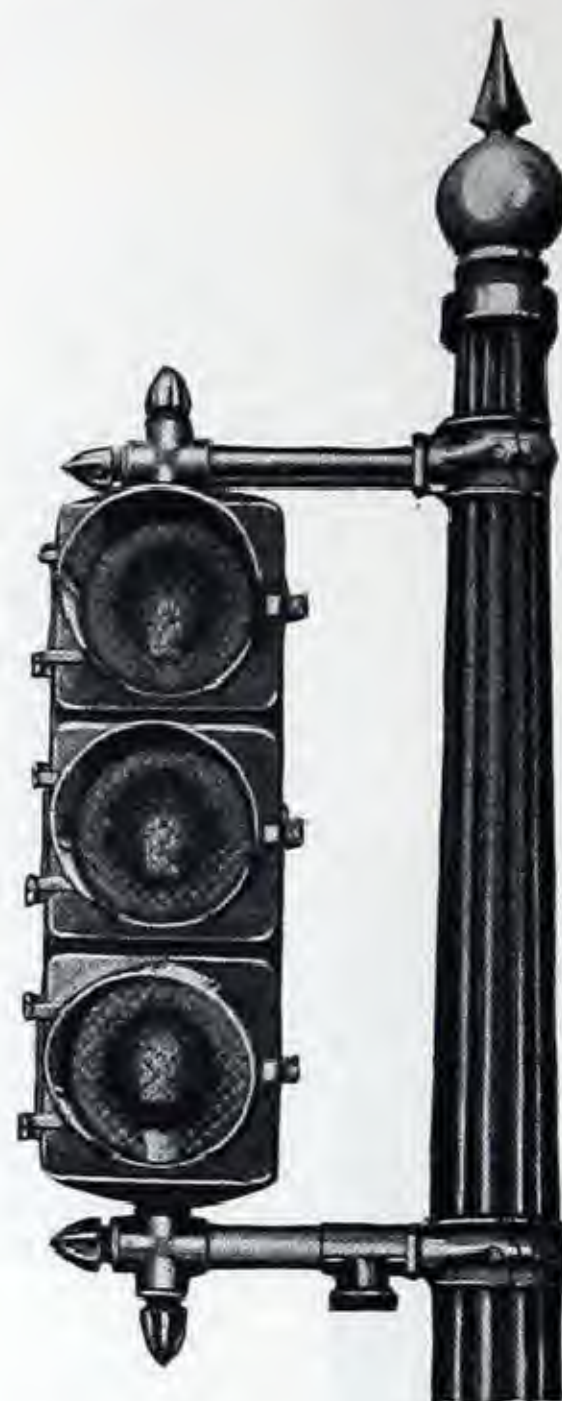
Eagle square section type signals can be furnished in two, three or four way types and any desired number of sections can be provided to make a two or three colour signal, or a signal with directional arrows or lenses with special wording. When two and three way signals are furnished, the blank sides are equipped with doors which may quickly be replaced by optical units if the situation requires the signals to show any more directions at a future date. The signal body and combination door and visor are of aluminum die cast construction which assures perfect interchangeability of parts. Each optical unit consists of a lens and a silvered glass mirror reflector of the highest quality. Both the optical unit door and the reflector holder are pivoted on hinges, and consequently bulbs may be replaced with greatest ease. These traffic signals can be supplied with special visors and special lenses where required to meet unusual conditions.



Four-Way Three-Color Signal Arranged for Span Wire Suspension

EAGLELUX TRAFFIC SIGNALS**One-Way Type**

Eaglelux Signals are of ornamental design which gives a pleasing appearance and will harmonize with lamp standards from plain to very decorative designs. The housings are of metal of uniform thickness and are adaptable to both vertical and horizontal mounting. The optical unit is of the double hinge type and consists of reflector, lens, socket and cast aluminum door and visor. The vertical mounted signal has a die cast aluminum door and visor.



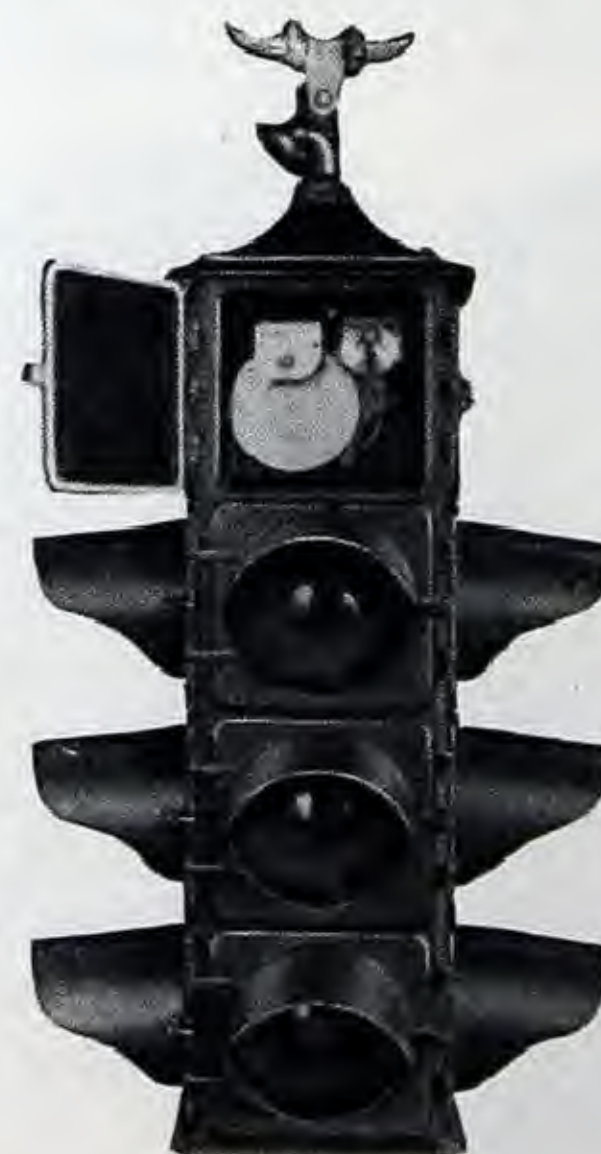
Eaglelux Signal with Ornamental clamps



Eaglelux Signal Back View showing ornamental design

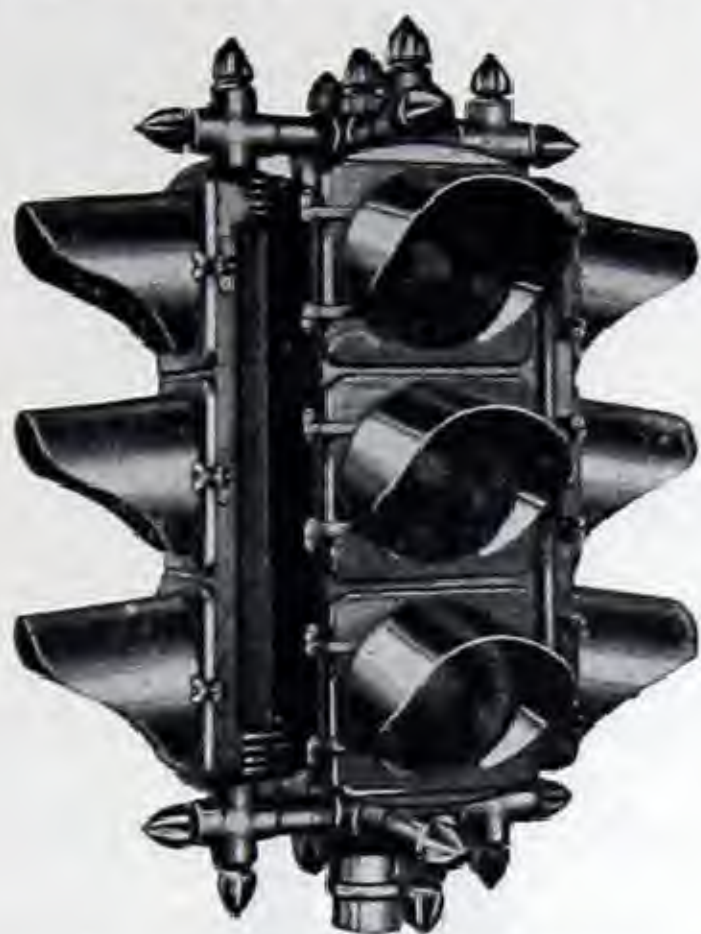
Eaglelux Combination Unit Signal and Controller

Where a quick economical suspension installation is necessary, the Eaglelux Combination Unit is without a peer. Merely string span wire between two supports, run two wires from a switch to a nearby pole, and connect to the power supply. No internal connection to make, no controller to mount on pole or pedestal.



Combination Signal and Controller

EAGLELUX TRAFFIC SIGNALS



Four-way Three-colour
Adjustable Post Top Type
Signal (Tenon Adapter).

Eaglelux Adjustable Type Traffic Signals

The signal body, door and visor are of cast aluminum. Each optical unit consists of a lens and silvered glass mirror reflector. Both the optical unit door and the reflector holder are pivoted on hinges and consequently bulbs may be replaced with greatest ease. Doors and visors are die cast as a unit unless special long visors are ordered, in which event sand cast door and special visors are furnished. Standard methods of mounting, either with or without a floodlight, include the following: Span wire suspension, mast arm suspension, bracket arm supports at both top and bottom of signal, and post top mounting. Special types can be furnished on short notice.



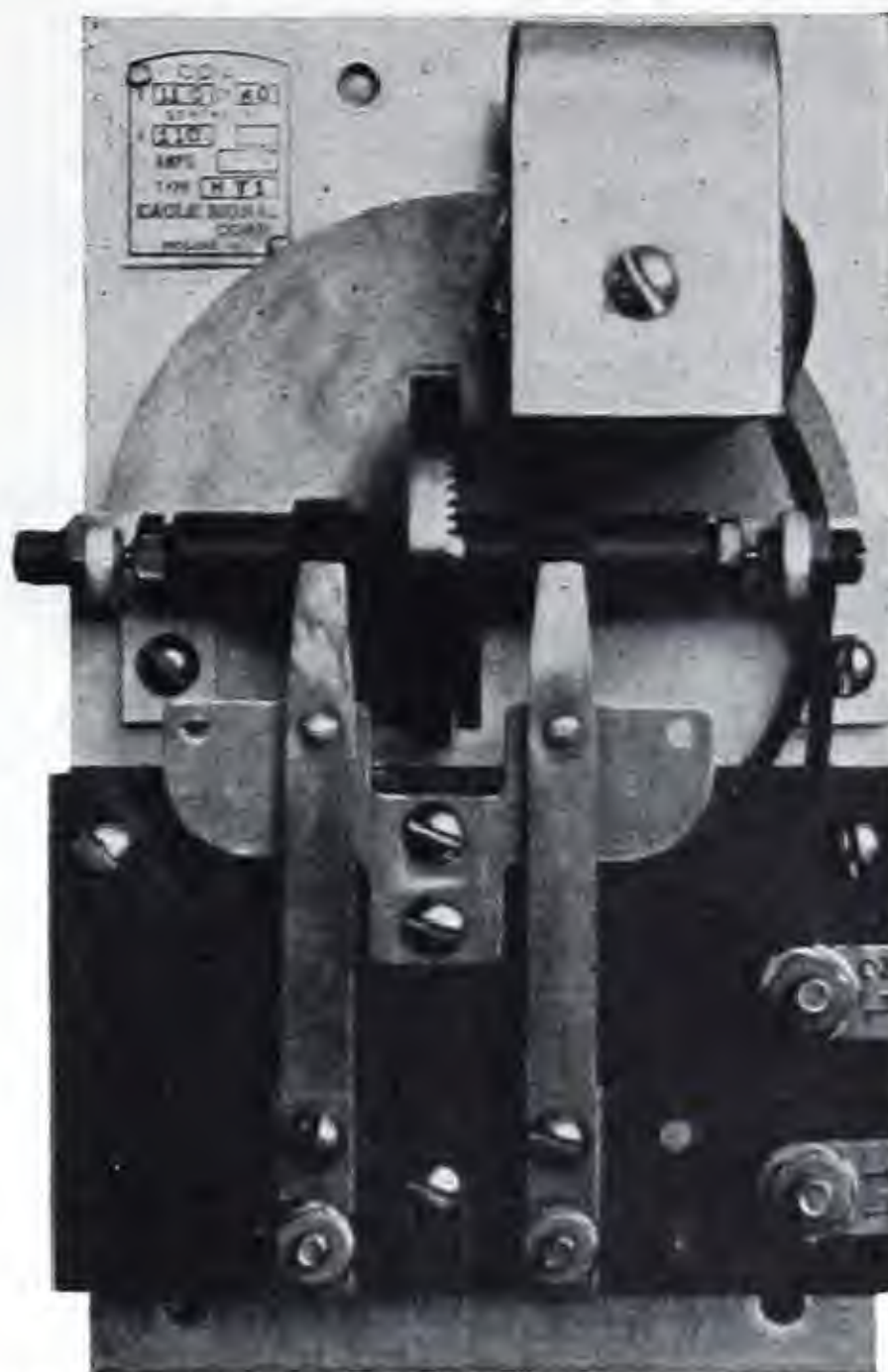
Two-way Three-colour
Adjustable Bracket Type
Signal.



Four-Way Three-colour
Adjustable Span Wire
Suspension Type Signal
with Floodlight.

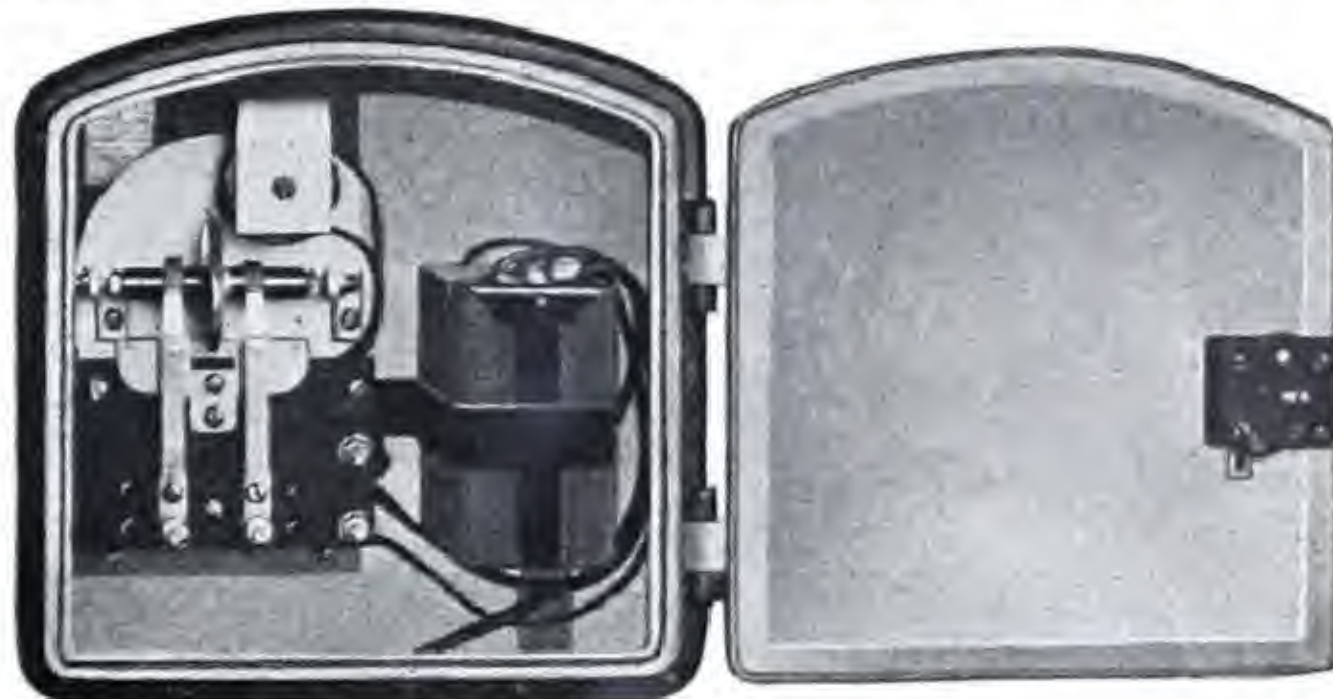
Prices on Request.

EAGLE FLASHERS



Eagle Junior Flasher—For Beacon Signals

This is an alternate ball bearing beacon flasher with two separate circuits. One circuit is closed during one half of the time and the other circuit is closed during the other half. Its silver contact points are rated at 10 amperes. It is designed for 110 volt, 60 cycle operation. It may be adjusted to flash from 12 to 36 times per minute.

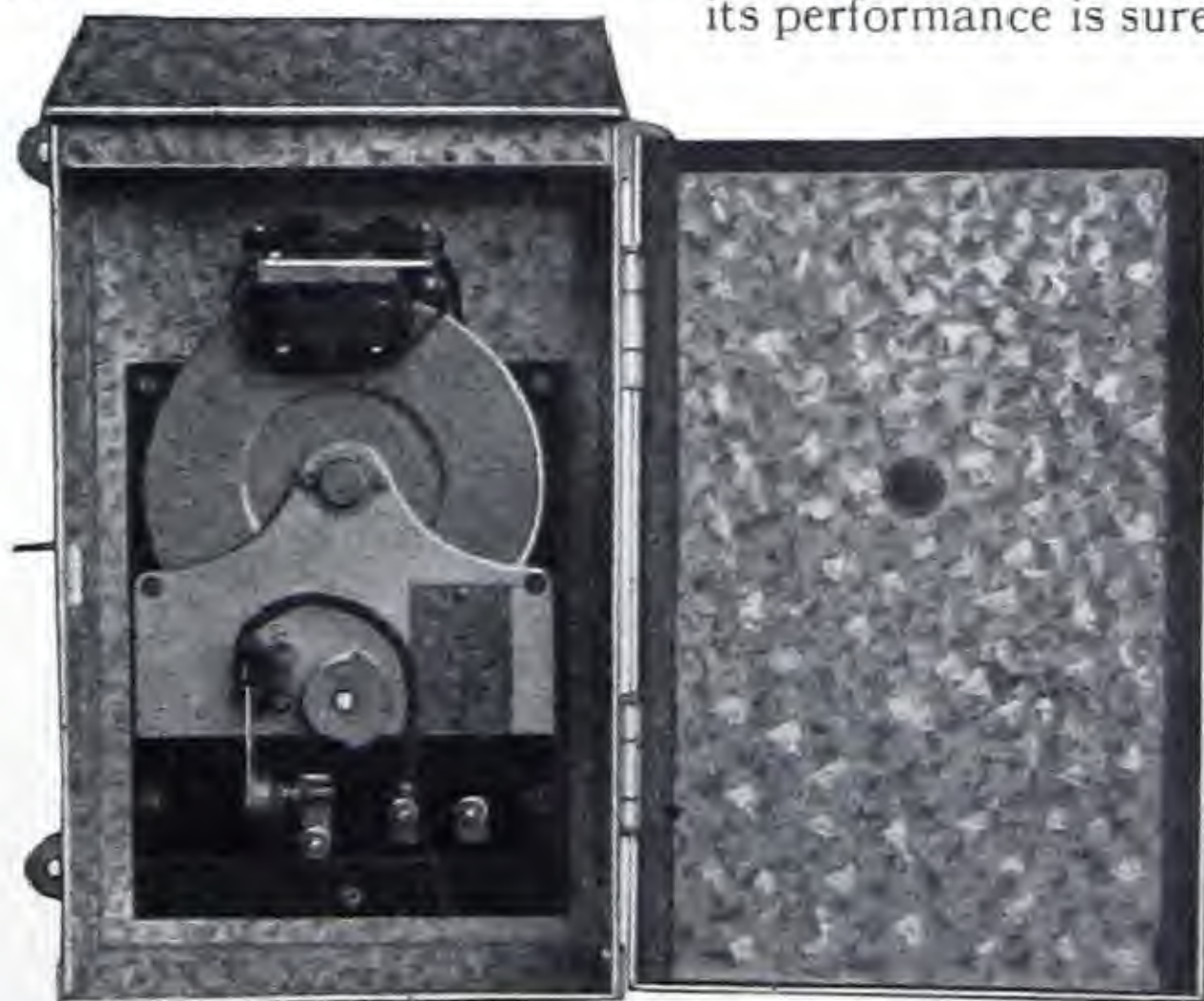


Eagle Junior Alternate Flasher

In Weatherproof Aluminum Cabinet with Radio Interference Eliminator.

Airway Beacon Flasher

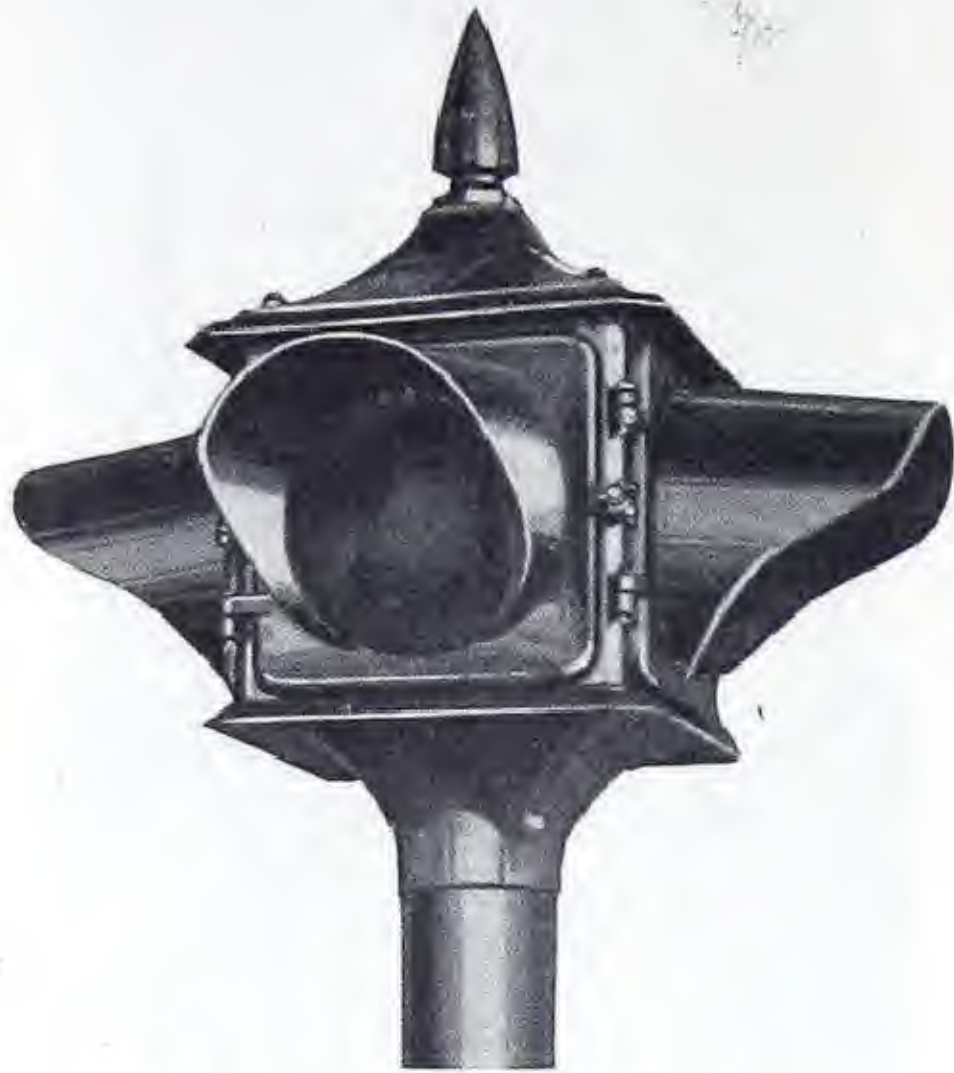
The Eaglelux Airway Beacon Flasher contributes to the safety and certainty of air travel. Its cost is reasonable, its performance is sure.



110-volt, 60-cycle Beacon Flasher contained in
Galvanized Steel Cabinet

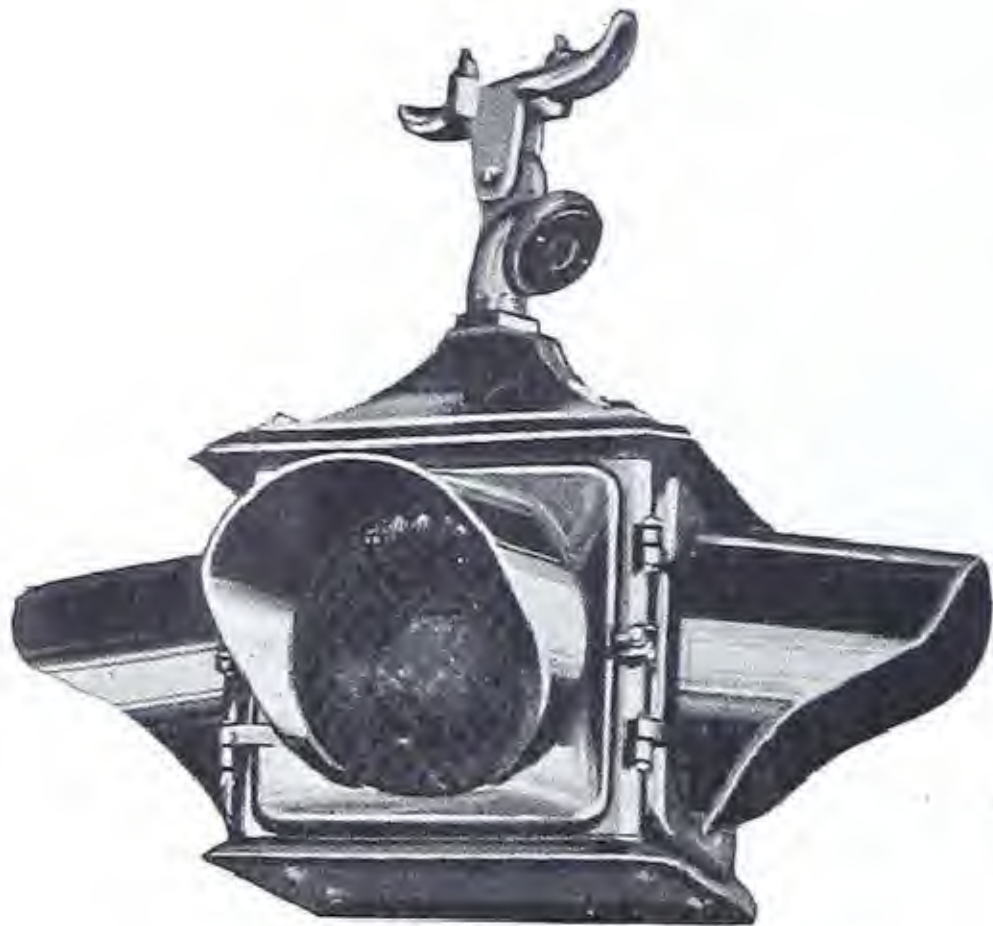
Prices on request.

EAGLELUX BEACONS



Eaglelux Beacons

Eaglelux Beacons warn traffic of dangerous intersections, bridge abutments, street obstructions, etc., and send out a warning which cannot escape attention. The clear uniform beam of light instantly classes it as a quality product. Die cast aluminum parts and silvered glass mirror reflectors are major parts of Eaglelux Beacons. A very wide assortment is available from which the requirements of any situation may be made.



Showing blank door open on which is mounted flashing mechanism

EAGLELUX BEACONS



Eaglelux Beacon mounted on a pedestal

Eaglelux Combination Beacon and Siren Unit

The Eaglelux Combination Beacon and Siren Unit is a most efficient safety device. The Beacon is constructed largely of die cast aluminum parts, and the entire unit will render perfect service for years. The Beacon may be furnished to shine its light in one, two, three or four directions.



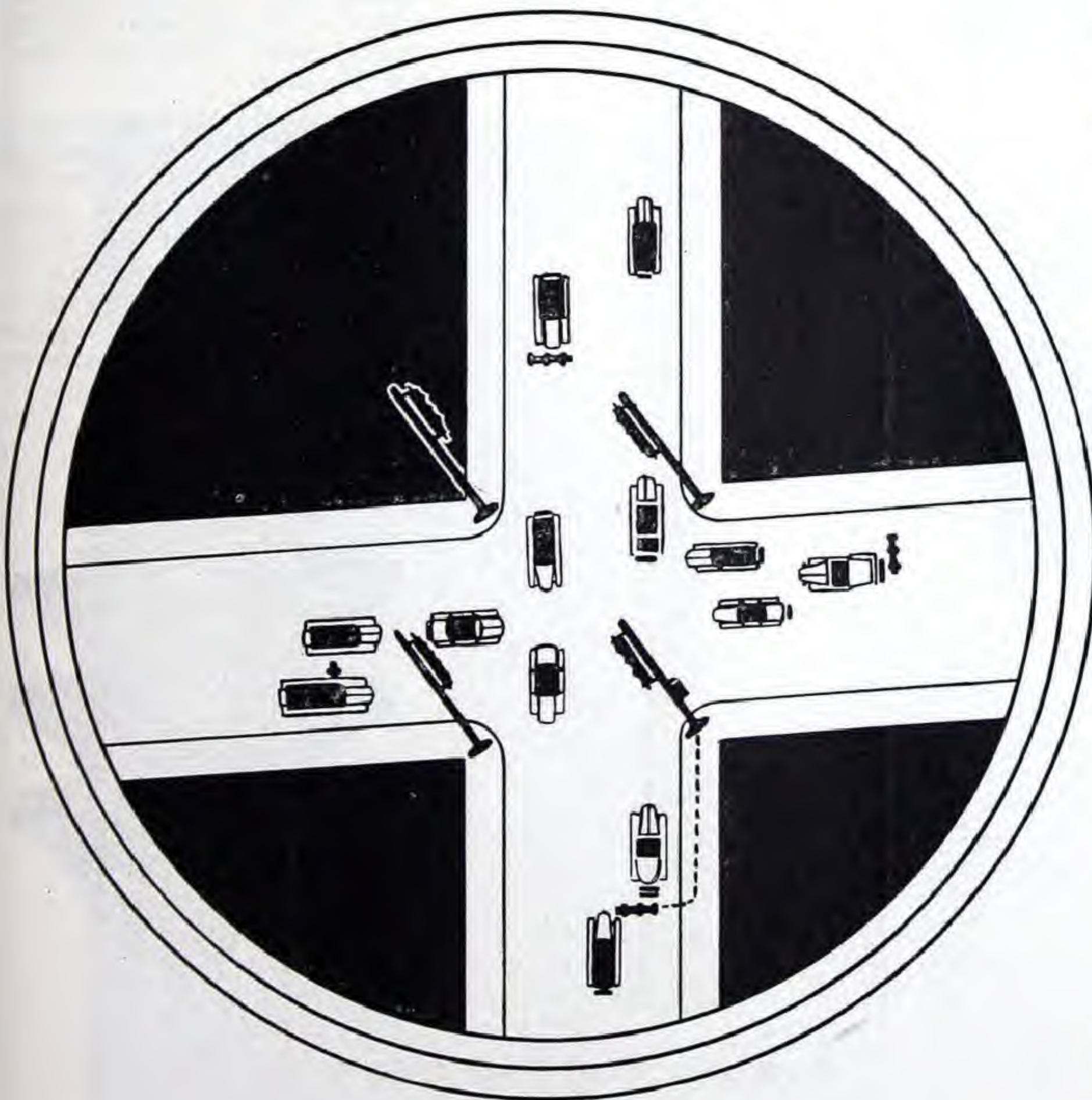
Four-Way One-Light Beacon With Siren Arranged for Span Wire Suspension
Prices on request.

Northern Electric

TRAFFIC ACTUATED SIGNALS

To approach more nearly the ideal condition where signal indications could change in exact accord with traffic demands from minute to minute, the Northern Electric Company has to offer what is known as Traffic-Actuated Control Signals, by which traffic desiring to use the intersection roadway automatically actuates the control mechanism,

Three major conditions for determining the exact justification for traffic controlled systems are: to reduce delays, to reduce accidents and to achieve improvement in the orderly and convenient movement of traffic. While these conditions apply with equal force to Fixed-Time control, Traffic-Actuated Signal Systems are more efficient for all three conditions than Fixed-Time Control for the following reasons:—



Traffic-Actuated Signals when properly designed and operated results in less delay than is involved in Fixed-Time Control due to the fact that the delays inherent in general Fixed-Time Control during light traffic are eliminated.

As Traffic-Actuated Signals can be operated continuously, it generally proves more effective in reducing or preventing accidents, because violations of the signals which frequently cause accidents, are less likely on account of reduced waiting periods.

Traffic-Actuated Signals can be more responsive to traffic demands than Fixed-Time Control, and hence under most conditions results in more orderly and convenient movement of traffic. There is less tendency to avoid intersections having Traffic-Actuated Control, thus resulting in more logical routing of traffic and creating fewer demands for signals.

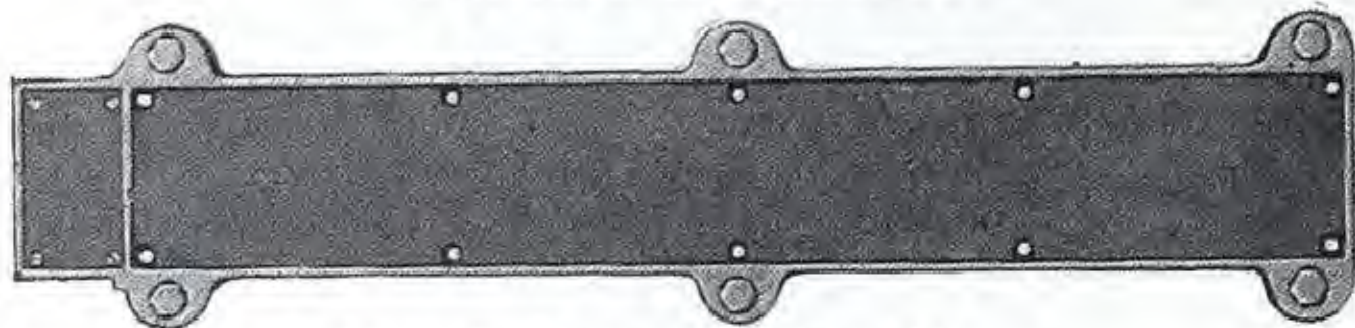
Full consideration of the desirability of Traffic-Actuated Signal Systems should be made before any decision is reached as to which of the two types of control should be utilized.

TRAFFIC ACTUATED SIGNALS

Trolley Detectors

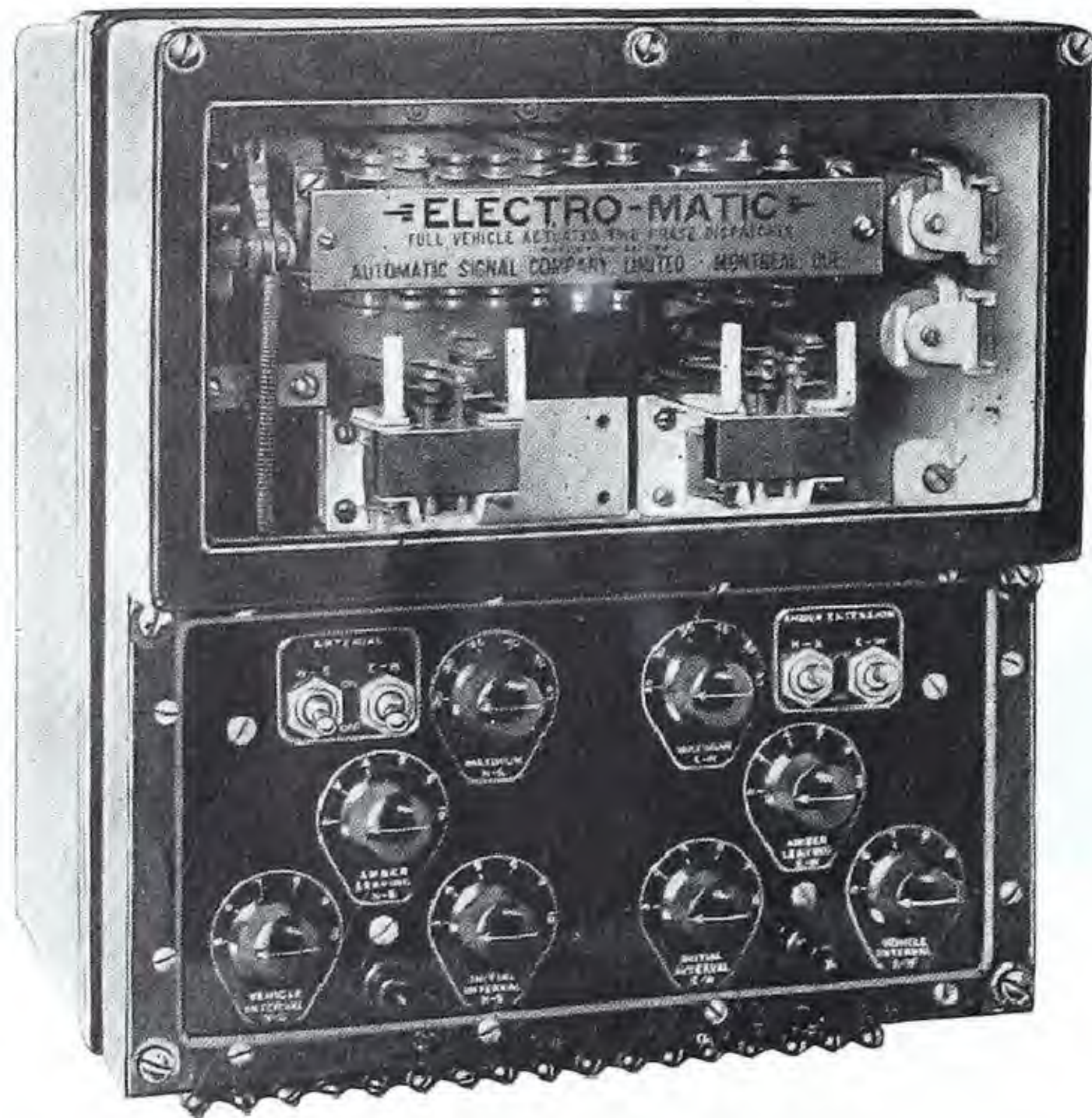
At intersections used by tramcars, a special Detector is mounted on the overhead trolley wire. These Detectors are actuated by the collector wheel and the trolley pole, and the signal is transmitted to the control mechanism in exactly the same manner as a signal from a standard Vehicle Detector.

Vehicle Detectors



Vehicle Detector—Top View

The Vehicle Detector is a contact making device placed in the pavement, and actuated by the pressure of a wheel passing over it at any point. It is enclosed in a heavy metal frame and the top portion which is flush with the road surface, is of live rubber. These Detectors are very rugged mechanically, and are unaffected by temperature changes and snow. Standard lengths are 4, 6 and 8 feet. They are installed in the normal path of vehicle movement approaching an intersection.



Electro-Matic Dispatcher

The Electro-Matic Traffic Actuated Dispatcher is designed for use with any standard type of traffic signal, and provides for all standard colour sequences. The radio type dials and switches mounted on the control panel on the front of the Dispatcher provide a quick and simple means of independently adjusting each of the several intervals obtainable on all phases. The construction of Electro-Matic Dispatchers is governed by the exclusive Electrostatic method of operation. No motors are used and moving parts are reduced to an absolute minimum. There are no continuously rotating parts, and lubrication is not required. The energy consumption of this Dispatcher averages less than 20 watts. Long life and dependable economical service is assured.

Dispatcher Cabinets

Cabinets suitable for mounting Electro-Matic Dispatchers on either pedestals or poles are supplied in cast aluminum. Ample space is provided for housing the Dispatcher together with the main and auxiliary switches. A terminal strip is provided for connecting incoming wires, and all interior wiring is included. The cabinet is thoroughly waterproof, and is equipped with reliable locks.

TRAFFIC ACTUATED SIGNALS

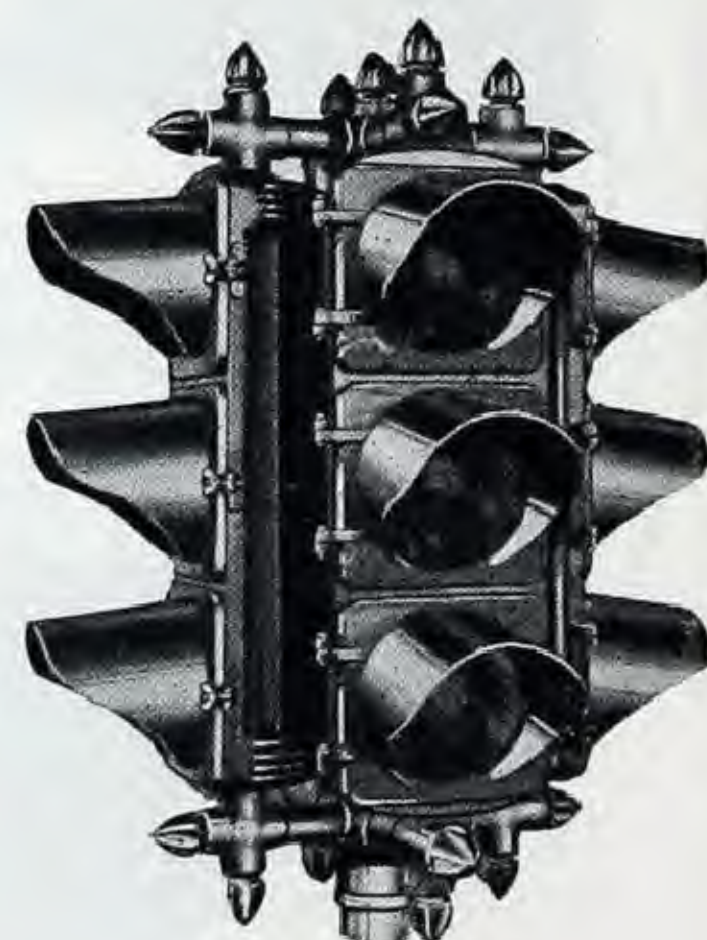


Dispatcher Cabinet

One-Way
Adjustable
Type
Signal

Standard assemblies of adjustable type signals are available in 1, 2, 3 and 4 types and with 1, 2 or 3 lenses. All adjustable signals are made of one-way signal units supported by ornamental and substantial mounting brackets.

The signal body and door and visor are of cast aluminum. Each optical unit consists of a lens and silver glass mirror reflector. Both the optical unit door and the reflector holder are pivoted on hinges, and consequently bulbs may be replaced with greatest ease. Doors and visors are die-cast as a unit.



Weldless Steel Pedestals

These pedestals are made of heavy weldless steel fitted with ornamental collars. The shaft is fluted to give a pleasing appearance. The high quality of the steel coupled with the one-piece construction results in a pedestal that is unbreakable. The base section is provided with a door to facilitate pulling in and connecting the necessary wires. The top portion is reduced in diameter to accommodate a standard adjustable type signalhead. This type of pedestal requires a minimum of sidewalk space and provides maximum strength and safety.

Northern Electric

FIRE ALARM SYSTEMS

The extent of any fire in a protected community depends in large measure upon the promptness with which the fire-extinguishing appliances are brought into operation. The fire alarm system of a city or town ought, therefore, to be as nearly perfect as money and skill can make it; a deficient or obsolete fire alarm system constitutes a general hazard.

The first and obvious disadvantage of having too few fire alarm boxes is the loss of time between the discovery of the fire and the notification of the fire department. The first few moments in fighting a fire are the vital moments. The arrival of the fire department a few minutes earlier or a few minutes later may make the difference between a small fire and a conflagration. It may make the difference between a fire that

can be put out by chemicals and one that requires three or four alarms.

If the fire alarm box fails then, it fails miserably; if it makes the slightest error, it is a costly error. The best that the mind and hand of man can produce is none too good for emergency signalling. That is the basis on which the Northern Electric apparatus is made.

Practically all of the central office station apparatus in Canada with which the boxes must work is of Northern Electric construction.

A fine illustration of the quality of Northern Electric Company's skill and workmanship will be found in Montreal's new fire alarm central office which is the largest centralized fire alarm system in the world.



FIRE ALARM SYSTEMS

For Municipal Service



In combating fire, eternal vigilance is the price of safety, and, consequently, any system capable of fulfilling its purpose must possess certain attributes which entitle it to the post of honor as sentry to the fire department.

The prime object of a fire alarm signaling system is to transmit an alarm of fire to the fire-fighting force within the shortest possible time after a fire is known to exist, and the best

efforts and ingenuity of skilled engineers have been brought to bear on this vital question of saving time in the transmission of alarms.

It is obvious that a fire may be more readily checked in its incipency than after it has made headway; therefore, no matter how efficient a fire department may be, it will fail in the achievement of its purpose if not supplemented by facilities for obtaining knowledge of the exact locations of fires without loss of time.

Fire alarm telegraph signaling systems consist of four elements namely:

- Fire Alarm Boxes, or Street Signaling Stations.
- Alarm Apparatus.
- Central Station Equipment.
- Circuits.

FIRE ALARM BOXES

Fire alarm boxes, or street signaling stations, may be considered the outposts of the signaling system and comprise that element of the system with which the general public comes most frequently in contact. It is, therefore, highly essential that the boxes be designed in such a manner that the operating parts are readily accessible and the method of operation such that it may be easily understood. No effort must be spared in arranging the operating devices to ensure the correct manipulation of same and to facilitate the transmission of alarms. The mechanism of the boxes must be positive in action, durable and protected in the best known manner from the action of the elements, dust, moisture and mechanical injury.

Fire Alarm Boxes may be divided into four general types namely: "Quick Successive," "Slow Successive," "Non-Interfering" and "Interfering" or so called "Plain" boxes.

The Northern Gamewell "Quick Successive" and "Slow Successive" Fire Alarm Boxes both contain positive non-interfering features which embrace devices preventing interference and confusion of signals whether resulting from careless or malicious manipulation of the starting lever or the simultaneous operation of a number of boxes.

In the case of the simultaneous operation of a number of the "Quick Successive" type boxes, the box awaiting control of the circuit makes an effort to secure the circuit for the transmission of its signal at the beginning of each round whilst the "Slow Successive" boxes operated under the same conditions make an effort to secure the circuit at the beginning of a series of four rounds.

The "Non-Interfering" type of fire alarm box is constructed in such a manner that no interference or confusion of signals will result through the operation of two or more boxes, at or about the same time, one of the boxes so operated being automatically selected to transmit a complete and definite signal.

The "Plain" or interfering boxes do not contain either the successive or non-interfering features.

FIRE ALARM SYSTEMS

CENTRAL STATION EQUIPMENT

The central station is the heart of the fire alarm system and at this point is located the apparatus for receiving, recording and transmitting signals and alarms of fire. The battery for supplying the electro-motive force necessary to operate the system is also located in the central station.

Fire alarm signaling systems range in size from a single circuit system adequate for a small town to systems of many circuits, requiring a force of operators constantly on duty in the central station and may be classified under two general heads; namely, automatic and manual.

When a system becomes large enough to warrant the constant attendance at the central station of one or more operators it ceases to be entirely automatic in its functions and requires facilities for the manual transmission of signals from the central station to the fire department houses.

Prices on application.



The City of Montreal Fire Alarm Central Office showing the Protector Board and the Recording Equipment

Alarm Apparatus

Alarm apparatus forms that element of the system depended upon to announce to the fire-fighting force the existence of and exact location of a fire.

This equipment consists of gongs and indicators located in the fire department houses, and where volunteers form part of the fire-fighting force, public alarms are given by means of devices for automatically striking large bells or blowing whistles.

These devices are supplemented by recording equipment consisting of registers and time stamps which automatically record and date all signals passing over the alarm circuits.

Northern Electric-Gamewell alarm apparatus is electro-mechanical and requires but a small amount of electric energy to control the operation of instruments possessing great mechanical power.

FIRE ALARM SYSTEMS

FOR INDUSTRIAL PLANTS

HOSPITALS, SCHOOLS, HOTELS, etc.



Fire alarm systems furnish a means for the discoverer of a fire to signal instantly to all employees and firemen, that there is a fire, and where it is, thus avoiding all the serious loss of time inevitable to any other method of conveying alarms. Whatever protection facilities there may be, as water-supply, hydrants, hose, pumps, and chemical engines, none of them are of any value until after the fire-fighting force has learned the location of the fire.

Fire alarm boxes are placed at the points of greatest danger, and generally throughout the plant, so located that not over 200 feet must be travelled to

reach one from any part of the premises.

Each box sends a signal indicating its location.

The boxes can be operated by anyone who can open a door, and pull a hook.

A single operation of the alarm box causes four repetitions of the alarm on all the gongs, bells, whistles, or electric horns in the equipment.

There are three types of industrial fire alarm systems.

1. Where the plant fire department is the only available force.

2. Where instant connection with the public fire department is desired from many interior stations.

3. Where there is a plant and a public fire department, and both can be called instantly and simultaneously.

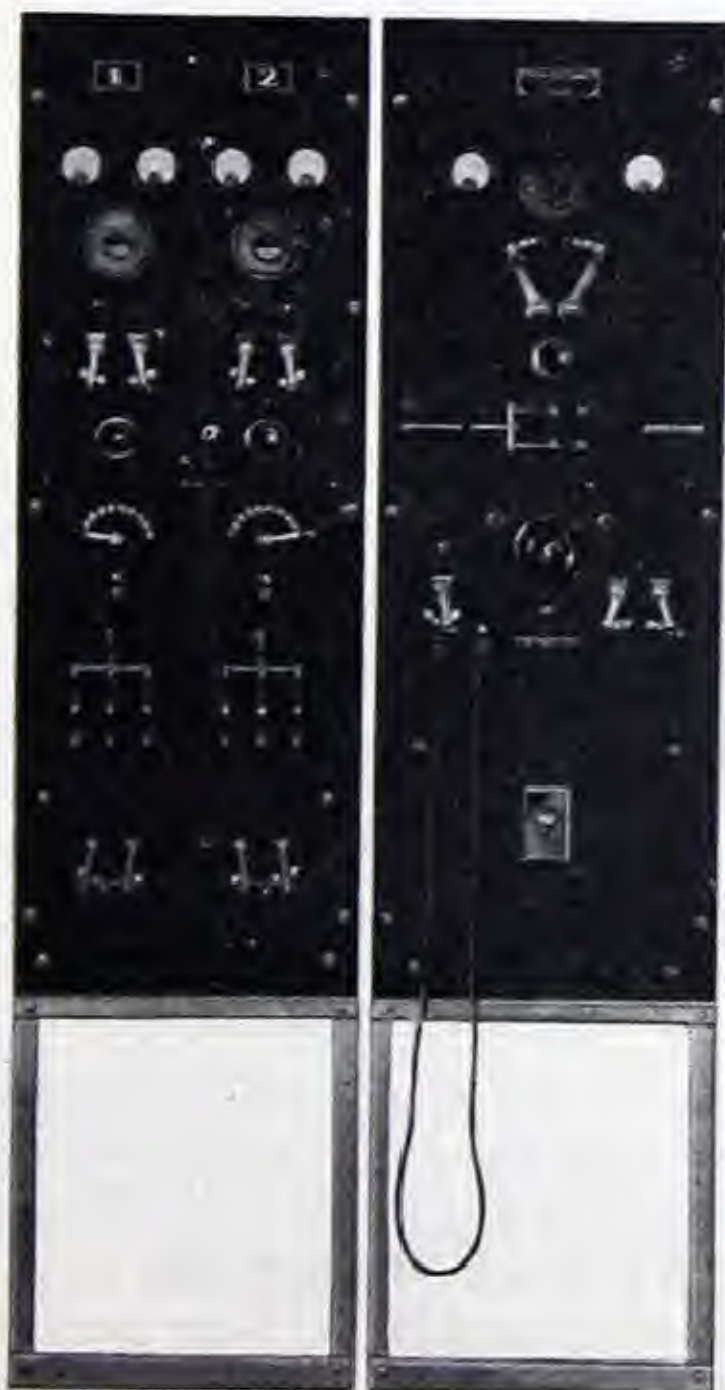
The life of standard fire alarm apparatus is indefinitely long. Apparatus already fifty years old is still in service.

The cost of maintenance is extremely small, and the equipment can be properly cared for by the plant electrician, or any skilled machinist, after brief instructions.

Type Equipments

Equipments are recommended by our engineers, after a study of the requirements needed to meet local conditions in each case.

Northern Electric-Gamewell apparatus has always been known to be of the highest standard for accuracy and durability.



FIRE ALARM SYSTEMS

For Industrial Plants—(Cont'd)

HOSPITALS, SCHOOLS, HOTELS, etc.

Many arrangements and modifications of these systems can be made to suit all conditions.

Class 1. Supervised—Code Signalling—Non Auxiliary.

Class 2. Supervised—Non-Code Signalling—Auxiliary.

Class 3. Supervised—Code Signalling—Auxiliary.

Supervised Code Signalling Non-Auxiliary Local Drill and Fire Signal System

This is one of the most popular industrial systems manufactured. It consists of return signal auxiliary fire alarm boxes, terminal set, vibrating alarm bells and city auxiliarized fire alarm box. It provides any desired number of interior fire alarm stations, from any one of which alarms can be directly and instantly transmitted to fire departments.

Such stations are usually located on every floor of the building protected, and where floor areas are very large, there are often two or more stations on each floor.

Each station is in effect a duplicate of the nearest alarm box in the public fire alarm system.

Each auxiliary box is provided with a "return signal" by which the sender of the alarm may know that the street box has operated.

Supervised, Non-Code Signalling, Auxiliary, Local Drill and Fire Signal System

There are two systems which can be considered under this heading, the first of which is known as the return signal auxiliary system and the other known as the silent auxiliary system.

Return Signal Auxiliary System

This system will give local fire drill on vibrating gongs and call city fire department simultaneously, but will not strike code numbers on alarm apparatus. It can be equipped with annunciators located at convenient points to indicate point from which alarm was given.

Silent Auxiliary System

In this system a local battery is dispensed with by connecting the signalling magnet directly in the signal circuit. This magnet is normally shunted by an auxiliary loop of low resistance which connects in series all the auxiliary sub-stations on the premises to be protected.

Operating a sub-station to cause a fire signal will break this auxiliary shunt loop of low resistance so that the only path for the current will then be through the starting magnet to energize same to release the signal mechanism.

Supervised, Code Signalling, Auxiliary, Local Drill and Fire Signal System

This system will give local fire drill on electro-mechanical gongs and call city fire department simultaneously. The fire drill will be struck in code on all alarm apparatus indicating the point from which alarm was given.

This is the best, most efficient and reliable Industrial System manufactured. It combines all the good features contained in systems described and in addition allows a fire drill to be pulled in at any time from any fire alarm station without sending the call to the Fire Department.

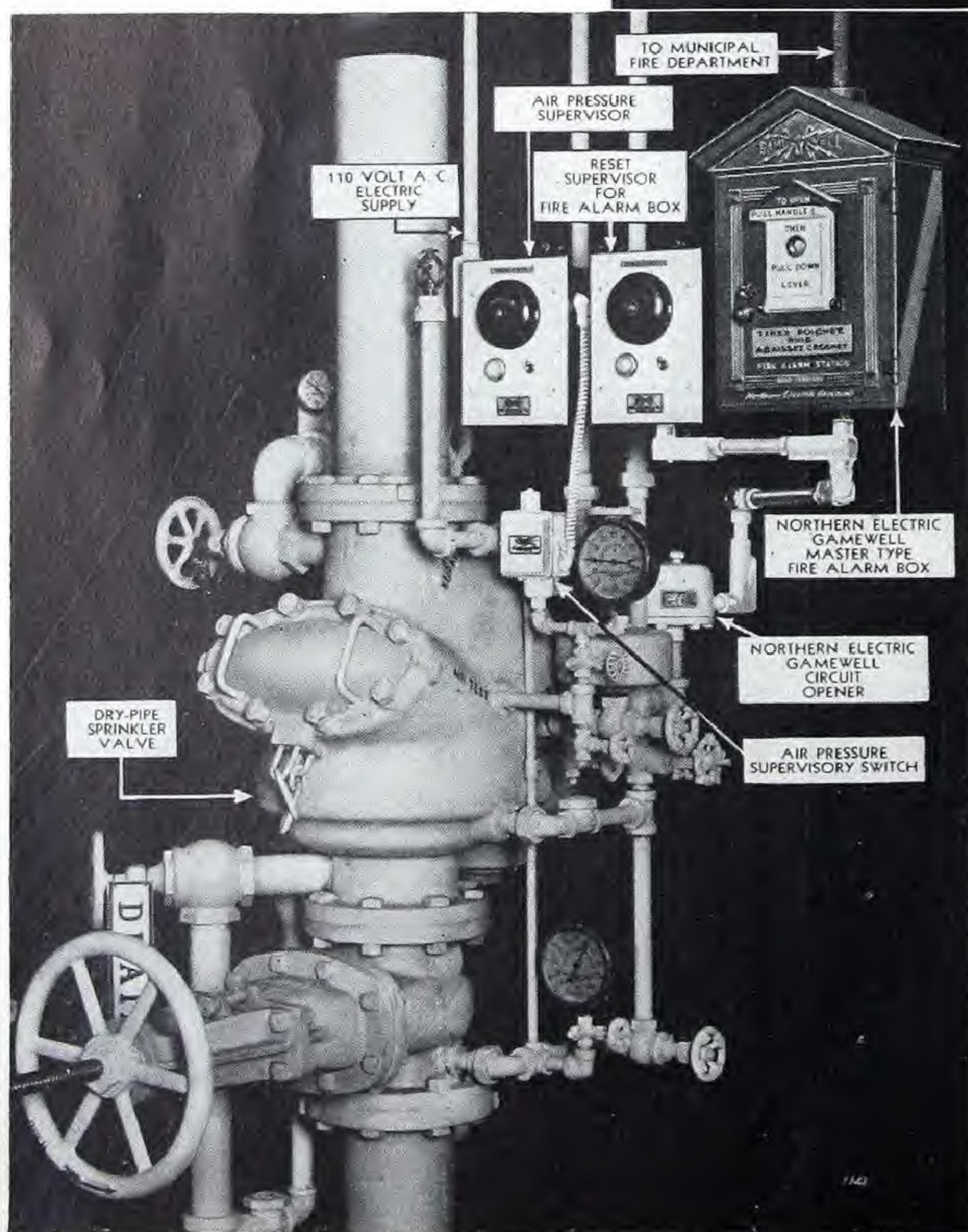
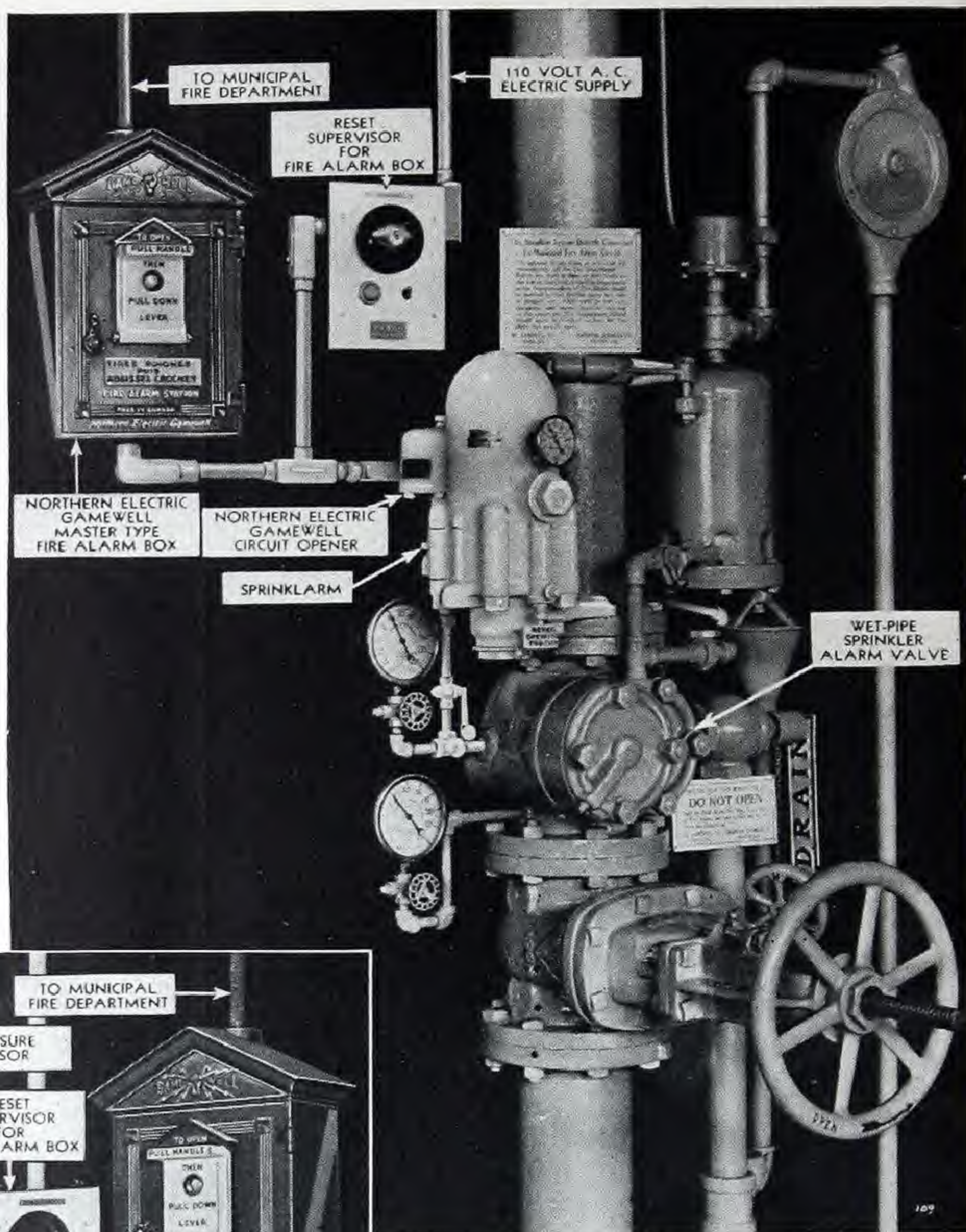
It consists of Code Signalling Fire Alarm Boxes (the type being determined by the class of building to be protected and by the number of boxes installed), Electro-Mechanical Gongs, Selective Relay, Supervisory Relays and City Auxiliarized Fire Alarm Box.

Prices on application.

NORTHERN ELECTRIC GAMEWELL SPRINKLER WATCHMAN

This equipment is intended for use in connecting the average sprinkler system directly with the municipal fire department through a Northern Electric-Gamewell Master Fire Alarm Box—Calls the firemen instantly upon the opening of a sprinkler head. The quickest, most reliable and economical sprinkler supervisory service known.

View below shows how DRY-PIPE SPRINKLER SYSTEM can be connected directly to the municipal fire alarm system so that the opening of a sprinkler head automatically trips a Northern Electric-Gamewell Master Type Fire Alarm Box which, in turn, transmits its alarm instantly to the fire department. Apparatus designated constitutes the Northern Electric-Gamewell Sprinkler Watchman except the sprinkler valve.



View above shows how WET-PIPE SPRINKLER SYSTEM can be connected directly to the municipal fire alarm system. Apparatus designated constitutes the Northern Electric-Gamewell Sprinkler Watchman except the sprinkler alarm valve.

The Master Box need not necessarily be installed alongside the Sprinkler Riser. A good location for its installation is on the nearest pole in the street adjoining the sprinkler-protected building; for in this way the public may also operate the Master Box to send in the alarm the same as a regular city fire alarm box.

Write for further particulars. State whether your sprinkler system is WET OR DRY PIPE; how many riser valves you have and the wording and numbers cast on each.

We can then show you how the Sprinkler Watchman will fit your needs.

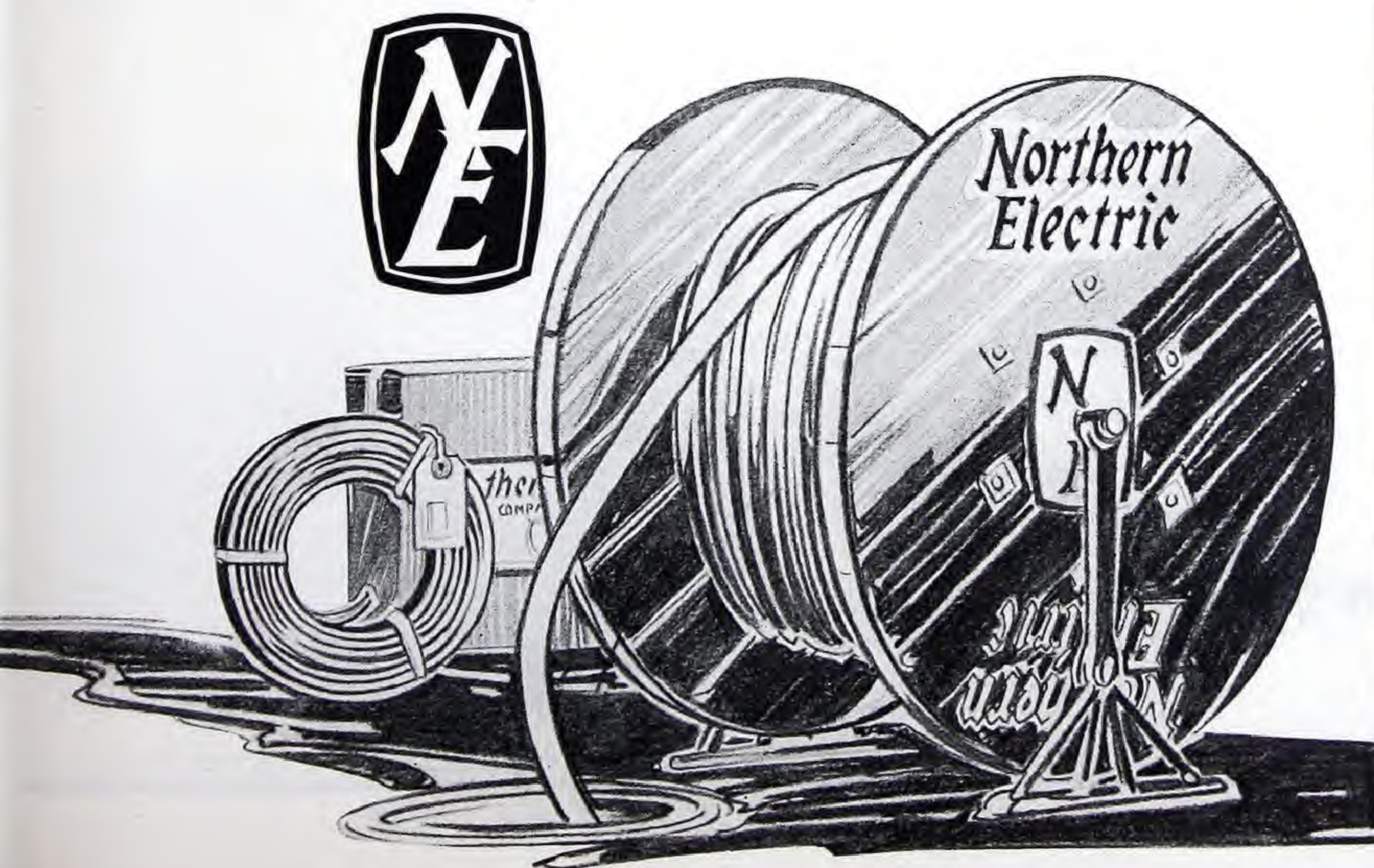
for
**RANGE of
WIRE and
CABLE**

See Back of
this Page

The Northern Electric Company manufactures and distributes all types of standard and special wires and cables. The buyer of wires and cables is interested in true quality, prompt delivery and fair price. It is by meeting these demands and satisfactorily serving discriminating buyers that the Northern Electric Company has achieved its position in the wire and cable field.

*See alphabetical index
for page numbers of
listings at back
of book.*

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WIRE AND CABLE DIVISION*Northern Electric***WIRES *and* CABLES for
POWER-LIGHT TELEPHONE AND TELEGRAPH CIRCUITS***Manufacturers of:*

A.B.C. Cable	Oil-burner Cable
Antenna Wire	Office Wire
Annunciator Wire	Paper Power Cable
Armature Wire	Paper Telephone Cable
Armored Cable	Police Patrol Cable
Asbestos Covered Wire	Radio Wire
Automobile Wire	Range Wire
Bare Copper Wire and Cable	Rubber Covered Wire
Bare Copperweld Wire and Cable	Rubber Insulated Cable
Bronze Wire	Service Cable
Bell Cord	Service Entrance Cable
Brass Wire	Signal Wire and Cable
Cab Tire Cable	Slow-burning Weatherproof Wire and Cable
Cadmium Copper Wire	Slow-burning Wire and Cable
Car Wire	Soil Heating Cable
Control Cable	Stove Wire
Copperweld Wires and Cables	Switchboard Cable
Dictograph Cable	Switchboard Cords
Elevator Cable	Switchboard Wire
Enamelled Wire	Telegraph Cable
Fire Alarm Cable	Telephone Cable
Fixture Wire	Telephone Cords
Flameproof Wire and Cable	Telephone Wire
Flexible Armored Cable	Terminating Cable
Flexible Cords	Thermostat Control Cable
Hollow Core Cable	Trolley Wire
Lead Covered Cables	Varnished Fabric Cable
Magnet Wire	Weatherproof Copper Cable
Marine Wire and Cable	Weatherproof Copper Wire
Metallizing Wire	Weatherproof Iron Wire
Military Wire	Cable Terminals
Neon-tube Cable	Junction Boxes
Non Metallic Armored Cable	Splicing Materials
Norel-X Cable	

ALL CLASSES OF CABLE SYSTEMS INSTALLED

SOLID BARE COPPER WIRE

Copper Line Wire

Hard Drawn, Medium Drawn, Soft Drawn

Northern Electric copper wire, both soft annealed and hard drawn, complies fully with the standard specifications of the "American Society for Testing Materials" for copper wire.

The wire is accurate in diameter and uniform in cross-section within the limits of the permissible variations given in the specification.

When ordering state whether hard, medium or soft annealed wire is required.

Size B. & S.	Diam. Mils	Area		Approx. Wgt. Per 1000 Ft.	Lbs. Per Mile
		Circular Mils	Square Inches		
0000	460	211600	.1662	641	3382
000	410	167800	.1318	508	2682
00	365	133100	.1045	403	2127
0	325	105500	.08289	320	1686
1	289	83690	.06573	253	1337
2	258	66370	.05213	201	1061
3	229	52630	.04134	159	841
4	204	41740	.03278	126	667
5	182	33100	.02600	100	529
6	162	26250	.02062	79.5	420
7	144	20820	.01635	63.0	333
8	128	16510	.01297	50.0	264
9	114	13090	.01028	39.6	209
10	102	10380	.008155	31.4	166
11	91	8234	.006467	24.9	132
12	81	6530	.005129	19.8	104
13	72	5178	.004067	15.7	82.7
14	64	4107	.003225	12.4	65.6
15	57	3257	.002558	9.86	52.1
16	51	2583	.002029	7.82	41.3
17	45	2048	.001609	6.20	32.7
18	40	1624	.001276	4.92	26.0
19	36	1288	.001012	3.90	20.6
20	32	1022	.0008023	3.09	16.3

Also put up in long lengths on reels, as desired.

Prices on application.



A wire-drawing machine

SOLID BARE COPPER WIRE

Trolley Wire



Round



Grooved

Hard drawn copper trolley wire is covered by the American Society for Testing Materials specification. Round trolley wire is similar to standard hard drawn wire. Grooved trolley wire standard sections are those known as the "American Standard Grooved Trolley Wire Sections." The standard sizes are given below.

Grooved trolley wire may vary 4% over or under any weight per unit length from standard as determined from the nominal cross-section.

Electrical Conductivity (Minimum).—Mile-ohm at 68 degrees Fahr. not to exceed 900.7 equals 97.16 per cent I.A.C.S.

Where extra strength and durability are required we supply cadmium-copper trolley wire. Although having somewhat higher resistance than copper wire of the same size, cadmium-copper wire has much greater tensile strength and toughness making it very resistant to wear. It can be supplied in both round and grooved forms.

The following table gives a comparison between copper and cadmium copper trolley wires:

	0000 B. & S.		000 B. & S.	
	Grooved	Round	Grooved	Round
Actual Area—Circular Mils	212,000	211,600	167,300	168,000
Actual Area—Square Ins.	.1665	.1662	.1314	.1320
Weight—Pounds per 1000 ft.	641.7	640.5	506.4	508.8
Weight—Pounds per mile	3388	3382	2674	2687

Hard Drawn Copper—

Cond. 97.16% I.A.C.S.

D.C. Resistance—Ohms				
per mile at 20°C.	.2659	.2664	.3369	.3353
Tensile Strength—Pounds				
per square inch.	46,600	49,000	48,500	51,000
Breaking Strength—				
Pounds.	7,759	8,143	6,373	6,734
Elastic Limit—Pounds.	4,267	4,479	3,505	3,703
Elongation—Percent in 10"	3.75	3.75	3.25	3.25

Cadmium Copper—

Cond. 85% I.A.C.S.

D.C. Resistance—Ohms				
per mile at 20°C.	.3039	.3045	.3851	.3832
Tensile Strength—Pounds				
per square inch.	62,000	62,000	64,000	64,000
Breaking Strength—				
Pounds.	10,320	10,300	8,410	8,450
Elastic Limit—Pounds.	6,144	6,132	5,046	5,070
Elongation—Percent in 10"	3.25	3.75	2.75	3.25

	00 B. & S.		0 B. & S.
	Grooved	Round	Round
Actual Area—Circular Mils	137,900	133,200	105,600
Actual Area—Square Inches	.1083	.1046	.08296
Weight—Pounds per 1000 feet	417.4	403.2	319.7
Weight—Pounds per mile	2204	2129	1688

Hard Drawn Copper—

Cond. 97.16% I.A.C.S.

D.C. Resistance—Ohms per mile at			
20°C.	.4087	.4230	.5336
Tensile Strength—Pounds per			
square inch.	50,200	52,800	54,500
Breaking Strength—Pounds	5,437	5,524	4,521
Elastic Limit—Pounds	2,990	3,038	2,487
Elongation—Percent in 10"	2.80	2.80	2.40

Cadmium Copper—

Cond. 85% I.A.C.S.

D.C. Resistance—Ohms per mile at			
20°C.	.4672	.4836	.6099
Tensile Strength—Pounds per			
square inch.	66,000	66,000	69,000
Breaking Strength—Pounds	7,150	6,900	5,720
Elastic Limit—Pounds	4,289	4,143	3,385
Elongation—Percent in 10"	2.25	2.75	2.40

Prices on application.

COPPERWELD WIRE

Copperweld wire consists of a steel core to which an outer layer of pure copper has been welded by the Molten Welding Process. Copperweld does not rust; the ordinary 30 per cent conductivity grade is 50 per cent stronger than hard-drawn copper or galvanized iron wires of equal size.

We manufacture three grades of Copperweld. These are:—

(1). High strength—30% conductivity—Comparing this wire to the International Annealed Copper Standard, it has a conductivity of 30 per cent of that of hard-drawn copper of the same size.

(2). "High strength 40% Conductivity"—Similar to 30 per cent but with a thicker coating of copper so that 10 per cent more conductivity is obtained.

(3). "Extra high strength"—A special grade of 30 per cent conductivity wire, the steel core of which is of high carbon steel. This wire is 50 per cent to 80 per cent stronger than the ordinary 30 per cent grade, depending on the size, and is used for making extra strong cables for long spans. It is also used in mixed Copperweld-copper cables for railway electrifications, feeder cables, etc.

We supply Copperweld as bare line wire, stranded cable, weatherproof braided wire, bond wire and rubber insulated telephone wire. We also supply copperweld strand, guy wire and ground rods.

Engineering Data "Copperweld," a looseleaf folder giving full information on Copperweld products, can be obtained from our nearest distributing house.

Prices on application.

Copperweld-Copper Conductors

The use of composite copperweld-copper conductors for transmission and distribution of power makes possible the construction of lines with long spans, small sags and high factors of safety.

Such copperweld-copper conductors have special advantages in the construction of rural lines. They are designed in 2 and 3 wire types which have wires of relatively large diameter as compared with the wires in a 7 wire conductor of a similar size. This presents greater resistance to wear and less susceptibility to damage both when in service and during construction.

Because of their irregular shape these conductors have little or no tendency to vibrate even when strung on long spans with high stringing tensions. They are, therefore, practically free from danger of parting through fatigue in service.

The following table gives, at a glance, the important information on the sizes and designs of copperweld-copper conductors usually used for rural distribution.

Cond. No.	Cond. Equiv. to H.D. B&S	Diam. of Cable Inch	Weight Pounds per 1000 ft.	Break. Load Pounds	Allow. Sag 60°F. Feet	Allow. Span Feet
2A	2	.367	258	5890	3.5	400
3A	3	.325	203	4790	3.5	403
4A	4	.290	161	3930	3.5	413
5A	5	.259	128	3190	3.6	385
6A	6	.230	101	2580	3.9	360
7R	7	.253	93.6	2760	3.7	383
8R	8	.225	74.3	2240	4.0	353

The sag and span data shown above is for Heavy Loading District— $\frac{1}{2}$ " ice 8 lbs. wind at 0°Fahr. Maximum tension—60% of rated breaking load. Based on 30 foot poles set $5\frac{1}{2}$ feet in the ground. Conductors on cross arms assumed at 24 feet above ground at poles. Allowable spans and sags at 60°F. to maintain clearance requirements of the National Electrical Safety Code for lines with voltage from 750 to 15000 volts which run along country roads.

Type A Conductors—2 hard drawn copper wires and 1 extra high strength copperweld wire Modulus of Elasticity: 17,700,000 lbs. per square inch. Coefficient of Linear Expansion: .000,008,5 per degree Fahr.

Type R conductors—1 hard drawn copper wire and 1 extra high strength copperweld wire Modulus Elasticity: 19,000,000 lbs. per square inch. Coefficient of Linear Expansion: .008,008,1 per degree Fahr.

FIRE ALARM AND RAILWAY SIGNAL WIRES AND CABLES

In the construction of overhead lines for fire alarm and railway signalling systems, safety and reliability are the foremost requirements. For this reason we recommend the use of High Strength Copperweld conductors.

Having great strength, ample conductivity and freedom from rusting, Copperweld Signal Line Wires are ideal overhead wires for signal, switch and other control circuits. The mechanical stability of its steel core—its high elastic limit, its great security against stretching, fatigue and against breakage due to bending—gives Copperweld wire a reliability which cannot be equalled by other types of wire sometimes used.

Copperweld wire can be supplied in all forms either as a solid wire or in stranded form and either bare or with standard weatherproof finish.

BRASS WIRE

Brass Wire is usually an alloy of copper and zinc but in some cases a third element such as lead is also used. The copper content varies from 65% to 90%. It is customary to include all mixtures containing less than 80% of copper under the name of High Brass and those containing from 80 to 90% copper under the name of Low Brass.

Brass Wire is used for a variety of commercial purposes and varies considerably in composition for different requirements. We supply all types of brass wire and specialize in wires used in the manufacture of pins, hooks and eyes, screws, nails, rivets, nipples, springs, brushes, etc.

Standard grades of brass wire are:

Soft—Tensile strength 40,000 to 50,000 pounds per square inch.

Medium—Tensile strength 70,000 to 80,000 pounds per square inch.

Hard—Tensile strength 80,000 to 100,000 pounds per square inch.

BRONZE WIRE

Bronze in its simplest form is an alloy of copper and tin in which the latter element is the hardening and strengthening agent. Frequently a third element is introduced such as phosphorus, silicon, manganese, zinc, aluminum or cadmium. In some cases more than three elements are used. Cadmium-copper alloys are called cadmium bronzes.

Bronze Wire possesses great tensile strength and toughness and is also highly resistant to corrosion. These properties make it valuable for both mechanical and electrical uses. It is used for overhead telephone, telegraph and power lines, as both conductor and messenger strand, on the seacoast and in localities where exposed to chemical fumes. It is used also for armature binding, springs, radio aerials, fishing line, etc.

In the following table are shown some of the bronzes in general use—

Type	Percentage Conductivity	Tensile Strength (Lbs. per Sq. Inch)
Neco-13	13	121,600
Neco-18	18	129,900
Neco-30	31.5	98,000
Neco-40	40	83,500
Neco-55	55	84,000
Neco-65	65	73,100
Neco-80	80	81,000
Neco-85	85	77,000
Neco-B	—	131,500
Neco-F	—	158,000

METALLIZING WIRE

We manufacture all types of wire used in the metallizing or metal spraying process including zinc, lead, tin, copper, brass, bronze, cadmium, etc. For the proper operation of the "guns" used in this process it is essential that the wire be clean, uniform in diameter with the surface free from nicks, bumps and other irregularities. We have had considerable experience in manufacturing such wire and are able to supply a product that meets these requirements in all respects. The sizes mostly used are No. 10 B. & S., No. 12 B. & S., and No. 15 B. & S. Other sizes can also be supplied.

GALVANIZED TELEPHONE AND TELEGRAPH WIRE

See listing in Overhead and Underground Materials section.

GALVANIZED STEEL WIRE STRAND

See listing in Overhead and Underground Materials section.

BARE COPPER CABLE

STANDARD STRANDED COPPER CONDUCTORS



Bare copper conductors are made up of concentrically laid wires. The number of wires forming the conductor may be 7, 19, 37, 61 or 91 depending on the size of the finished conductor.

Furnished in hard drawn, medium drawn or soft annealed wire as required.

We can make up stranded conductors to any desired special strand but recommend the standard strandings given below.

Standard Stranding				
Stranded Conductor Cir. Mills	Weight Lbs. per 1000 Feet	No. of Wires	Diam. Each Wire Inches	Diam. Stranded Conductor Inches
2000000	6179	91	.1483	1.631
1750000	5405	91	.1387	1.526
1500000	4631	61	.1568	1.411
1250000	3862	61	.1432	1.289
1000000	3086	61	.1280	1.152
950000	2933	61	.1248	1.123
900000	2780	61	.1215	1.094
850000	2622	61	.1180	1.062
800000	2469	61	.1145	1.031
750000	2316	61	.1109	.998
700000	2160	61	.1071	.964
650000	2006	61	.1032	.929
600000	1853	37	.1273	.891
550000	1700	37	.1219	.853
500000	1543	37	.1162	.813
450000	1390	37	.1103	.772
400000	1236	19	.1451	.726
350000	1082	19	.1357	.679
300000	925.3	19	.1257	.629
250000	772	19	.1147	.574

Standard Stranding				
Size B. & S.	Weight Lbs. per 1000 Feet	No. of Wires	Diam. Each Wire Inches	Diam. Stranded Conductor Inches
0000	649.1	7	.1739	.522
000	518.4	7	.1548	.464
00	410.0	7	.1379	.414
0	325.6	7	.1228	.368
1	256.4	7	.1093	.328
2	203.6	7	.0974	.292
3	161.3	7	.0867	.260
4	127.9	7	.0772	.232
5	101.5	7	.0688	.206
6	80.38	7	.0612	.184
8	50.69	7	.0486	.146
10	31.81	7	.0385	.116
12	19.97	7	.0305	.092
14	12.57	7	.0242	.073

Prices on application.

BARE COPPER CABLE

STANDARD FLEXIBLE COPPER CONDUCTORS

It is often found that the flexibility of the Standard Stranded Conductors is not sufficient to meet certain service conditions. In such cases we recommend the design given in the table below.

Approx. Area Cir. Mills	Weight Lbs. per 1000 Feet	No. of Wires	Diam. Each Wire Inches	Diam. Stranded Conductor Inches
2000000	6257	217	.0960	1.6320
1750000	5475	217	.0898	1.5270
1500000	4692	169	.0942	1.4130
1250000	3911	169	.0860	1.2900
1000000	3085	127	.0887	1.1540
950000	2934	127	.0865	1.1250
900000	2780	127	.0842	1.0950
850000	2624	127	.0818	1.0640
800000	2472	127	.0794	1.0330
750000	2313	127	.0768	.9990
700000	2159	127	.0742	.9650
650000	2005	127	.0715	.9300
600000	1851	127	.0687	.8940
550000	1698	127	.0658	.8560
500000	1543	91	.0741	.8160
450000	1389	91	.0703	.7740
400000	1235	91	.0663	.7300
350000	1080	91	.0620	.6820
300000	925.1	91	.0574	.6320
250000	771.46	91	.0524	.5770
Size B. & S.				
0000	653.39	61	.0589	.5310
000	517.14	61	.0524	.4720
00	410.75	61	.0467	.4210
0	325.93	61	.0416	.3750
1	257.84	61	.0370	.3330
2	204.41	37	.0423	.2970
3	162.37	37	.0377	.2640
4	128.97	37	.0336	.2360
5	102.13	37	.0299	.2100
6	80.83	37	.0266	.1870
8	50.86	37	.0211	.1480
10	31.91	37	.0167	.1170
12	20.25	37	.0133	.0940
14	12.61	37	.0105	.0740

STANDARD EXTRA FLEXIBLE COPPER CONDUCTORS

2000000	6375	703	.0533	1.869
1750000	5565	703	.0498	1.743
1500000	4769	703	.0461	1.617
1250000	3977	703	.0421	1.477
1000000	3193	427	.0484	1.305
950000	3037	427	.0472	1.278
900000	2884	427	.0460	1.242
850000	2699	427	.0445	1.206
800000	2544	427	.0432	1.170
750000	2393	427	.0419	1.134
700000	2236	427	.0405	1.098
650000	2073	427	.0390	1.053
600000	1917	427	.0375	1.017
550000	1757	427	.0359	.972
500000	1595	427	.0342	.927
450000	1431	427	.0324	.873
400000	1277	427	.0306	.828
350000	1115	427	.0286	.774
300000	957.05	427	.0265	.720
250000	799.52	259	.0311	.651
Size B. & S.				
0000	676.17	259	.0286	.602
000	534.97	133	.0355	.535
00	423.87	133	.0316	.475
0	337.58	133	.0282	.425
1	257.95	91	.0303	.333
2	203.31	91	.0269	.296
3	161.83	91	.0240	.264
4	128.30	61	.0261	.235
5	102.24	61	.0233	.210
6	80.70	61	.0207	.186
8	51.36	61	.0165	.148
10	31.91	37	.0167	.117
12	20.25	37	.0133	.094
14	12.61	37	.0105	.074

ROPE CORE AND HOLLOW CORE CONDUCTORS



In the all-copper Northern Electric Hollow Conductor one or more layers of copper strands are spiralled around a core of twisted copper having an I-shaped section.

Engineers have been giving increased study to corona loss from high voltage overhead transmission lines for a number of years. This problem has generally been solved by using a conductor of sufficiently large diameter to bring this loss within tolerable limits. When material such as hemp is used as a core to increase the diameter, the core is liable to deteriorate, especially in warm, damp climates.

Hollow-core conductors have been developed to obtain the desired outside diameter without the use of such an easily deteriorated material as hemp, which adds nothing to the tensile strength or conductivity. These cables consist of copper or bronze wires stranded around a core of soft copper. The soft copper core has an I-shaped section and is twisted with a short lay thus offering a good support for the wires and making the cable very rugged and capable of withstanding high compression. The I-section core adds to the conductivity and to the tensile strength of this cable as well as to the weight. With this construction, the outside diameter and cross-sectional area of the cable are independent within wide limits, permitting the design of transmission cable which will provide maximum economy both as regards corona and resistance losses and permanency.

Cores are also used in large cables to reduce the so-called "skin effect" with alternating current. The resistance of metallic conductors is greater for alternating currents than for direct current. With large alternating currents, the distribution of current is not uniform throughout the cross-section of the conductor, the density being greater at the surface than at the centre. This concentration of current towards the surface increases with the frequency of the current, varies with the materials and diameter of the conductor, and causes an apparent increase of resistance which is known as "skin effect."

This increase in resistance due to the "skin effect" of alternating currents may be decreased by building the conductor around a core. The core generally used in insulated cables is hemp rope, but in bare overhead cables that are exposed to the weather, the core should be of metal, such as the copper I-section core of hollow-core cables. Our insulated rope-core cables are designed to produce the most economical cable as regards both "skin effect" losses and cost of cable.

Extra high voltage transmission is an important factor in meeting the widespread and growing demands for power.

Hollow Core Copper Conductors have been developed to overcome some of the principal difficulties encountered in long distance A.C. transmission of extra high voltages and large currents. Some of the advantages of Hollow Core cables are:—

1. Corona and resistance losses can be controlled and reduced as the hollow construction permits the variation of outside diameters and cross sections within wide limits.

2. The conductor is made entirely of copper and therefore is high in conductivity and tensile strength.

3. The twisted copper I-section core eliminates the use of formerly used perishable fillers, thus adding strength without the addition of dead weight and increasing its conductivity and durability.

4. There can be no shifting of stresses between the cores and the outside layers due to temperature changes as they are both made of copper.

5. They are as easy to handle as any concentric copper cable.

The high efficiency and low maintenance cost mark hollow core conductors as an important contribution to the development of super-power.

WEATHERPROOF COPPER WIRES AND CABLES



Weatherproof wires and cables consist of copper conductors covered with two or three weatherproofed braids. These wires and cables are used extensively for the outdoor distribution of power where they are subject to the effects of all types of weather. It is important, therefore, that the material used in their construction be of the best quality and properly constituted to withstand the ravages of exposure to the elements.

In designing our weatherproof wires and cables we have combined the latest accepted standards with the results of our own research and experience, producing a cable that is ideally adapted for service under conditions encountered in Canada.

TRIPLE BRAID—SOLID CONDUCTOR

Size B. & S.	Approx. Weight Pounds		Approx. Diam. over Insulation In.
	Per 1000 Feet	Per Mile	
0000	767	4050	.760
000	629	3320	.710
00	502	2650	.650
0	407	2150	.590
1	316	1670	.540
2	260	1370	.480
3	199	1050	.430
4	164	865	.390
5	135	710	.350
6	112	590	.320
8	75	395	.290
9	62	325	.280
10	53	280	.260
12	35	185	.210
14	25	130	.190

TRIPLE BRAID—STRANDED CONDUCTOR

Size Cir. Mils B. & S.	Approx. Weight Pounds		Approx. Diam. over Insul. In.	Concentric Strands No. of Wires	Diam Each. In.
	Per 1000 Feet	Per Mile			
2000000	7008	37002	2.03	91	.1483
1750000	6193	32699	1.92	91	.1387
1500000	5380	28406	1.81	61	.1568
1250000	4508	23802	1.69	61	.1432
1000000	3674	19399	1.55	61	.1280
900000	3332	17593	1.49	61	.1215
800000	2992	15798	1.43	61	.1145
750000	2822	14900	1.40	61	.1109
700000	2650	13992	1.37	61	.1071
600000	2235	11801	1.29	37	.1273
500000	1894	10000	1.22	37	.1162
450000	1724	9103	1.18	37	.1103
400000	1553	8200	1.14	19	.1451
350000	1345	7102	1.10	19	.1357
300000	1174	6199	1.05	19	.1257
250000	985	5201	1.00	19	.1147
0000	800	4224	.82	7	.1739
000	653	3448	.75	7	.1548
00	522	2756	.68	7	.1379
0	424	2239	.62	7	.1228
1	328	1732	.55	7	.1093
2	270	1426	.50	7	.0974
3	206	1088	.45	7	.0867
4	170	898	.41	7	.0772
5	140	739	.37	7	.0688
6	115	607	.35	7	.0612
8	78	412	.31	7	.0545
9	65	343	.29	7	.0432
10	56	296	.28	7	.0385

Prices on application

WEATHERPROOF COPPER WIRES AND CABLES



Double braid weatherproof is similar in construction to triple braid weatherproof except that the covering consists of two braids only. This type is often used under favorable conditions when economy is essential.

DOUBLE BRAID—SOLID CONDUCTOR

Size B. & S.	Approx. Weight Pounds		Approx. Diam. over Insulation In.
	Per 1000 Feet	Per Mile	
0000	723	3817	.640
000	587	3098	.590
00	467	2467	.540
0	377	1989	.500
1	294	1553	.470
2	239	1264	.400
3	185	977	.370
4	151	795	.350
5	122	646	.320
6	100	529	.300
8	66	349	.270
9	54	283	.260
10	46	241	.240
12	30	158	.190
14	20	106	.170
16	15	83	.150
18	12	64	.140

DOUBLE BRAID—STRANDED CONDUCTOR

Size Cir. Mils and B. & S.	Approx. Weight Pounds		Approx. Diam. over Insul. In.	No. of Wires	Diam. Each In.
	Per 1000 Feet	Per Mile			
2000000	6690	35323	1.91	91	.1483
1750000	5894	31120	1.81	91	.1387
1500000	5098	26917	1.69	61	.1568
1250000	4264	22514	1.57	61	.1432
1000000	3456	18248	1.43	61	.1280
900000	3127	16511	1.34	61	.1215
800000	2799	14779	1.28	61	.1145
750000	2635	13913	1.24	61	.1109
700000	2471	13047	1.21	61	.1071
600000	2093	11051	1.14	37	.1273
500000	1765	9319	1.02	37	.1162
450000	1601	8453	.98	37	.1103
400000	1436	7582	.94	19	.1451
350000	1248	6589	.89	19	.1357
300000	1083	5718	.84	19	.1257
250000	907	4789	.79	19	.1147
0000	745	3934	.70	7	.1739
000	604	3189	.64	7	.1548
00	482	2545	.59	7	.1379
0	388	2049	.55	7	.1228
1	303	1600	.51	7	.1093
2	246	1299	.43	7	.0974
3	190	1003	.40	7	.0867
4	155	818	.37	7	.0772
5	126	665	.35	7	.0688
6	103	544	.33	7	.0612
8	68	359	.29	7	.0545
9	56	296	.27	7	.0432
10	48	253	.26	7	.0385

Prices on application

SLOW-BURNING WIRES AND CABLES

These wires have three close braids all saturated with a white fireproof compound, and finished with a smooth, hard finish. The compound used on the outer braid becomes very hard but still the wire retains its flexibility. As this insulation does not deteriorate in a continued high temperature, it is especially suitable for engine and boiler rooms, furnaces and foundries.

The conductors of these wires and cables are exactly the same as those of ordinary double braid or triple braid weatherproof. Details of construction will be found in the tables for these wires shown on the preceding pages.

Slow-burning wire is considerably heavier than weatherproof. The weights per unit length are greater than those of triple braid weatherproof by about 10 per cent in the case of the larger stranded conductors, this ratio increasing to as much as 35 per cent in the case of small stranded or solid conductors.

SLOW-BURNING WEATHERPROOF WIRES AND CABLES

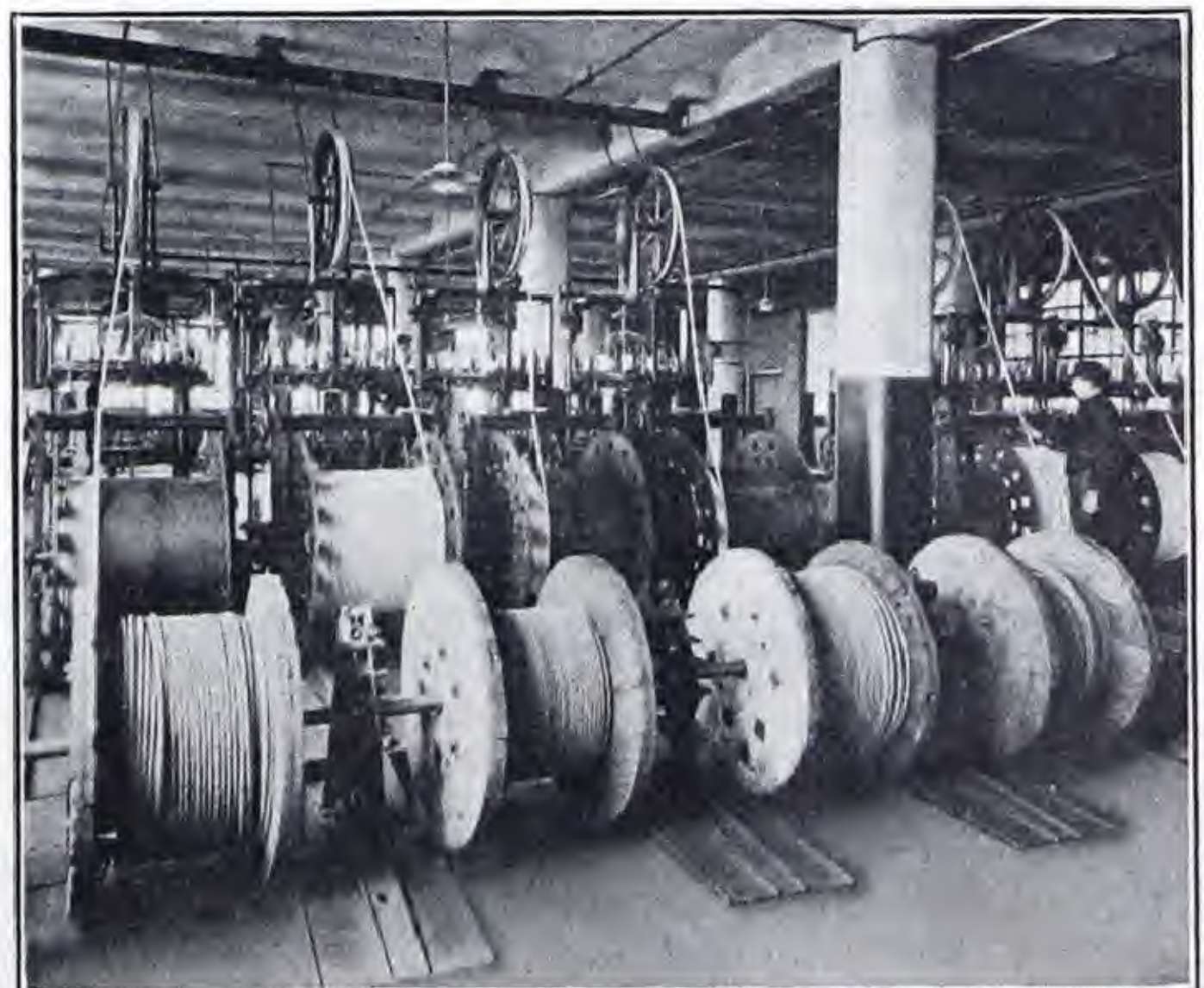
The insulation of this wire does not burn as readily as that of ordinary weatherproof nor is it so liable to soften under heat. It is not suitable for outside work. The insulation is composed of one braid, thoroughly saturated with a black weatherproof compound, covered with two braids saturated with white fireproof compound, giving a hard, smooth finish. Dimensions and weights approximately the same as for slow-burning wire.

WEATHERPROOF IRON WIRE DOUBLE AND TRIPLE BRAIDED

These wires are extensively used in telephone and telegraph work, and have the same insulation as regular weatherproof wires. They are finished the same as all other weatherproof wires and are put up for shipment in coils only, wrapped in burlap.

Size B.W.G.	Double Braided		Triple Braided	
	Approx. Lbs. per 1000 Ft.	Approx. Lbs. per Mile	Approx. Lbs. per 1000 Ft.	Approx. Lbs. per Mile
6	135	710	147	775
8	93	490	103	543
9	77	407	85	449
10	63	338	71	375
12	46	243	52	275
14	28	148	34	179

Prices on application.



Large Braiders used principally in braiding cotton insulation on Weatherproof Cable.

MAGNET WIRE



Double Cotton Covered Wire

Magnet Wire is used for a number of purposes but mostly in the winding of induction coils for radio, telephone and telegraph apparatus, for armature and field coils of motors and generators, and for transformer windings.

The copper used is of the highest conductivity, drawn true to gauge, free from imperfections and annealed extremely soft.

The insulating materials used on magnet wire consist principally of enamel, silk and cotton.

Enamelled Magnet Wire consists of copper conductor covered with a continuous, thin, uniform film of an insulating enamel. This enamel wire has high dielectric strength, very low space factor and may be bent around relatively sharp corners without danger of cracking or opening up of the insulation. The enamel film has a high resistance to oil and to weak acids and alkali. Enamelled wire may be operated at temperatures above that allowable for textile insulated wires. On account of its better heat conductivity coils wound with enamelled wire will transfer the heat generated by the current to the outside of the coil much more readily than is the case with the textile insulated wire.

Textile Insulated Magnet Wire (silk or cotton) has the insulation wound spirally around the conductor, successive layers being wound in opposite directions. While there are several species of cotton used for insulating, only Sea Island Cotton is used for magnet wire, as it is of a very soft, heavy texture, and produces an even yarn which makes an ideal covering for this type of wire. The space factor for silk covered magnet wire is lower than that for cotton covered magnet wire, though not so low as for enamelled wire. When silk magnet wire is required, the insulation is an Italian Tram Silk composed of fine selected fibres.

Round, flat or square magnet wire is manufactured and is covered with enamel, silk, cotton or asbestos, or combinations of these, depending on the use for which it is intended.

We also supply Bonded Magnet Wire in which the cotton insulation is cemented to the conductor. This "bonding" of the insulation to the wire is accomplished by the use of an insulating compound which acts as a cementing agent causing the cotton to adhere firmly. Such wire may be twisted and bent to much sharper angles without the cotton wrap opening and exposing the conductor. When "bonded" magnet wire is cut the cotton wrap stays in place and does not unravel. The danger of short circuits due to wires crossing one another is less, particularly between adjacent layers where wires cross at nearly the same angle as that at which the cotton is applied. This type of magnet wire is particularly adapted for use with high speed coil winding machines. Tests have shown that it will stand up under more severe conditions than will unbonded wire.

The following tables give details which are standard for round magnet wire:

MAGNET WIRE—Silk Covered

Size B. & S.	Single Silk			Double Silk		
	Bare Diam. Inches	Overall Diam. Inches	Lbs. per 1000 Feet	Overall Diam. Inches	Lbs. per 1000 Feet	
16	.0508	.0533	7.91	.0546	8.01	
17	.0453	.0478	6.28	.0491	6.37	
18	.0403	.0428	4.97	.0441	5.07	
19	.0359	.0384	3.95	.0397	3.96	
20	.0320	.0345	3.15	.0358	3.19	
21	.0285	.0310	2.50	.0323	2.53	
22	.0254	.0279	1.97	.0292	2.00	
23	.0226	.0251	1.58	.0264	1.59	
24	.0201	.0226	1.25	.0239	1.28	
25	.0179	.0204	.99	.0127	1.01	
26	.0159	.0184	.79	.0197	.80	
27	.0142	.0167	.63	.0180	.64	
28	.0126	.0151	.50	.0164	.51	
29	.0113	.0138	.40	.0151	.41	
30	.0100	.0125	.32	.0138	.33	

Prices on application.

MAGNET WIRE—Silk Covered

Size B. & S.	Single Silk			Double Silk		
	Bare Diam. Inches	Overall Diam. Inches	Lbs. per 1000 Feet	Overall Diam. Inches	Lbs. per 1000 Feet	
31	.0089	.0114	.25	.0127	.26	
32	.0080	.0105	.20	.0118	.21	
33	.0071	.0096	.16	.0109	.17	
34	.0063	.0088	.13	.0101	.14	
35	.0056	.0081	.11	.0094	.11	
36	.0050	.0075	.08	.0088	.09	
37	.0045	.0070	.07	.0083	.08	
38	.0040	.0065	.06	.0078	.06	
39	.0035	.0060	.05	.0073	.05	
40	.0031	.0056	.04	.0069	.05	

Cotton Covered

Size B. & S.	Single Cotton			Double Cotton		
	Bare Diam. Inches	Overall Diam. Inches	Lbs. per 1000 Feet	Overall Diam. Inches	Lbs. per 1000 Feet	
0000	.4600	.4720	642.2	.4780	643.8	
000	.4096	.4216	509.4	.4276	510.8	
00	.3648	.3768	404.1	.3828	405.4	
0	.3249	.3369	320.9	.3429	322.2	
1	.2893	.3013	254.5	.3073	255.6	
2	.2576	.2696	202.0	.2756	202.9	
3	.2294	.2414	160.2	.2474	161.1	
4	.2043	.2163	127.2	.2223	128.0	
5	.1819	.1939	101.0	.1999	101.5	
6	.1620	.1720	80.15	.1780	80.76	
7	.1443	.1543	63.73	.1603	64.25	
8	.1285	.1375	50.58	.1425	51.07	
9	.1144	.1224	40.13	.1264	40.58	
10	.1019	.1069	31.87	.1119	32.28	
11	.0907	.0957	25.30	.1007	25.64	
12	.0808	.0858	20.12	.0908	20.46	
13	.0720	.0770	16.01	.0810	16.32	
14	.0641	.0691	12.71	.0731	13.01	
15	.0571	.0621	10.11	.0661	10.38	
16	.0508	.0558	8.03	.0598	8.26	
17	.0453	.0503	6.40	.0543	6.60	
18	.0403	.0453	5.09	.0493	5.28	
19	.0359	.0409	4.06	.0449	4.24	
20	.0320	.0370	3.23	.0410	3.40	
21	.0285	.0335	2.57	.0375	2.73	
22	.0254	.0304	2.04	.0344	2.17	
23	.0226	.0276	1.64	.0316	1.75	
24	.0201	.0251	1.31	.0291	1.42	
25	.0179	.0229	1.05	.0269	1.15	
26	.0159	.0209	.83	.0249	.93	
27	.0142	.0192	.67	.0232	.76	
28	.0126	.0176	.53	.0216	.62	
29	.0113	.0163	.44	.0203	.51	
30	.0100	.0150	.35	.0190	.42	
31	.0089	.0139	.29	.0179	.35	
32	.0080	.0130	.24	.0170	.29	
33	.0071	.0121	.19	.0161	.25	
34	.0063	.0113	.16	.0153	.21	
35	.0056	.0106	.13	.0146	.18	
36	.0050	.0100	.11	.0140	.15	
37	.0045	.0095	.09	.0135	.13	
38	.0040	.0090	.08	.0130	.11	
39	.0035	.0085	.07	.0125	.10	
40	.0031	.0081	.06	.0121	.09	

Prices on application

ENAMELLED MAGNET WIRE

Size B. & S.	Bare Diam. Inches	Plain Enamelled		Single Silk	
		Overall Diam. Inches	Lbs. per 1000 Feet	Overall Diam. Inches	Lbs. per 1000 Feet
14	.0641	.0671	12.60	.....	..
15	.0571	.0599	10.00	.....	..
16	.0508	.0535	7.94	.0555	8.00
17	.0453	.0478	6.26	.0499	6.33
18	.0403	.0427	4.96	.0448	5.03
19	.0359	.0383	3.95	.0404	4.01
20	.0320	.0342	3.14	.0364	3.19
21	.0285	.0305	2.49	.0328	2.54
22	.0253	.0274	1.98	.0297	2.03
23	.0226	.0245	1.57	.0268	1.60
24	.0201	.0219	1.24	.0242	1.28
25	.0179	.0196	.99	.0219	1.01
26	.0159	.0175	.783	.0198	.810
27	.0142	.0156	.621	.0180	.645
28	.0126	.0140	.493	.0164	.514
29	.0113	.0126	.391	.0150	.411
30	.0100	.0112	.311	.0136	.329
31	.0089	.0100	.246	.0124	.260
32	.0080	.0090	.196	.0114	.210
33	.0071	.0080	.155	.0104	.168
34	.0063	.0072	.123	.0096	.135
35	.0056	.0064	.098	.0088	.109
36	.0050	.0058	.078	.0082	.087
37	.0045	.0052	.062	.0076	.070
38	.0040	.0042	.049	.0071	.057
39	.0035	.0041	.039	.0065	.046
40	.0031	.0037	.031	.0061	.038

Size B. & S.	Double Silk		Single Cotton		Double Cotton	
	Over- all Diam. Inch	Lbs. Per 1000 Feet	Over- all Diam. Inch.	Lbs. Per 1000 Feet	Over- all Diam. Inch.	Lbs. Per 1000 Feet
14			.0715	12.8	.0755	13.1
15			.0644	10.25	.0684	10.4
16	.0568	8.13	.0580	8.10	.0620	8.49
17	.0512	6.49	.0524	6.42	.0564	6.67
18	.0461	5.15	.0473	5.15	.0513	5.35
19	.0417	4.09	.0429	4.10	.0469	4.28
20	.0377	3.29	.0389	3.26	.0429	3.45
21	.0341	2.63	.0353	2.61	.0393	2.78
22	.0310	2.08	.0322	2.09	.0362	2.23
23	.0281	1.66	.0293	1.66	.0333	1.80
24	.0255	1.30	.0267	1.33	.0307	1.45
25	.0232	1.05	.0244	1.07	.0284	1.17
26	.0211	.854	.0223	.85	.0263	.960
27	.0193	.683	.0205	.685	.0245	.786
28	.0177	.548	.0189	.550	.0229	.642
29	.0163	.441	.0175	.440	.0215	.530
30	.0149	.355	.0161	.360	.0201	.439
31	.0137	.286	.0149	.290	.0189	.369
32	.0127	.230	.0139	.235	.0179	.310
33	.0117	.187	.0129	.191	.0169	.264
34	.0109	.154	.0121	.156	.0161	.226
35	.0101	.125	.0113	.128	.0153	.196
36	.0095	.101	.0107	.106	.0147	.170
37	.0089	.085	.0101	.088	.0141	.155
38	.0083	.071	.0095	.074	.0135	.145
39	.0078	.059	.0090	.067	.0130	.081
40	.0074	.050	.0086	.057	.0126	.080

INTERIOR COPPER WIRES
AND CABLES

ANNUNCIATOR WIRES



Annunciator wire is used for connecting call bells, annunciators, etc., on low voltage battery circuits. The wire consists of a solid annealed copper conductor, wound with two tight servings of cotton, saturated in a transparent wax compound and carefully polished to prevent the adherence of dust. The standard colors of annunciator wire are red, brown, blue, black, green, white, red-white, brown-white, blue-white, blue-brown, and green-white.

The wire is usually shipped in one-pound coils, or on seven-pound spools, in sizes No. 14, 16, 18, 20 and 22 B. & S.

DAMP-PROOF ANNUNCIATOR WIRE

This wire is for use in damp places and is made up similar to annunciator wire, except that the inner serving of cotton is saturated in a black weatherproof compound which protects the wire against moisture.

Annunciator			Damp-proof Annunciator		
Approx. Wt. Lbs. per 1,000 feet			Approx. Wt. Lbs. per 1,000 feet		
Size B. & S.	Single Conductor	Twisted Pair	Size B. & S.	Single Conductor	Twisted Pair
14	15	30	14	16.6	33.2
14	9	18	16	11.1	22.2
18	6	12	18	7.7	15.4
20	4	8	20	5.0	10.0
22	3	6	22	3.1	6.2

ANNUNCIATOR CABLE

Annunciator cable is used in wiring buildings for electric bells, annunciators, etc. The cable consists of any desired number of annunciator wires stranded together and covered with a cotton braid saturated in a transparent wax compound and polished.

ELEVATOR ANNUNCIATOR CABLE

Elevator annunciator cable is used to connect the annunciator in the elevator car to the signal push buttons on the different floors. As it hangs freely in the shaft at all times it must possess strength and flexibility. The conductors are composed of a strand of fine copper wires insulated with servings of cotton and covered with a dry cotton braid. The braid of each conductor has a distinctive marking throughout its length so that it can be easily identified at either end of the cable. The required number of conductors are cabled together and covered with two heavy dry cotton braids. Where extreme flexibility and greater tensile strength are required, the conductors may be cabled around a hemp or jute core.

OFFICE WIRE

Office wire is largely used by telephone and telegraph companies for high grade annunciator wiring. It is superior grade of annunciator wire insulated with a cotton serving and a braid saturated in a transparent compound and polished. The standard color is red-white and it is supplied in the following standard sizes, in coils of about 500 feet.

Size B. & S.	Feet per Lb.	Wt. Lbs. per 1000 ft.	Size B. & S.	Feet per Lb.	Wt. Lbs. per 1000 ft.
12	44	23	18	143	7
14	63	16	20	200	5
16	100	10	..	...	..

DAMP-PROOF OFFICE WIRE



No. 18 Single Conductor

This wire is for use in damp places and is insulated with servings of cotton saturated in a black weatherproof compound to protect the wire from moisture. It is then covered with a cotton braid saturated in a transparent compound and polished. It is supplied in the same sizes and color as office wire in coils of about 500 feet.

Price on application.

INTERIOR COPPER WIRES AND CABLES

OFFICE CABLE

Any number of office wires or damp-proof office wires may be stranded together and braided or lead-covered to form a cable. To facilitate soldering, any of the above types of wires may be tinned if called for. They also may be had in twisted pair form.

SILK BELL CORD AND CABLE

Silk bell cord is used for desk push buttons and annunciators where good appearance is essential. It consists of a copper conductor which is composed of six fine annealed copper strands each No. 34 B. & S. insulated with servings of cotton and a colored silk braid. Any number of such conductors may be stranded together to form a cable, over which, unless otherwise specified, no further covering is placed except in cables having 8 conductors or more over which an overall cotton or silk braid is placed. Standard colors are royal blue, green, old gold, yellow, olive and maroon.



Large Bare Wire Strander used in the manufacture of Transmission Cable.

SOIL HEATING CABLE



Soil heating cable or, as it is sometimes called, hotbed cable, is used by market gardeners, truck farmers and amateur growers as a means of applying controlled heat directly to the soil. It is used mostly in hotbeds taking the place of manure over which it has many advantages.

The cable is laid directly in the soil and is connected to the regular power supply mains. A switch is provided for turning the current on and off so that the temperature of the soil is always under control. By means of an inexpensive thermostat this control may be made entirely automatic.

The cable consists of a resistance wire conductor, which serves as a heating element, insulated with cotton and paper and covered with a lead sheath.

Ask our nearest branch for full details and samples.

RUBBER-COVERED WIRES

SOLID COPPER CONDUCTORS



Our rubber-covered wires are made in accordance with the requirements of the Canadian Engineering Standards Association. Each coil is tested and receives an approval stamp before leaving the factory.

The conductors consist of thoroughly tinned copper wire and are insulated with a superior grade of rubber compound which is thoroughly vulcanized. Over the insulation is applied the protective fibrous covering which consists of braid thoroughly saturated in weatherproof compound.

The Canadian Electrical Code requires at least one braid on No. 8 and smaller and at least two braids or one braid and one tape, on all larger sizes. Wax with a high melting point gives to these wires the smooth hard outside finish, which makes them especially desirable for conduit work. They are supplied with any colour of outer braid as desired, but black or white is standard.

Several finishes alternative to the standard weatherproof can be supplied. Single braid wires can be furnished with a white fireproof compound over the braid. We also supply single and multiple conductor cables with lead sheath over all.



No. 10 Solid Single Braid Wire

Size B. & S.	Diam. Copper In.	Rubber Wall In.	Single Braid	
			Approx. Diam. Over All In.	Approx. Wgt. Lbs. per 1000 Ft.
8	.1285	4/64	.30	75
10	.1019	3/64	.24	52
12	.0808	3/64	.22	37
14	.0640	3/64	.20	28
*16	.0508	1/32	.17	18
*18	.0403	1/32	.16	15
Double Braid				
2	.2576	4/64	.47	275
4	.2043	4/64	.41	189
6	.1620	4/64	.37	133
8	.1285	4/64	.34	88
10	.1019	3/64	.28	58
12	.0808	3/64	.26	43
14	.0641	3/64	.24	33

*Fixture Wire.

Prices on application.

RUBBER COVERED WIRES AND CABLES

STRANDED COPPER CONDUCTORS



No. 00 Stranded Double Braid Cable

The conductors of these cables consist of a number of small tinned copper wires twisted together to form a concentric strand. The cables thus formed are more pliable than those with solid conductors; in other respects they are similar to the solid conductor wires on the preceding page and can be supplied with the same finishes. Made in accordance with the requirements of the Canadian Engineering Standards Association. Each coil is tested and receives an approval stamp before leaving the factory.

Single Braid					
Size B. & S. or C.M.	No. of Wires	Diam. Each	Rubber Wall Inches	Approx. Diam. Over All Inches	Approx. Wgt. Lbs. per 1000 Ft.
8	7	.0486	4/64	.31	88
10	7	.0385	3/64	.25	55
12	7	.0305	3/64	.23	40
14	7	.0242	3/64	.21	30
*16	3	.0293	1/32	.18	19
*18	3	.0233	1/64	.14	11

Double Braid					
Size B. & S. or C.M.	No. of Wires	Diam. Each	Rubber Wall Inches	Approx. Diam. Over All Inches	Approx. Wgt. Lbs. per 1000 Ft.
2000000	127	.1255	8/64	2.03	6976
1750000	127	.1174	8/64	1.95	6150
1500000	91	.1284	8/64	1.81	5323
1250000	91	.1172	8/64	1.69	4489
1000000	61	.1280	7/64	1.47	3564
950000	61	.1248	7/64	1.43	3398
900000	61	.1215	7/64	1.41	3232
850000	61	.1180	7/64	1.38	3061
800000	61	.1145	7/64	1.35	2896
750000	61	.1109	7/64	1.31	2728
700000	61	.1071	7/64	1.28	2559
650000	61	.1032	7/64	1.24	2390
600000	61	.0992	7/64	1.21	2222
550000	61	.0950	7/64	1.17	2054
500000	37	.1162	6/64	1.10	1848
450000	37	.1103	6/64	1.04	1671
400000	37	.1040	6/64	1.00	1501
350000	37	.0973	6/64	.95	1330
300000	37	.0900	6/64	.90	1157
250000	37	.0822	6/64	.84	984
0000	19	.1055	5/64	.77	828
000	19	.0940	5/64	.71	674
00	19	.0837	5/64	.66	551
0	19	.0745	5/64	.61	452
1	19	.0664	5/64	.57	375
2	7	.0974	4/64	.50	294
4	7	.0772	4/64	.44	202
6	7	.0612	4/64	.39	142
8	7	.0486	4/64	.36	90
10	7	.0385	3/64	.29	63
12	7	.0305	3/64	.27	46
14	7	.0242	3/64	.25	36

*Fixture Wire.

Prices on application.

RUBBER-COVERED CABLES

FLEXIBLE RUBBER-COVERED CABLES



No. 1 Flexible Double Braid Cable

These cables are all Canadian Electrical Code Standard and are especially designed for switchboard, dynamo and motor connections.

Size B. & S.	Rubber Wall Inches	No. Wires	Diam. Inches	Approx. Diam. Over All Inches	Approx. Weight Lbs. per 1000 Ft.
0000	5/64	61	.0529	.76	854
000	5/64	61	.0524	.70	710
00	5/64	61	.0467	.65	582
0	5/64	61	.0416	.60	480
1	5/64	61	.0370	.58	372
2	4/64	37	.0423	.51	292
4	4/64	37	.0336	.45	193
6	4/64	37	.0266	.40	136
8	4/64	37	.0188	.31	95
10	3/64	37	.0169	.25	58
12	3/64	37	.0133	.23	43
14	3/64	37	.0105	.21	32

TWIN—PARALLEL—COPPER CONDUCTORS



No. 14 Solid Twin Wire

Twin rubber-covered wire consists of two Canadian Electric Code wires laid parallel, one conductor having a white braid and the other a black braid; over the parallel conductors, an additional braid. Wire of this construction is approved by the Canadian Engineering Standards Association for use in unlined conduits.

Twin, Solid

Size B. & S.	Rubber Wall Inches	Approx. Dimensions Over All Inches	Approx. Wgt. Lbs. per 1000 Ft.
8	4/64	.33 x .62	175
10	3/64	.27 x .51	113
12	3/64	.25 x .47	83
14	3/64	.24 x .43	63

Twin, Stranded

Size B. & S.	Rubber Wall Inches	Concentric Strands No. Wires	Diam. Each Inches	Approx. Dimensions Over All Inches	Approx. Wgt. Lbs. per 1000 Ft.
6	4/64	7	.0612	.40 x .75	287
8	4/64	7	.0486	.35 x .66	185
10	3/64	7	.0385	.29 x .54	120
12	3/64	7	.0305	.26 x .49	88
14	3/64	7	.0242	.25 x .45	67

Prices on application.

RUBBER-COVERED WIRES FIXTURE WIRE

No. 18 Solid Conductor Fixture Wire

A single conductor wire, that may be used under specific conditions for wiring fixtures, show cases, etc., and furnished in solid or stranded conductor as wanted.

Conductors are insulated with Canadian Electrical Code compound and then covered with a saturated cotton braid. Dry cotton or silk can also be furnished.

HEAT RESISTING FIXTURE WIRE

Types CF and CFC for use in fixtures in dry places where temperature conditions do not exceed 90°C, may be had with solid or flexible conductors, either in plain form or having outer colored cotton or silk braids. Type CF refers to single conductor wires and Type CFC refers to two or more flexible conductors cabled together. The insulation on both CF and CFC wires and cords consist of $\frac{1}{32}$ " cotton thickness, thoroughly saturated with heat and moisture-resisting compounds and polished.

Types AF and AFC same as above except they are insulated with asbestos and are for use where temperature conditions exceed 90°C.

HIGRADE RUBBER COVERED WIRE

This wire was designed to meet the demand when a better grade than Code is required and where the requirements do not justify the use of 30 per cent. It is the grade generally supplied on special or high-class building work. In elasticity, tensile strength and dielectric qualities, the insulation is much superior to the ordinary grade.

Supplied with either standard black braid or white braid finish, or other colours if desired.

Each coil is tested and stamped with an approval label before leaving the factory.

Dimensions, weights, etc., approximately the same as for code wires.

THIRTY PER CENT

The insulation used for this wire is made in accordance with the latest engineering standards and is the best compound for special or high voltage work or for very severe service conditions. Each coil is tested and stamped with an approval label before leaving the factory.

Dimensions, weights, etc., approximately the same as for Code wires.

Supplied with either standard black braid or white braid finish, or other colours if desired.

RUBBER INSULATED PLAIN LEAD- COVERED CABLE

Supplied in all sizes and types for working voltages up to 5,000 volts unshielded and up to 15,000 volts with special shielding. For higher voltages we recommend the use of paper or varnished cambric insulation.

Prices on application.

CONTROL CABLE

These cables are used in Central Stations and Sub-stations for carrying control circuits. They consist of tinned, annealed copper conductors each of which is rubber insulated and covered with a distinguishable colored cotton braid. The braided conductors are stranded together (with jute fillers if necessary to provide a compact core) and covered with a layer of insulating tape. Over the tape is placed either a weatherproof cotton braid or a lead sheath.

Unless otherwise specified we follow Canadian Electrical Standards Association specifications which call for stranded conductors and code rubber insulation. We can also supply solid or flexible conductors and 30% insulation where required. A flameproof finished braid may also be substituted for the standard weatherproof braid.

We also supply control cables with steel armoring for various purposes. Cables having steel tape or flexible interlocking armor are suitable for burying directly in the ground or for installation where liable to mechanical injury. Steel wire armored cables may be used for submarine work and also where the cables are to be installed vertically such as in mine shafts, etc.

A.B.C. FLEXIBLE ARMORED CABLE

(Type AC)



Northern Electric Company ABC (Armored Bushed Cable) is quick and easy to install. The flexible steel armor protects the insulated conductors from mechanical injury and also provides a continuous path to ground, removing danger due to stray currents and shorts. The moisture-proof Kraft Armor over the insulated conductors gives further protection against abrasion of conductors during installation.

Adequate space is provided between the conductors and steel armor for the insertion of the fibre bushing at the ends of the cable. The bushings protect the insulation from the sharp edges and add greatly to the safety of the installation (License under Pat. Nos. 288408 and 289660).

This cable is approved for use under The Canadian Electrical Code and is made up under the following standard sizes.

Size B&S Gauge Solid	Two Conductor			Three Conductor		
	Outside Diam.	Ins. Wall	Weight Per 1000 Feet	Outside Diam.	Ins. Wall	Weight Per 1000 Feet
14	.555	$\frac{3}{64}$	259	.580	$\frac{3}{64}$	302
12	.588	"	294	.615	"	350
10	.625	"	342	.655	"	414
Stranded						
8	.836	4/64	635	.882	4/64	762
6	.958	"	764	1.013	"	936
4	1.054	"	953	1.116	"	1186
2	1.195	"	1186	1.275	"	1509

TYPE A.C.L.—FLEXIBLE ARMoured LEAD SHEATHED CABLE

Northern Electric type A.C.L. Cable is for use in the same manner as A.B.C. Cable where conditions are more severe. The Kraft paper armour is replaced with a lead sheath which adds to the mechanical strength and moisture-proof properties of the cable.

NOREL-X NON-METALLIC SHEATHED CABLE



This cable is particularly suitable for residential wiring. It is clean, easy to handle, moisture-proof and fireproof, and provides a wiring system that is rugged and trouble free. Over and above these facts it makes a neater job, is quicker to install and, therefore, is more economical for house wiring.

This cable is approved for use under the Canadian Electrical Code and we are supplying same in the following sizes.

Size B&S Gauge Solid	Two Conductor			Three Conductor		
	Outside Diam.	Ins. Wall	Weight per M ft.	Outside Diam.	Ins. Wall	Weight per M ft.
14	.375 x	.565	$\frac{3}{64}$ 97	.615	$\frac{3}{64}$	153
12	.385 x	.595	$\frac{3}{64}$ 117	.640	$\frac{3}{64}$	184
10	.415 x	.635	$\frac{3}{64}$ 154	.690	$\frac{3}{64}$	233
Stranded						
8	.597 x	.886	4/64 280	.930	4/64	426
6	.522 x	.971	" 347	1.041	"	541
4	.570 x	1.067	" 482	1.144	"	745
2	.630 x	1.187	" 674	1.273	"	1041

We can also supply Norel-X cable with an uninsulated neutral should it be required.

SERVICE CABLE

Used for connecting the power distribution line to the building. These cables are used in place of weatherproof service wires, where improved appearance is desirable. Service cable is also easier to run through trees.

There are a number of different ways in which Service Cables are made up. For convenience in ordering, these cables have been divided into the following eight classes in accordance with their construction.

Class No.	Description of Make-Up
1	Where 2, 3 or 4 single weatherproof braided rubber insulated conductors are simply to be twisted together to form a cable with no overall covering.
2	Where 2, 3 or 4 double weatherproof braided rubber insulated conductors are simply to be twisted together to form a cable with no overall covering.
3	Where 2, 3 or 4 single weatherproof braided rubber insulated conductors are to be twisted together to form a cable with a single weatherproof overall braid.
3A	Where 2, 3 or 4 plain rubber insulated conductors, (no braids on conductors) are to be twisted together to form a cable with a single weatherproof overall braid.
4	Where 2, 3 or 4 single weatherproof braided rubber insulated conductors are to be twisted together to form a cable with an overall tape and a single weatherproof braid.
5	Where 2, 3 or 4 double weatherproof braided rubber insulated conductors are to be twisted together to form a cable with a single weatherproof braid.
6	Where 2, 3 or 4 double weatherproof braided rubber insulated conductors are to be twisted together to form a cable with an overall tape and a single weatherproof braid.
7	Where a 3 conductor cable is required consisting of two R.C.D.B. conductors and one double braided weatherproof conductor all twisted together with no outer covering.
8	Where a 3 conductor cable is required consisting of two R.C.S.B. conductors and one double braided weatherproof conductor all twisted together with no outer covering.

Where a cable has an overall tape and braid covering jute fillers may be specified in order to provide a compact and round core.

SERVICE ENTRANCE CABLE

TYPE A.S.E.

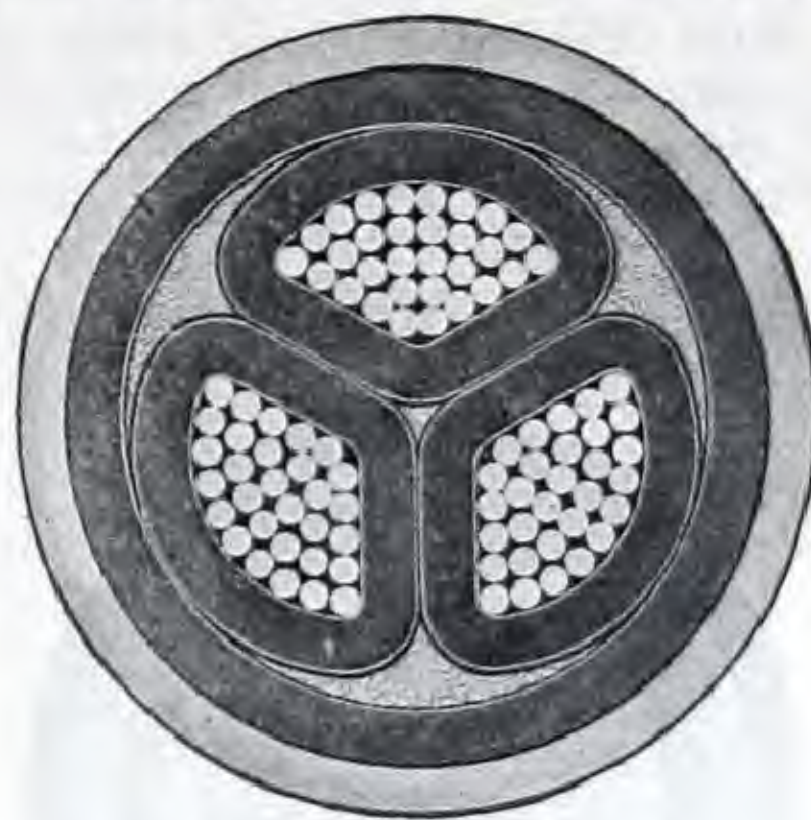
Service entrance cable is used to carry the power leads from the point of attachment of the service wires at the building to the service entrance switch. It is attached directly to the wall of the building by means of ordinary pipe straps.

The cable consists of two or three rubber insulated and double weatherproof braided conductors with 600 volt insulation and one paper wrapped neutral conductor all stranded together and covered with a layer of flexible, galvanized steel armor. The armor is covered with a layer of rubberized tape, weatherproofed, a second layer of rubberized tape and an overall weatherproofed cotton braid.

In the following table we show the cables in general use:

Size and Description	Approx. O.D.	Approx. Wt. 1000 feet.
2 of No. 6 R.C.B. and 1 of No. 8 paper covered.....	1.18"	1035 lbs.
2 of No. 4 R.C.B. and 1 of No. 6 paper covered.....	1.27"	1257 lbs.
2 of No. 2 R.C.B. and 1 of No. 4 paper covered.....	1.38"	1566 lbs.
2 of No. 1 R.C.B. and 1 of No. 4 paper covered.....	1.58"	1991 lbs.
2 of No. 1/0 R.C.B. and 1 of No. 2 paper covered.....	1.72"	2222 lbs.
2 of No. 6 and 1 of No. 10 R.C.B. and 1 of No. 8 paper covered.....	1.18"	1091 lbs.
2 of No. 4 and 1 of No. 10 R.C.B. and 1 of No. 6 paper covered.....	1.27"	1314 lbs.
2 of No. 2 and 1 of No. 10 R.C.B. and 1 of No. 4 paper covered.....	1.38"	1623 lbs.
2 of No. 1/0 and 1 of No. 10 R.C.B. and 1 of No. 2 paper covered.....	1.72"	2279 lbs.

PAPER INSULATED POWER CABLES



250000 C.M.

Triple Conductor—13200 Volts, Lead Covered

The first Paper Insulated Lead Covered Power Cable made in Canada was manufactured by this Company in Montreal.

Paper Insulated Power Cables, on account of their relatively low cost and satisfactory characteristics when properly constructed and installed, can be recommended and are being used for all classes of feeder and distribution work on electric light and power circuits, both overhead and underground.

They can be manufactured with conductors covering a large range of sizes and for all the voltages used in ordinary underground transmission work. They are made up with single or multiple conductors. Multiple conductor cables are made with conductors of round cross section or sector, as desired.



500000 C.M.

Single Conductor—13200 Volts, Lead Covered

The conductors are either solid or stranded wires drawn from copper of the highest conductivity and thoroughly annealed. Thin tapes of manilla paper are applied spirally to the thickness required. The cable is thoroughly dried and impregnated with a suitable compound after which it is covered with a lead sheath to prevent access of moisture.

When cables are to be laid in water or in the ground, additional protection is provided in the form of steel wire or steel tape armour over the sheath.

VARNISHED FABRIC INSULATED CABLES



No. 2 B. & S.—Single Conductor—3300 Volts—Braid Covered

Cables insulated with varnished fabric are extensively used for power-house work. Like paper insulated cables, they are made up with single conductor or multiple conductor as required, but unlike the paper insulated cable they may be used without a lead sheath.

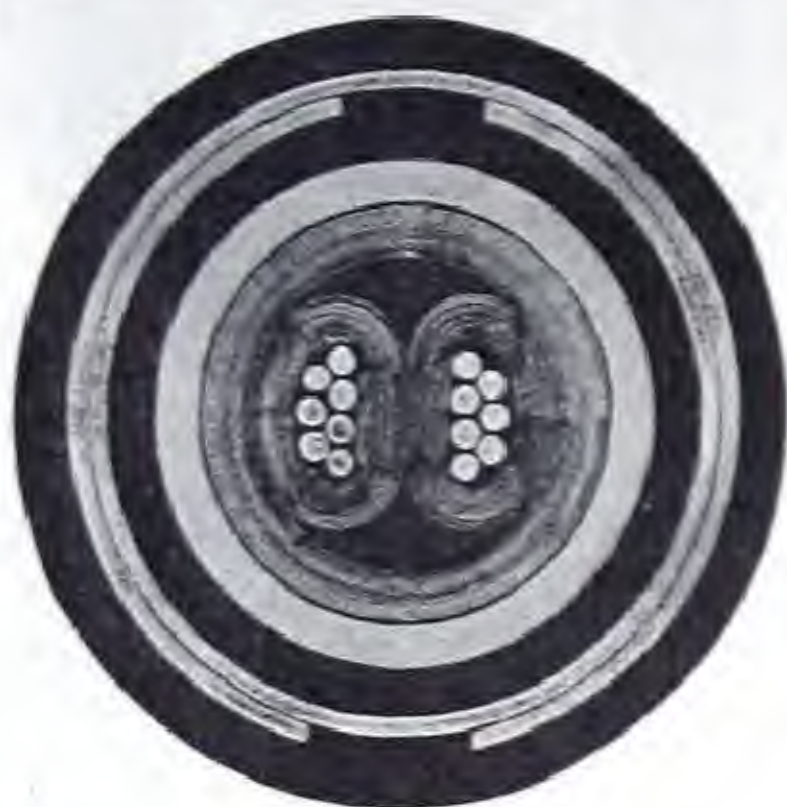
Standard methods of finishing consist of lead sheath, weatherproof braid or slow burning braid. The copper conductors are insulated with successive layers of the varnished fabric, which are separated from each other by a lubricating compound. This compound prevents the absorption of moisture by the cable and also allows the cable to be bent without cracking the insulation.

Prices on application.

ARMORED CABLES

There are three different types of armor which may be employed on cables where an external protection is necessary, namely, steel tape, steel wire and steel wire braid. Their relative functions and uses are described hereinafter.

STEEL TAPE ARMORED CABLES



No. 6 B. & S.—Sector
Double Conductor—6600 Volts, Lead Covered—Steel
Tape Armored

Steel tape armored cables are used extensively for underground work and in other places where cables, so armored, will not be subject to tensile strain. They are particularly adaptable to being laid directly in the ground without further protection and are thus frequently used where it is not desired to install a conduit system. The following table gives details of steel tape armoring on lead covered cable:—

Diameter over lead sheath (Inches)	Width of Steel Tape (Inches)	Thickness of Steel Tape (Inches)	Increase in Dia. for armoring (Inches)
.500— .750	.75	.020	.400
.751—1.000	1.00	.020	.450
1.001—1.750	1.50	.030	.490
1.751—Up.	2.00	.030	.490

Steel tape armored cables are constructed as follows:

The cable is first covered with an impregnated jute bedding. A steel tape of suitable width and thickness is then wound on with sufficient space between each turn of the tape to enable the cable to be easily bent. A second steel tape is then applied in a similar manner so that it will cover the spaces left by the first tape. Two layers of jute are then applied in reverse directions and saturated in a preservative compound. The cable is then given a coating of whitewash or other compound to prevent layers sticking when reeled.

WIRE ARMORED CABLES



No. 4 B & S Stranded—Triple conductor—2500 volts. Rubber
insulated—Lead covered—Double steel wire armored.

Wire armored cables are used extensively for submarine and underground work and in mine shafts, tunnels and other places where the cables are subject to severe strains. The size and number of wires required depend upon the size of the cable, the importance of the system of which it is to be a part, and the severity of the conditions under which it is to operate. It is sometimes advisable under severe conditions to use a double wire armor, in which case two layers of wires in reverse directions are used. The wires are applied over a jute bedding and are covered with two layers of jute in a similar manner to steel tape armored cables.

ARMORED CABLES

(Continued)

STEEL WIRE-BRAIDED CABLES



Rubber Insulated Lead Covered Wire Braid Armored Cable
Three Conductor

Steel wire braid is a very flexible and efficient armor used for all classes of small wires and cables, particularly marine cables. It consists of fine galvanized steel wires closely woven and tightly applied. With lead-covered cables the wire braid is applied over a jute or other suitable bedding, and on cables other than lead-covered it is usually applied immediately over the weather-proof braids. Wire-braided cables are generally supplied without any covering over the wire braid, which is treated with a special compound over which a coat of paint may be applied after the cable is installed.

Prices on application.

FLEXIBLE INTERLOCKING ARMORED CABLES

Flexible interlocking armor of the type used on A.B.C. cable has a wide use in the cable field. Such armor is strong, flexible, light and comparatively inexpensive. It may be applied to practically any type of cable and may consist of galvanized steel, aluminum or copper (tinned or plain). Galvanized steel is most generally used and provides an exceedingly strong armoring which is resistant to most forms of corrosion. Aluminum and copper are used principally in mines where their resistance to the corrosive effects of certain alkalis and acids is of value. Both these metals also have a desirable feature for such work in that they do not throw sparks when struck by a sharp object as does steel.

We show herewith some specific examples of flexible armored cables. Inquire at our nearest branch for samples and further details.

MINE SIGNAL AND UNDERGROUND TELEPHONE CABLE



This cable consists of either rubber or paper insulated conductors covered with a lead sheath, a jute bedding, a layer of interlocking armor and an outer weatherproofed jute braid. Developed particularly for Mine Signal and Telephone work its design makes it well able to withstand the crushing impacts that it is liable to suffer in such service. It is also well adapted for burying directly in the earth for carrying underground telephone lines. Its design can, of course, be modified to meet individual requirements.

FLEXIBLE ARMORED CAB TIRE CABLES



The use of interlocking armor on a type S Cab Tire cable provides a light, flexible cable for portable power leads that is practically indestructible. Such cable is in demand by companies who must afford the ultimate in protection.

FLEXIBLE ARMORED LEAD COVERED POWER CABLE

Lead covered power cables of all types may be covered with flexible interlocking armor. Such cables may be buried directly in the ground without further protection. Ideal for airport lighting and control circuits.

LEAD-COVERED PAPER INSULATED TELEPHONE CABLES



Paper-insulated lead-covered telephone cables are everywhere superseding the unsightly and cumbersome network of the old open-wire construction. Their advantages, in congested areas and for long distance transmission between cities, have long been established.

In these cables each telephone circuit consists of a pair of copper wires individually insulated by a wrapping of paper. The twisted pairs are stranded together to form a core which is protected from damp and mechanical injury by a lead sheath, containing a small percentage of antimony or tin. When the cable is to be laid under water or in the ground additional protection in the form of wire armor or steel tape is applied over the sheath.

We make many specialized forms of paper insulated telephone cable; among these may be mentioned cables with large sized conductors for long distance underground lines, composite cables containing conductors of two or more gauges of wire and quadded cables designed to give three telephone circuits for every four conductors in the cable.

TYPES OF CABLE

Lead-covered paper-insulated cables, except for some special types mentioned later, may be divided into two general classes according to the method of installation:

1. Cables for aerial use or for underground use in ducts.
2. Submarine cables.

1. Aerial Cables and Underground Cables in Ducts.

Under the usual conditions of installation of telephone cables, the same type of cable may be used for aerial construction or in ducts underground. Until recently plant practices have called for somewhat higher dielectric strength for cables for aerial use. Actual experience, however, has shown that this special requirement is not warranted, and the same cable is now being furnished for either use, resulting in economies not only in cost of the cable but in the smaller stocks required.

2. Submarine Cables.

Paper insulated submarine telephone cable is made in several general classes to meet the varying conditions encountered. A statement to us of conditions to be met will bring to you information on the most suitable cable for the conditions.

CODED PAPER INSULATED CABLES

The following table lists the Northern Electric coded paper-insulated cables and shows their important characteristics and uses:

Code	B. & S.	Standard Size—Pairs	Average A.C. Capacitance Guarantee M.F. per Mile	Conductor Resist. at 68°F. Ohms per Mile	Insulation Resistance Megohms per Mile	Dielectric Strength Max. Instantaneous Value	Transmission Equivalent Decibels per Mile	Principal Uses
ASM	24	11-1212	.080	145	500	500 A.C.	2.14	Short Subscriber Lines
BSA	22	11-909	.090	92	500	500 A.C.	1.79	Subscriber Lines
CNB	19	6-455	.090	46	500	700 A.C.	1.26	Trunk and
DNB	19	6-303	.072	46	500	700 A.C.	1.11	long Subscriber Lines
NH	16	26-152	.072	23	500	1000 A.C.	.75	Toll entrance and long trunks.

COMPOSITE CABLES

Composite cable (composed of conductors of two or more gauges) can be furnished. The combinations of pairs utilizing the space within the lead sheath most economically, are somewhat limited, and our cable engineers will make recommendations along this line upon receipt of detailed information on the conditions to be met.

CODED PAPER INSULATED CABLES

Code No. and No. of Pairs	Size (B. & S.)	Guaranteed No. of Pairs	Max. Average Mutual A.C. Capacitance farads per Mile	Nominal Thickness of Sheath (Inches)	Approximate Outside Diameter (Inches)	Approximate Weight per 1000 Ft. (lbs.)	Convenient No. of Feet on Reels
ASM 1212	24	1200	.080	.115	2.61	7970	650
ASM 909	24	900	.080	.105	2.21	6060	900
BSA 909	22	900	.090	.115	2.61	8500	650
ASM 606	24	600	.080	.105	1.90	4690	1100
BSA 606	22	600	.090	.105	2.15	6020	900
ASM 455	24	450	.080	.095	1.66	3670	1200
CNB 455	19	450	.090	.115	2.61	8460	650
ASM 404	24	400	.080	.090	1.56	3220	1400
BSA 404	22	400	.090	.095	1.78	4280	1200
CNB 404	19	400	.090	.115	2.48	7770	700
ASM 303	24	300	.080	.085	1.36	2560	1600
BSA 303	22	300	.090	.095	1.60	3580	1400
CNB 303	19	300	.090	.105	2.15	5980	900
DNB 303	19	300	.072	.115	2.51	7185	700
ASM 202	24	200	.080	.080	1.14	1910	1800
BSA 202	22	200	.090	.085	1.33	2550	1600
CNB 202	19	200	.090	.095	1.78	4250	1200
DNB 202	19	200	.072	.105	2.09	5182	900
NH 152	16	152	.072	.115	2.54	7190	700
ASM 101	24	100	.080	.075	0.85	1200	2500
BSA 101	22	100	.090	.080	0.99	1580	2500
CNB 101	19	100	.090	.085	1.30	2480	1600
DNB 101	19	100	.072	.090	1.52	2979	1400
NH 101	16	101	.072	.105	2.12	5180	900
ASM 51	24	50	.080	.070	0.64	770	3000
BSA 51	22	50	.090	.070	0.73	950	3000
CNB 51	19	50	.090	.075	0.95	1460	2500
DNB 51	19	50	.072	.080	1.13	1803	1800
NH 51	16	51	.072	.090	1.52	2970	1400
ASM 26	24	25	.080	.070	0.52	560	3500
BSA 26	22	25	.090	.070	0.58	670	3500
CNB 26	19	25	.090	.070	0.72	930	3000
DNB 26	19	25	.072	.075	0.84	1149	2500
NH 26	16	26	.072	.080	1.13	1790	1800
ASM 11	24	10	.080	.070	0.39	380	3500
BSA 11	22	10	.090	.070	0.44	450	3500
CNB 11	19	10	.090	.070	0.53	600	3500
DNB 11	19	10	.072	.070	0.61	700	3000
CNB 6	19	5	.090	.070	0.44	450	3500
DNB 6	19	5	.072	.070	0.48	509	3500

TELEGRAPH CABLES

Telegraph cables are made up in the same manner as paper insulated telephone cables. Due to the fact that they operate at higher potentials the conductors are usually double paper wrapped and heavier lead sheaths are used.

Both quadded and non-quadded cables are used and also cables containing both quadded and non-quadded pairs. These cables are used to carry telegraph circuits of all types including carrier circuits. In addition they quite often carry radio broadcast hook-ups and other voice circuits.

Capacitance balances are extremely important in cables of this type and satisfactory operation is dependent on the engineering knowledge and practical experience behind their design and manufacture. The Northern Electric Company's many years of manufacturing experience and the constant researches and experiments of their Engineers particularly qualifies this company as authorities on this type of cable.

Telegraph cables are customarily designed to withstand test potentials up to 1200 volts A.C. between conductors and from conductors to sheath. For circuits paralleling high voltage lines, cables designed to withstand test potentials up to 3500 volts A.C. from conductors to sheath can be furnished.

A specification describing in detail this type of cable will be furnished on request.

SUPERVISORY CONTROL CABLES

These cables are used in connection with the remote control of electrical apparatus such as switchgear, etc., and for remote metering circuits. In general telegraph cable construction is followed. These cables are manufactured with dry cores and also with impregnated cores.

RUBBER-INSULATED TELEPHONE TELEGRAPH CABLES

For short runs inside, where moisture is present, and also for aerial and submarine use, paper-insulated lead-covered cables are sometimes found undesirable and rubber-insulated cables are used. These cables are usually made up with Nos. 19, 18, 16 or 14 B. & S. conductors. The conductors are insulated with rubber and twisted into pairs. The pairs are stranded in layers and covered with insulating tape, and over this core is applied the required outer covering consisting of either a weatherproof finish or a lead sheath. If the cable is for submarine or other use where it will be subject to strain, it is usually further protected by one or more layers of armor wires.

Rubber-insulated telephone cables have a higher electrostatic capacity than paper-insulated cables, and as this reduces their transmission value they are not recommended for use in long lengths.

TERMINATING CABLES

These cables are used for terminating all types of paper insulated telephone and telegraph cables. They are spliced directly to the paper insulated cable where it enters the building and are used to lead the circuits to the terminating rack. They consist of tinned annealed copper conductors insulated with silk and cotton. The insulated conductors are twisted together to form pairs which are stranded together to form a core and covered with a lead sheath. For terminating quadded telephone or telegraph cables the pairs may be quadded also if required. For humid localities enamelled conductors are supplied.

For complete descriptions of different types of terminating cables see listing under Telephone Apparatus Section.

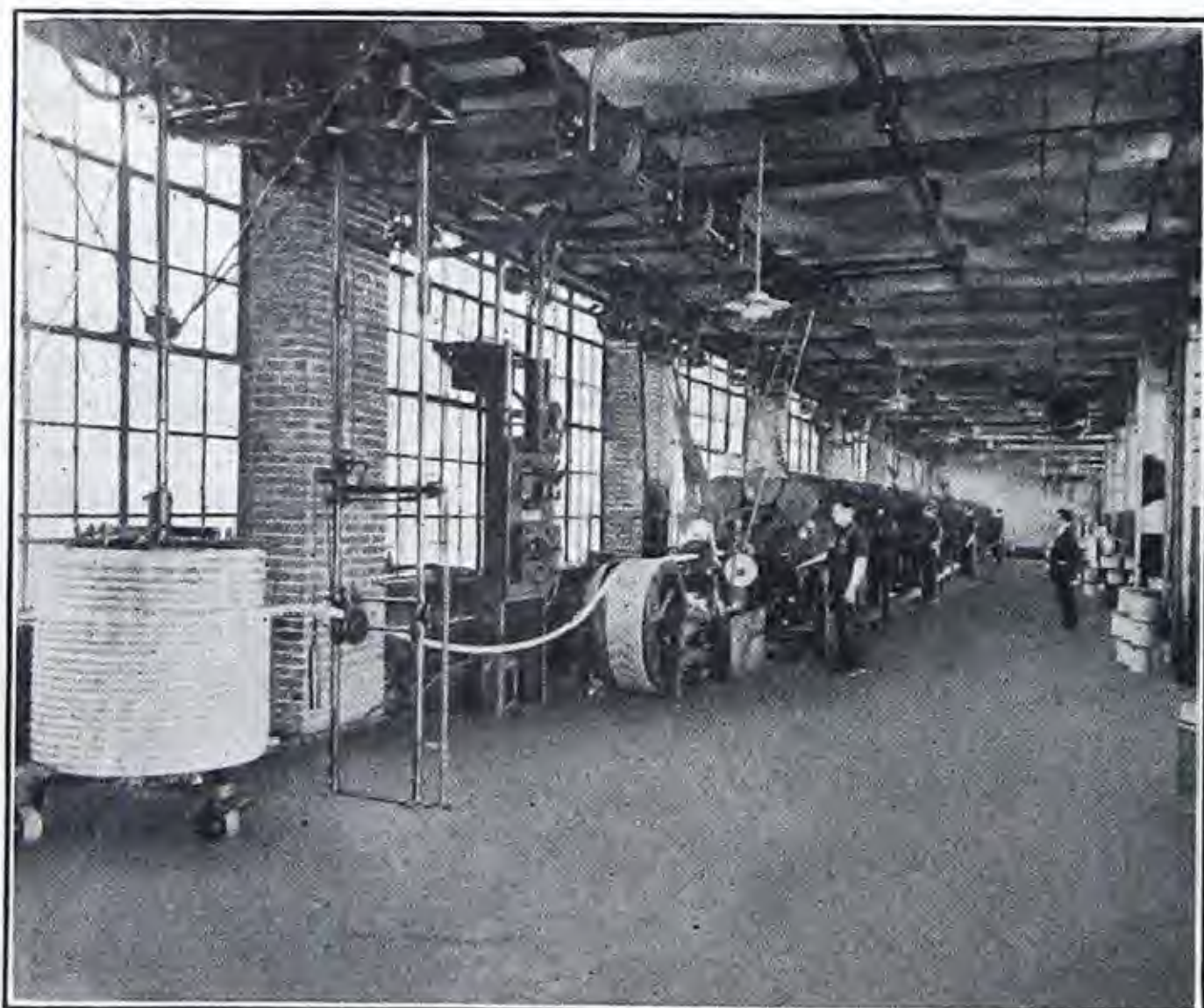
SILK AND COTTON INSULATED SWITCHBOARD WIRE

Switchboard wire is used for the wiring of telephone and telegraph switchboards and miscellaneous purposes in central offices.

For complete details refer listing under Telephone Apparatus section.

DICTOGRAPH CABLE

Used in connection with Dictograph systems. For details refer listing under Telephone Apparatus Section.



Section of Stranding Room showing a Telephone Cable Strander

INSULATED TELEPHONE WIRES

The conductors of all these wires are thoroughly tinned. The insulation is of a high quality rubber compound and varies in thickness according to the size and requirements of the different wires; over this is placed a weatherproof braid; or when wanted for inside use, a glazed cotton braid of any standard colour combination.

POTHEAD WIRE Style A



Used in interior and pothead work for terminating a paper insulated telephone cable. It is composed of an annealed copper conductor carefully tinned and covered with a high quality of rubber compound. Two such wires are twisted together to form the twisted pair, one conductor having a raised tracer on the surface of the rubber. No braid is placed over this wire, as it would act as a wick to convey moisture into the pothead and probably ruin the paper insulated cable.

DROP WIRES Outside Distributing Wires



Drop Wire	Description
"HC"	Consists of two tinned copper conductors, each insulated with rubber and covered with cotton braid saturated in a weatherproof compound. Conductors twisted together to form a pair.
"CS"	Consists of two tinned Copperweld conductors, each insulated with a rubber compound, covered with a cotton braid thoroughly saturated in a weatherproof compound and twisted together into a pair.
"B"	Consists of two tinned bronze alloy conductors insulated with rubber and braided with a weatherproof braid. The braided conductors are twisted together.
"CP"	Consists of two tinned copperweld conductors, insulated with rubber. Conductors laid parallel and covered overall with a weatherproof braid; one conductor marked for tracing.
"BP"	Consists of two tinned bronze alloy conductors, insulated with rubber. Conductors laid parallel and covered overall with a weatherproof braid; one conductor marked for tracing.
"CR"	Consists of two tinned copperweld conductors similar to "CP" except heavier rubber insulation and braided overall with Hawser cord.
"BR"	Consists of two tinned alloy conductors similar to "BP" except heavier rubber insulation and braided overall with Hawser cord.
Iron	Consists of two galvanized iron conductors insulated with rubber, each covered with a cotton braid saturated in a weatherproof compound. Conductors twisted together to form a pair.
Cadmium	Consists of two tinned cadmium copper conductors, each insulated with rubber, covered with a cotton braid thoroughly saturated in a weatherproof compound and twisted together into a pair.

INSIDE WIRE Style C



Used for interior connections between the telephone and the entrance to the building. It consists of a tinned annealed copper conductor insulated with rubber and covered with a glazed cotton braid. Two or three of these conductors are twisted together the braid of each conductor having a colored thread for tracing purposes. The usual colors of braid are brown or ivory. Other colors, however, may be had to order.

INSULATED TELEPHONE WIRES

DUCT WIRE

Used instead of Inside Wire in conduit systems in buildings. Also used instead of Inside Wire in exposed installations where subject to very damp conditions. Similar in make-up to inside wire except has weatherproof braids.

SUBSTATION GROUND WIRE



Used for making the connections between the telephone protector and the ground at the subscriber's station. It consists of a tinned annealed copper conductor, insulated with rubber and covered with an impregnated braid.

Prices on application.



DISTRIBUTING WIRE

Style D

Used in place of twisted pair outside distributing wire when it is necessary to run the connection underground or in other places where braided wire would be unsuitable. It consists of two tinned, annealed, copper conductors, insulated with rubber, twisted together with jute and covered with a lead sheath 1/16" thick.

Style E

Sometimes used as a substitute for lead covered distributing wire (style D), but generally for inside work where moisture is present. It is made up in the same manner as Style D, except that a weatherproof braid is used in place of a lead sheath.

BRIDLE WIRE

Style G

This is similar to Style HC wire, except that the conductors are annealed instead of hard drawn copper. This wire is generally used between open line wires and terminal boxes.

DISTRIBUTING FRAME OR JUMPER WIRE

E Type

A flameproof wire used principally for cross connecting work on distributing frames. It consists of a tinned annealed copper conductor, enamelled, insulated with servings of purified silk and moistureproofed. The wire is then covered with a cotton braid and saturated in a flameproof compound. Available in two, three and four conductors with each conductor marked for tracing purposes.

INSULATED TELEPHONE WIRES

TELEPHONE WIRES—Two Conductor—Insulation and Weights

Size of Conductor B. & S.

	22	20	19	18	17	16	14	13	12
	Diameter over Insulation Inches								
Style A.....	$\frac{5}{64}$	..	$\frac{3}{32}$	..	..	$\frac{9}{64}$	$\frac{5}{32}$	$\frac{5}{32}$	..
Drop Wire HC.....	..	..	..	$\frac{7}{64}$	..	$\frac{9}{64}$	$\frac{5}{32}$	..	$\frac{11}{64}$
Drop Wire CS.....	..	..	..	..	.120	..	..	..	..
Drop Wire B.....	..	..	..	..	.120	$\frac{9}{64}$	$\frac{5}{32}$	..	..
Drop Wire CP.....	..	..	..	..	.110	..	..	..	..
Drop Wire BP.....	..	..	..	..	.110	..	..	..	..
Drop Wire CR.....	..	..	..	..	.110	..	..	..	..
Drop Wire BR.....	..	..	..	..	.110	..	..	..	..
Drop Wire Cadmium									
Copper ..	..	..	..	..	.104	..	..	..	..
Drop Wire Iron.....	..	..	..	$\frac{7}{64}$	..	4/32	$\frac{5}{32}$	..	$\frac{11}{64}$
Inside Wire.....	.082	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{7}{64}$	..	$\frac{9}{64}$	$\frac{5}{32}$	..	..
Style D.....	..	..	..	$\frac{7}{64}$	..	$\frac{9}{64}$	$\frac{5}{32}$	..	..
Style E.....	..	..	..	$\frac{7}{64}$	..	$\frac{9}{64}$	$\frac{5}{32}$	..	..
Style F.....	.078	.085	..	..	..	..	..	..	..
Style G.....	..	.085	..	$\frac{7}{64}$	..	..	..	..	..
E Type.....	.072	.086	..	..	..	..	..	..	..
Substation									
Ground Wire.....	..	..	..	$\frac{7}{64}$	..	4/32	$\frac{5}{32}$	..	..
Duct Wire.....	.060	..	..	..	..	..	..	..	..

Weight per 1000 Feet (Pounds)

Style A.....	12	..	17	..	..	33	51	56	81
Drop Wire HC.....	..	..	..	32	..	47	61	..	..
Drop Wire CS.....	..	..	..	..	36	..	..	..	..
Drop Wire B.....	..	..	..	..	37	..	..	..	..
Drop Wire CP.....	..	..	..	..	29	..	..	..	..
Drop Wire BP.....	..	..	..	..	30	..	..	..	..
Drop Wire CR.....	..	..	..	..	47	..	..	..	..
Drop Wire BR.....	..	..	..	..	47	..	..	..	..
Drop Wire Cadmium									
Copper ..	..	..	..	..	47	..	..	..	..
Drop Wire Iron.....	..	..	..	34	..	46	60	..	..
Inside Wire.....	14	19	21	27	..	42	56	..	..
Style D.....	..	..	..	..	..	385	..	..	..
Style E.....	..	..	..	29	..	44	58	..	..
Style F.....	13	17	..	..	..	..	..	..	..
Style G.....	..	20	..	32	..	..	..	..	..
E Type.....	6	10	..	..	..	..	..	..	..
Substation									
Ground Wire.....	..	..	..	15	..	18	31	..	..
Duct Wire.....	13.3	..	..	..	..	..	..	..	..

FIRE ALARM AND POLICE PATROL CABLES

These cables are used in fire alarm and police patrol systems to carry signal and telephone circuits between the street boxes and the fire and police station. Most cables are manufactured in accordance with specifications of the International Association of Municipal Electricians. These specifications may of course be modified to suit individual requirements. The cables consist of tinned, annealed copper conductors insulated with a special 30% rubber compound.

For telephone circuits the insulated conductors are twisted into pairs. For signal circuits this is not necessary. The conductors are then laid up concentrically in layers, using jute fillers if necessary to provide a compact core, and covered with a layer of rubber insulating tape and a lead-tin or lead-antimony sheath. A weatherproof braid may be substituted for the lead sheath for aerial installation.

In police signal and telephone systems paper insulated lead sheathed cables are also used as trunk cables between stations. They may have single or double paper wrapped insulation on the conductors and may have dry or impregnated cores depending on circuit requirements and operating conditions.

These cables are also supplied with steel tape armoring over the lead sheaths making them suitable for burying directly in the ground without further protection.

We are equipped to supply and install complete fire alarm and police signal systems including cables and all apparatus. See listings under Special Products Section.

FLEXIBLE CORDS

Flexibility is the predominating feature of our standard and special flexible cords and cables, as listed hereinafter. Every step in the manufacture of our products is carefully inspected and no expense is spared to produce the best obtainable flexible cords and cables.

A large stock of all standard cords is always available so as to give prompt and satisfactory service.

GENERAL DESCRIPTION

Flexible cords consist of small extra flexible copper conductors, insulated and protected in a manner suitable for the service which will be required of them.

The conductors consist of a number of small individual copper strands, cabled together and covered with a cotton or paper separator.

The insulation consists of a rubber compound which meets all the requirements of the Canadian Electrical Code.

All flexible cords manufactured by the Northern Electric Company carry the company's standard marker consisting of an orange and purple thread twisted together and laid parallel to the core under the overall braid.

STANDARD STRANDING

Size of Conductor B. & S.	No. of Wires No. 30 B. & S.	Size of Conductor B. & S.	No. of Wires No. 30 B. & S.
8	165	16	26
10	104	18	16
12	65	*20	10
14	41	..	..

*This size is not approved by the Canadian Electrical Code rules.

Colors

Cotton-covered Cords—The most called for finish of cotton-covered cords is a brown braid which will be furnished unless otherwise ordered. The following colours can be supplied or combinations of any two of them: Red, black, brown, green, yellow, blue, gray, white, maroon, orange, olive and brushed brass.

Silk-covered Cords—In all cases when ordering silk-covered cords, the color required must be specified. The following are standard colours: green, maroon, olive, old gold, blue, brown, brushed brass, black, red, white, yellow, gray, rose and Tiffany green.

Prices on application.

SUMMARY TABLE

As pendants in dry places where not subject to hard usage

Type	Trade Name	Braid on Each Conductor	Reinforcement Or Filler	Outer Cover
AT	Tinsel Cord	Cotton	None	Cotton or Silk
CT	Tinsel Cord	Cotton	None	Cotton or Silk
AFC	Heat Resisting Cord	Cotton or Silk	None	None
AFPO	Heat Resisting Cord	None	None	Cotton or Silk
AFPD	Heat Resisting Cord	None	None	Cotton or Silk
CFC	Heat Resisting Cord	Cotton or Silk	None	None
CFPD	Heat Resisting Cord	None	None	Cotton or Silk
CFPO	Heat Resisting Cord	None	None	Cotton or Silk

As pendants and portables in dry places where not subject to hard usage

PO ($\frac{1}{32}$)	Parallel Cord	Cotton	None	Cotton or Silk
C	Lamp Cord	Cotton or Silk	None	None
PD	Twisted Portable	Cotton	None	Cotton or Silk
P ($\frac{1}{8}$)	Reinforced Cord	Cotton	Rubber Jacket	Cotton or Silk

As pendants and portables in dry places where subject to hard usage

P ($\frac{1}{32}$)	Reinforced Cord	Cotton	Rubber Jacket	Cotton or Silk
CA	Armored Cord	Cotton	None	Armor
PA	Armored Reinforced Cord	Cotton	Rubber Jacket	Cotton and Armor

As pendants in dry places where not subject to hard usage

PWP	Moistureproof Reinforced Cord	Cotton	Rubber Jacket	Moistureproof Cotton (2)
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As pendants and portables in damp places where subject to hard usage

K	Braided Heavy Duty Cord	Cotton	Jute	Moistureproof Cotton (2)
PAWP	Moistureproof Armored Reinforced Cord	Cotton	Rubber Jacket	Cotton Moistureproofed & Armored
SJ	Junior Hard Service Cord	None	Rubber Jacket	None
S	Hard Service Cord	None	Rubber Jacket	None

Elevator lighting and control

E	Elevator Cable	Cotton	Rubber Jacket and Outer Moistureproof Cotton Braid or No Jacket and 3 Cotton Braids, outer one to be flame-proofed.	
ES	Elevator Cable	None	Rubber Jacket	None

Portable Heaters

AFS	Rubber Jacketed Heat Resisting Cord	None	Rubber Jacket	None
AFSJ	Rubber Jacketed Heat Resisting Cord	None	Rubber Jacket	None
HC	Heater Cord	Cotton or Silk	None	None
HPD	Heater Cord	None	None	Cotton or Silk

Clocks, portable lighting devices and Mantel Type Radios that are not liable to be moved frequently

PO ($\frac{1}{64}$)	Parallel Cord	Cotton	None	Cotton or Silk
POSJ	All Rubber Parallel Cord	None	Rubber Jacket	None

FLEXIBLE CORDS



LAMP CORD, TYPE C



For general use as pendant cord in dry places; as portable cord for use when not exposed to hard usage.

Construction.—Two or more insulated conductors twisted together with glazed cotton or silk braid on each conductor. No outer covering. Insulation not less than 1/32 inch on No. 18 and No. 16 A.W.G. For larger sizes same as rubber-covered wire.

Approximate weights of two-conductor cord:

Size B. & S.	Weight		Size B. & S.	Weight	
	Pounds per 1000 Ft.	Silk		Pounds per 1000 Ft.	Silk
10	120	115	16	37	34
12	85	81	18	27	25
14	63	59	..	..	..

Prices on application.

TWISTED PORTABLE CORD, TYPE PD



For portable use in offices, dwellings and similar dry places where not likely to be subjected to rough usage and where appearance is an essential feature.

Construction.—Twisted pair with glazed or plain cotton braid on each conductor; glazed cotton or silk outer covering around twisted conductors; insulation not less than 1/32 inch on Nos. 18 and 16 A.W.G.; for larger sizes same as rubber-covered wire.

Approximate weights of two-conductor cord:

Size B. & S.	Weight		Size B. & S.	Weight	
	Pounds per 1000 Ft.	Silk		Pounds per 1000 Ft.	Silk
10	121	116	16	41	38
12	88	83	18	30	27
14	67	62	..	..	..

Prices on application.

FLEXIBLE CORDS

PARALLEL CORD, TYPE PO



Exactly similar to Type PD, except that the conductors are laid parallel instead of being twisted together and that under specified conditions 1/64" insulation is allowed for No. 18 B. & S.

Prices on application.

ALL RUBBER PARALLEL CORD, TYPE POSJ

For use only with clocks, portable lighting devices and radios of the table or mantle type, which are not liable to be moved frequently and where appearance is a consideration.

Construction.—Two rubber insulated conductors laid parallel and covered overall with a rubber jacket.

REINFORCED CORD, TYPE P



For pendant or portable use in dry places only.

Construction.—Twisted pair with glazed or plain cotton braid on each conductor; rubber jacket not less than 1/64 inch thick around twisted pair; outer covering of glazed cotton or silk; insulation not less than 1/64" for No. 18 and 1/32" for No. 16 B. & S.; for larger sizes same as rubber-covered wire.

Approximate weights of two-conductor cord.

Size B. & S.	Weight		Size B. & S.	Weight	
	Pounds per 1000 Ft.	Silk		Pounds per 1000 Ft.	Silk
10	198	192	16	73	69
12	148	143	18	57	54
14	117	112	..	..	..

Prices on application.

REINFORCED WEATHERPROOF CORD, TYPE PWP

For pendant or portable use in damp places where not subject to hard usage.

Construction.—Similar to Type P, except that the outer braid is saturated and finished with a weatherproof compound.

Size B. & S.	Wt., Lbs. per 1000 Ft.	Size B. & S.	Wt., Lbs. per 1000 Ft.
10	209	16	81
12	159	18	64
14	127	..	..

Prices on application.

BRAIDED HEAVY DUTY CORD, TYPE K

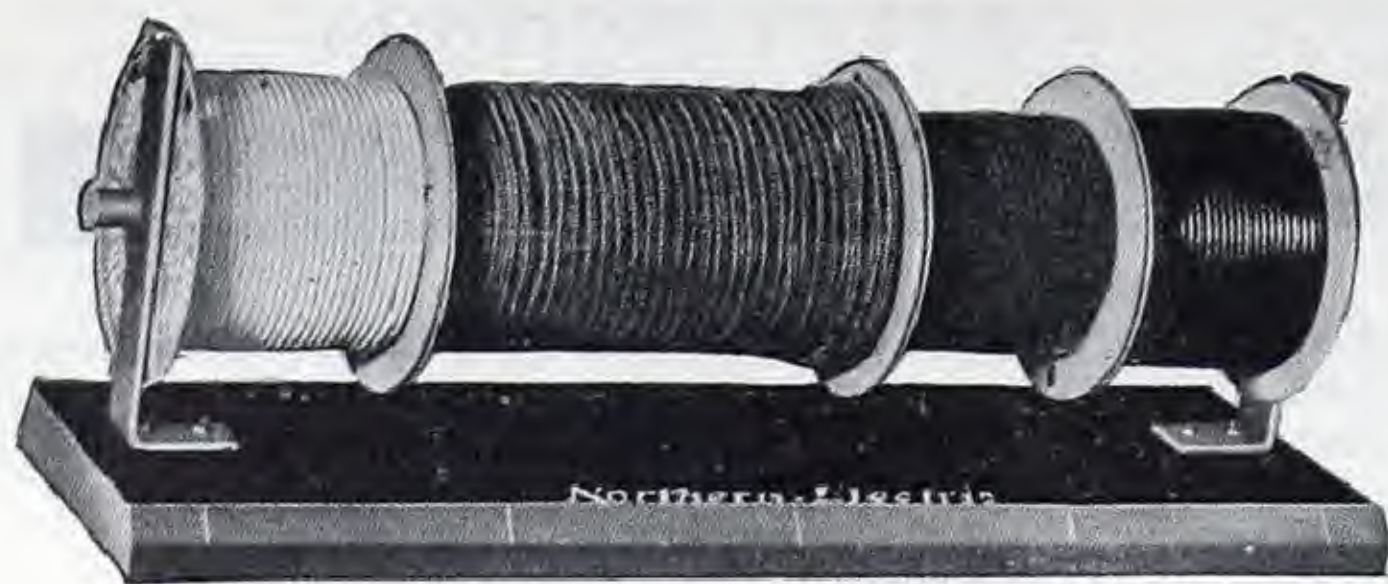


Specially constructed for pendant or portable use in damp places where subject to hard usage. Also suitable for use on Theatre Stages.

Construction.—Twisted conductors with cotton braid on each conductor; these built up with jute to form a circular exterior; outer covering of two braids or a tape and a braid saturated with moisture-proof compound.

Prices on application.

FLEXIBLE CORDS



ARMORED REINFORCED WEATHERPROOF CORD, TYPE PAWP

For portable use in damp places where likely to be subjected to severe service.

Construction.—Twisted pair with glazed or plain cotton braid on each conductor; rubber jacket not less than 1/64-inch thick enclosing the twisted pair; outer covering of plain cotton, saturated with moisture-proof compound, the whole encased in standard armor; insulation not less than 1/32-inch for Nos. 18 and 16 B. & S.; for larger sizes same as rubber-covered wire.

Prices on application.

CAB TIRE CABLES

Hard Service Cord, Type S



The flexible connection for portable lights and motor-driven tools in railway and machine shops, shipyards, chemical works, mines, etc.

Construction.—Flexible copper conductors, insulated to code thickness with a special grade of rubber; conductors twisted together and covered with a heavy jacket of special wearproof vulcanized rubber compound, very similar to that used for cab tires. It has no outer braid. This cable will resist the action of steam, oil, acid or alkalis; is light and flexible and will outwear any braided cable.

Standard cable has two conductors. Also manufactured with three or more conductors.

CAB TIRE CABLE

Junior Hard Service Cord, Type SJ

For pendant or portable use where not normally exposed to hard usage other than ordinarily is to be expected in offices, dwellings and similar places. Particularly adapted for use with household appliances such as vacuum cleaners, washing-machines, etc.

Two types are supplied. One is termed "SJ-Heavy" and is similar in construction to type S cord, except that the rubber jacket is thinner. The other type is termed "SJ-Light" and has the same construction except that the conductors are twisted together with cotton fillers. This type of construction makes the cable more resistant to flexing strains and lengthens its life. The "Light" type is for use with portable appliances and the "Heavy" type for stationary appliances.

Prices on application.

MINE LAMP CABLE

For use with the electric head lamps worn by miner. Similar in construction to type S except that it customarily is of lighter construction with smaller overall diameter. We also manufacture a special mine lamp cable with very short lay conductors. This special cable is extremely resistant to injury due to flexing and has an exceptionally long life.

Prices on application.

FLEXIBLE CORDS

ARMORED CORD, TYPE CA

For pendant or portable use in dry places such as show windows, etc.

Construction.—Twisted pair with glazed or plain cotton braid on each conductor and the twisted pair encased in standard armor; insulation not less than 1/32-inch for Nos. 18 and 16 B. & S.; for larger sizes same as for rubber-covered wire.

Prices on application.

ARMORED REINFORCED CORD, TYPE PA

For pendant or portable use in dry places where likely to be subjected to severe service.

Construction.—Twisted pair with glazed or plain cotton braid on each conductor; rubber jacket not less than 1/64-inch thick around twisted pair; outer covering of glazed cotton or silk; the whole encased in standard armor; insulation not less than 1/32-inch for Nos. 18 and 16 A.W.G.; for larger sizes same as rubber-covered wire.

Prices on application.

ELEVATOR CABLES, TYPE E



Used for elevator lighting and control.

Construction.—Conductors twisted together with glazed or plain cotton braid on each conductor; rubber jacket not less than 1/64-inch thick around assembled conductors; outer covering of plain cotton saturated with moistureproof compound. If desired, the rubber jacket may be omitted, in which case three plain cotton braids may be substituted, the final braid being saturated with a moistureproof compound. Tape may be substituted for either one or both of the two inner braids. Insulation not less than 1/32-inch for No. 16 A.W.G.; for larger sizes same as rubber-covered wire. When used for elevator lighting conductors must not be smaller than No. 14 B. & S. and when used for elevator control conductors must not be less than No. 16 B. & S.

Prices on application.

ELEVATOR CABLE, TYPE ES

Used for elevator lighting and control.

Construction.—Rubber insulated conductors stranded together and covered with a rubber jacket. The jacket is made of special compound and is very tough and durable.

Prices on application.

SUPER CAB TIRE TRAILING CABLE

For use with electric shovels, coal cutters, drag lines, dredges, lifting magnets, cranes and similar heavy machines where ability to stand up under severe usage is an important factor. These cables may be dragged over rough surfaces and sharp objects without causing injury. Sudden shocks and bruising blows have very little effect on this cable.

Construction.—The extra flexible copper conductors are covered with a high quality 30% rubber insulation, stranded together and covered with a double reinforced special compound covered with a reinforcing braid of cable laid twine and an outer jacket also of special rubber compound. The two jackets are vulcanized together by specially developed processes.

Prices on application.

ARC-WELDING CABLE

As the name implies these cables are used in conjunction with arc-welding equipment. Two classes of cable are required for this type of work and are known as "Lead" cables and "Electrode" cables.

Lead Cables—Construction.—Tinned, annealed, extra flexible copper strand insulated with a special high quality rubber compound.

Electrode Cable—Construction.—Plain, annealed, extra flexible copper strand, covered with a reinforcing hawser cord braid and special non-corroding rubber compound.

Prices on application.

FLEXIBLE CORDS

HEATER CORD, TYPE HPD



For use with portable electric heating devices.

Construction.—Flexible copper conductors covered with a separator, a thin wall of rubber and a layer of asbestos. The conductors are twisted together and covered overall with either a cotton or a silk braid.

Prices on application.

HEATER CORD, TYPE HC

Same as type HPD except that each conductor is individually braided with either cotton or silk and the two conductors are twisted together with no overall covering.

Prices on application.

RUBBER JACKETED HEAT RESISTING CORD, TYPE AFS

For use with portable heating devices such as soldering irons, etc., where subjected to particularly severe usage.

Construction.—Type AFC heat resisting cord covered with a special $\frac{1}{16}$ " rubber jacket.

Prices on application.

RUBBER JACKETED HEAT RESISTING CORD, TYPE AFSJ

Same as type AFS except jacket thickness is only $\frac{1}{32}$ ".

Prices on application.

RUBBER JACKETED HEATER CORD, TYPE HSJ

For use with portable heating devices where subject to severe service.

Construction.—Type HPD heater cord covered with a special $\frac{1}{32}$ " rubber jacket.

TINSEL CORD TYPE AT

Used in lengths not exceeding 8 feet attached directly, or by means of a special plug, to portable heating appliances rated at 50 watts or less.

Construction: conductors consist of copper tinsel strands covered with rubber insulation and asbestos and an overall cotton or silk braid.

Prices on application.

TINSEL CORD TYPE CT

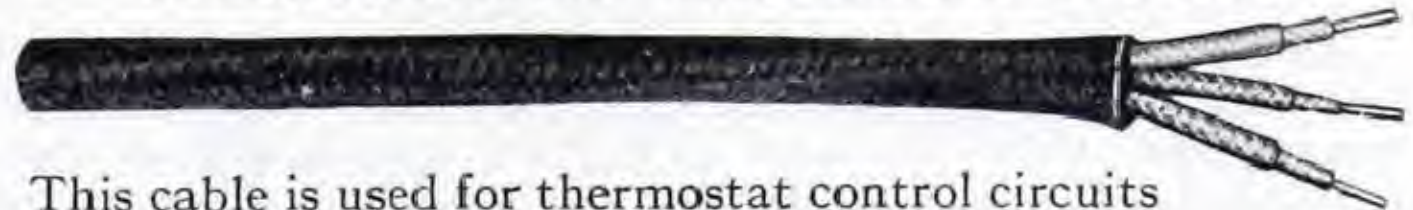
Same as Type AT except no asbestos is used in its construction, and it cannot be used with heating appliances.

Prices on application.

ASBESTOS INSULATED RANGE WIRE

This is used where an absolutely fireproof wire is desired for low tension service, such as for the interior wiring of electric ranges and places where very high temperatures are encountered. Either solid or stranded conductor, it is insulated with braid asbestos lappings and thoroughly impregnated with flameproof compound. This class of wire is not weatherproof.

THERMOSTAT CONTROL CABLE



This cable is used for thermostat control circuits principally in connection with oil burning furnaces.

The cable is used to connect the thermostat with the relays controlling the furnace heat. It may also be used for any thermostat control circuit of similar nature.

It consists of two or more solid annealed copper conductors each of which is covered with a cotton serving and a cotton braid thoroughly saturated with flameproof compound. Each conductor is differently colored. The conductors are stranded together and covered with an overall dry, colored cotton braid.

No. 16 gauge only is approved. Other gauges can, of course, be supplied.

NEON-TUBE AND OIL-BURNER-IGNITION CABLE



Used for connecting the high-tension terminals of transformers to electrodes both of neon-tube signs and oil-burner ignition equipment.

This cable is manufactured in accordance with the Canadian Electrical Code and is supplied in three types as follows:

Type	Maximum Working potential
GTO-5	5000 volts
GTO-10	10000 volts
GTO-15	15000 volts

The cable consists of a No. 14 B&S gauge tinned, annealed flexible conductor over which is placed a specially developed corona resisting insulation. The thickness of this special insulation varies according to the type of cable. Over the insulation is placed a cotton braid thoroughly impregnated with absorption-resisting and flame-resistive compounds.

This cable can also be supplied with a lead sheath over the outer braid where added protection is desired. Long runs of lead sheathed cable is not to be recommended, however, unless special transformers are used, due to the fact that the lead sheath increases the electrostatic capacity of the cable which may overload standard transformers.

Prices on application.

DYNAMO OR BRUSH HOLDER CABLE

This cable consists of flexible copper conductor, insulated with rubber and finished with either a weather proof or a glazed cotton braid.

Black glazed cotton braid will be furnished unless otherwise specified. All sizes 70000 C.M. and larger to have rubber-filled tape under outer braid.

Voltage:

These cables stand voltage and insulation resistance test as called for by the Canadian Engineering Standards Association for Rubber Covered Wires and Cable (600 volt class) for the respective size of conductors.

No. of Wires and Size	C.M.	Insulation Thicknesses	Approx. Diam., Inches
19-24 B & S	7600	3/64"	.256"
37-24 B & S	14800	3/64"	.296"
61-24 B & S	24400	4/64"	.411"
91-24 B & S	35400	4/64"	.454"
125-24 B & S	50000	4/64"	.534"
150-24 B & S	60000	4/64"	.572"
175-24 B & S	70000	5/64"	.627"
225-24 B & S	90000	5/64"	.657"
275-24 B & S	110000	5/64"	.720"
325-24 B & S	130000	5/64"	.754"
375-24 B & S	150000	5/64"	.775"
450-24 B & S	180000	5/64"	.840"
550-24 B & S	220000	5/64"	.877"
650-24 B & S	260000	6/64"	.977"
775-24 B & S	310000	6/64"	1.047"
925-24 B & S	370000	6/64"	1.085"
1110-24 B & S	440000	6/64"	1.182"
1325-24 B & S	530000	7/64"	1.249"
1600-24 B & S	640000	7/64"	1.429"
1925-24 B & S	770000	7/64"	1.537"
2300-24 B & S	920000	7/64"	1.669"
2750-24 B & S	1100000	8/64"	1.835"

RADIO WIRES

Unless otherwise specified we manufacture our radio wires strictly in accordance with the Radio Manufacturers Association, C.E.S.A. and H.E.P.C. specifications where applicable. On vulcanized rubber insulated wires we use a special compound that is free stripping and which does not tarnish the conductors. The following is a brief description of the more generally used wires.

ANTENNA WIRE

Used for constructing radio antennas. Consists of hard drawn bare copper wire. May be used as solid or stranded wire. The most popular wire in use is a No. 16 B. & S. gauge 7 of No. 24 strand. Enamelled copper wire is sometimes used for antennas and has the advantage over bare copper in that it does not corrode. Bronze wire is also used for antennas. We can supply antenna wire in any shape or form.

LEAD-IN WIRE

A rubber insulated wire used for connecting the antenna to the radio receiving set or the lightning arrester. May or may not have a cotton braid over the insulation. The most popular wire now in use is a No. 14 or No. 16 solid tinned copper conductor covered with 3/64" or 1/32" rubber insulation.

WINDOW AND GROUND LEAD WIRE

This wire is used to connect the receiving set to the lead-in wire where it terminates at the window and to connect the set to ground. Usually consists of a No. 18 or No. 20 solid or flexible copper conductor with a light rubber insulation.

HOOK-UP OR PRODUCTION WIRES

Hook-up wires as the name implies are used for connecting up the radio set itself. Such wires are used by radio manufacturers, servicemen and amateur set-builders. A large variety of different constructions and gauges are supplied depending on the requirements and preferences of the user. The following tables give the requirements for wires used in power operated receivers.

Table 1.—TYPES AND USES OF WIRES

Location in Radio Set	Maximum Voltage	Types Permissible
Inside the Chassis Housing.....	300	VR64; UVR64; VSR32; CR32; AR32.
Inside the Chassis Housing.....	500	VR32; UVR32; VSR3/64; VXR64.
Either Inside or Outside Chassis Housing.....	300	VXR64; VR32; VR64 (See Note).
Either Inside or Outside Chassis Housing.....	500	VXR32; VR3/64; VR32 (See Note).

Note—Types VR64 and VR32 may be used outside the chassis housing if the wires are bunched or cabled with a closely-woven cotton braid applied overall.

Table II
CONSTRUCTION OF VARIOUS TYPES OF WIRES

Type	Kind	Thickness	Covering
VR64	Vulcanized Rubber	1/64	1 Braid
VXR64	" "	1/64	2 "
VR32	" "	1/32	1 "
VXR32	" "	1/32	2 "
VR3/64	" "	3/64	1 "
UVR64	Unvulcanized Rubber	1/64	1 "
UVR32	" "	1/32	1 "
VSR32	Superaging Rubber	1/32	None
VSR3/64	" "	3/64	"
CR32	Heat-resisting Cotton	1/32	Optional
AR32	Heat-resisting Asbestos	1/32	"

Braid Finish: Dry or Treated.

In addition to hook-up wire we also supply cord assemblies for speaker connections, etc., and type PO cord sets for power leads.

AUTOMOBILE CABLES

Northern Electric Company's Automobile Cables are made up to meet the requirements of the Society of Automotive Engineers (S.A.E.). They also meet the requirements of the Specifications of the various automobile manufacturers. The use of only the best materials and a rigid inspection ensures the user of a product that will give long and satisfactory service under the severest conditions.

IGNITION CABLES

Ignition cables are divided into two classes i.e. high tension or primary and low tension or secondary. The high tension cables are used for the coil to distributor to spark-plug circuit and the low tension cables for the battery to coil circuit.

They consist of a flexible tinned copper conductor covered with a thick wall of special rubber insulation. The rubber insulation may or may not be protected by a heavily lacquered cotton braid.

For high tension circuits either 7 M.M. or 9 M.M. cables may be used. This designation refers to the diameter over the rubber insulation. The 7 M.M. cable is satisfactory for use on passenger cars and light trucks. The 9 M.M. cable, which has a heavier insulation wall, is recommended for heavy duty work such as is encountered on large trucks, tractors, etc.

For low tension circuits the smaller 5 M.M. cable is suitable.

We also supply Ignition cable specially developed for use with buses and heavy duty trucks, etc., where extremely severe operating conditions exist. The insulation on this cable consists of a combination of varnished cambric and rubber and it is covered with a special heavily lacquered braid. It is extremely resistant to the effects of sustained high temperatures in conjunction with gasoline and oil fumes.

LIGHTING CABLES

For use in the automobile lighting circuit.

Construction:—A flexible tinned copper conductor with either rubber or varnished cambric insulation covered with a lacquered cotton braid which may or may not have further protection in the form of a bright flexible aluminum or steel armor. No. 14 and No. 16 are the most used sizes.

STARTER CABLES

Used to connect the battery to the starter. Consists of a flexible annealed copper conductor covered with a separator, rubber insulation, an insulating tape and an outer weather-proofed cotton braid. Sizes range from No. 1 B & S to No. 2/0 B & S and larger depending on the model of car.

SPOTLIGHT CABLE

Used for connecting spotlight to battery. Consists of two flexible rubber insulated and cotton braided conductors twisted together. Each conductor has its cotton braid coated with lacquer which provides an attractive finish and makes the wire weatherproof.

HORN-BUTTON WIRE

For connecting the horn with the battery. Consists of a flexible tinned, annealed copper conductor covered with rubber insulation and a cotton braid. May also be had in two conductor form.

CHARGING CABLE

A special cable intended for use in Battery Charging. Used to connect the batteries to the rectifier. Consists of a flexible, tinned, annealed copper conductor covered with a special acid resisting rubber insulation.

CABLE TERMINALS

For Street Lighting or Similar Service

Cable terminals are designed to protect the ends of lead covered cables against electrical breakdown and mechanical injury. A very small amount of moisture in the insulation of a cable will destroy the dielectric qualities of the insulation. A properly installed cable terminal of the right type will absolutely prevent the entrance of moisture. A further function of the cable terminal is to re-inforce cables at the ends where breakdowns due to electrostatic discharges generally occur.

For general all round service we recommend the well known G. & W. line of cable terminals. For description and information on these terminals refer to Power Apparatus section of this catalogue.

We also manufacture ourselves a special type of terminals for street lighting and similar service, a description of which follows.

COMBINATION TERMINAL AND SERIES CUTOUTS TYPES SC-1, SC-2 AND SC-3



Type SC



Type ST

Cutouts for series arc and incandescent street lighting circuits up to 7000 volts, particularly adapted for use inside post pedestals. The cut-out consists essentially of three parts, (1) a brass base in the form of a wiping sleeve, (2) an insulating casing, (3) a cover of insulating materials. The lower portion forms a pothead for a lead covered cable.

Operation.—When a lamp fails the continuity of the service is maintained by the fusing of a film cutout between the metal parts of the cover. To make repairs the cover is removed, continuity being maintained by the springing together of phosphor bronze parts in the casing. Type SC-1 is adapted for one double conductor cable, Type SC-2 for two single conductor cables and Type SC-3 for one double conductor and two single conductor cables.

Type	List No.	Approx. Height	Approx. Over All Width	Approx. Dim., In. Depth	Approx. Shipping Wt., Lbs.	Approx. Lbs. of Comp. to Fill
SC-1	1100	7½	4¼	4¼	4	1
SC-2	1101	7½	4¼	4¼	4	1
SC-3	1102	7½	4½	4¾	5	1½

TYPES ST-1, ST-2 AND ST-3

Designed for similar service to the Type SC terminals where automatic cutout and disconnecting feature are not required. The terminal consists of (1) a brass base in the form of a wiping sleeve, and (2) an insulating casing.

Type	List No.	Approx. Height	Approx. Over All Width	Approx. Dim., In. Depth	Approx. Shipping Wt., Lbs.	Approx. Lbs. of Comp. to Fill
ST-1	1200	8	4¼	4½	7	1½
ST-2	1201	8	4¼	4½	7	1½
ST-3	1202	8	4½	4¾	8	2

CABLE TERMINALS

For Street Lighting or Similar Service—(Cont'd)

TYPE MT

For multiple arc and incandescent street lighting circuits up to 600 volts. The terminal consists of two parts, (1) a brass base in the form of a wiping sleeve, (2) a cast iron casing. The base and the casing are screwed together making a perfectly watertight connection.

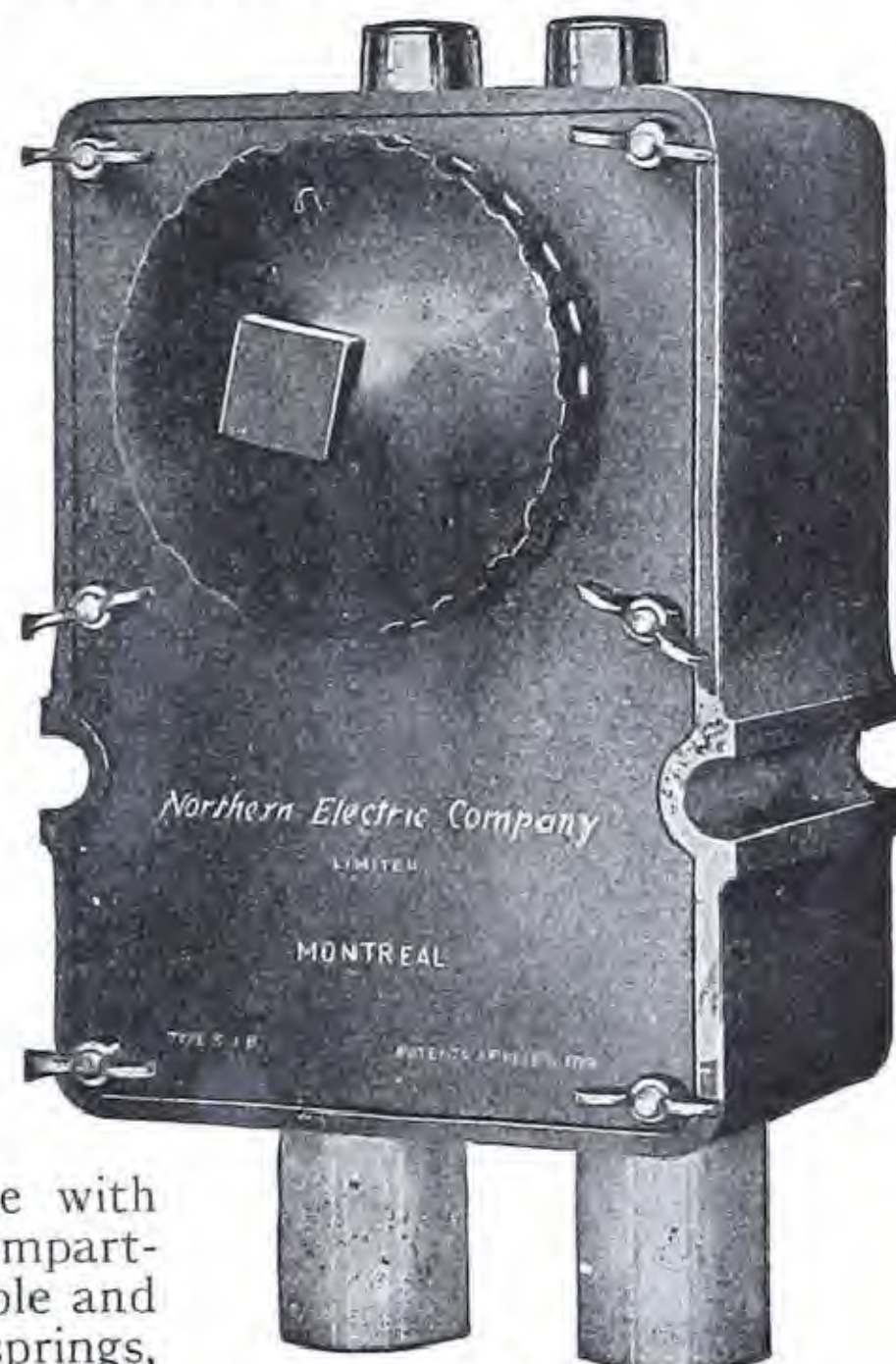


Type MT

Type	List No.	Sheath Inches	Approx. Hgt. In.	Approx. Over All Dimens. In. Wd.	Approx. Over All Dimens. In. Dpt.	Approx. Shipping Wt. Lbs.	Approx. Lbs. of Comp. to fill
MT	1001	Up to .875	6	3½	3½	7	1'
MT	1002	.876 to 1.25	7	4	4	10	1¼

TYPE SJB BOX CUTOUT

For use on series arc and incandescent street lighting circuits up to 7000 volts. Especially designed for operating on circuits where double conductor cable is employed. The cutout consists of a rectangular box moulded from insulating material having high dielectric properties and mechanical strength. It is divided into a rear and front compartment by a separating wall of the same material which is moulded in one piece with the box. The front compartment is easily accessible and contains the contact springs, etc., which form the operating parts of the cutout. The rear compartment is the cable sealing chamber. Into this chamber the conductors from the lead covered cable and from the leads to the lamp are brought for connection through the dividing wall to the details in front. The special features of this cutout are as follows:



Type SJB

1.—Individual lamps isolated for the purpose of inspecting and repairing without interfering with the remainder of the circuit.

2.—The cable may be easily sectionalized for the purpose of testing and locating faults.

3.—Lamps may be transferred to a different circuit in case of a breakdown, since each leg of the cable is accessible at every junction box.

Northern Electric compound is recommended for filling the sealing chamber.

Type	List No.	Normal Working Voltage	Approx. Overall Dim. Inches H	Approx. Overall Dim. Inches W	Approx. Overall Dim. Inches D	Approx. Shipping Wt. Lbs.	Approx. Lbs. of Comp. to Fill
SJB	1200	0—7000	11½	6	4½	11	3

As No. 6 B. & S. or No. 8 B. & S. are the sizes generally used in practice, the lugs have been designed for these or smaller sizes.

NORTHERN ELECTRIC SEALING COMPOUNDS



No. 23 SEALING COMPOUND

Standard for use in filling telephone cable potheads, telephone cable terminals and telephone condensers.

Put up in 5 lb. cans.

No. 30 SEALING COMPOUND

For use in all kinds of power cable splices, terminals and junction boxes and in all places on power work where a semi-solid insulating compound is required.

Put up in 10 lb. cans.

No. 66 SPLICING COMPOUND

For use in the splices of paper insulated power cables which are impregnated with compound having a mineral oil base.

Put up in 10 lb. cans.

NORTHERN ELECTRIC PAPER TAPE

For wrapping paper power cable splices. A manilla rope paper of the highest grade which has been dried under vacuum and impregnated with insulating compound.

Put up in convenient sized rolls 1, 2 and 3 inches wide.

Sold in tins containing the tape completely submerged in insulating compound.

COPPER CABLE CONNECTORS

High conductivity tinned copper connectors of the same cross section as the cables they are designed to join. No sharp edges to cause electrostatic discharges.

When ordering state size of conductors and whether solid, stranded or sector.

Prices on application.

LEAD SLEEVING

We carry in stock lead tin sleeving in the sizes more commonly required for splicing purposes. Lengths listed below are standard stock lengths, but shorter sections can be furnished when required at slight additional expense.

Inside Diam. In.	Thickness Inches	Length Inches	Approx. Wt. Lbs. per Length
1	.125	15	2.71
1 1/4	.125	17	3.76
1 1/2	.125	17	4.71
1 3/4	.125	17	5.13
2	.125	17	5.82
2 1/4	.125	20	7.64
2 1/2	.125	20	8.45
2 3/4	.125	20	9.26
3	.188	20	15.44
3 1/2	.188	20	17.90
4	.188	22	22.31
4 1/2	.188	22	24.90
3	.188	6	4.63
3 1/2	.188	6	5.36
4	.188	6	6.09
4 1/2	.188	6	6.81

Prices on application.



Copper Cable Connectors

UNDERGROUND CABLE INSTALLATIONS

Installation Contracts

We have a large staff of highly trained installers who are familiar with all phases of cable installation work and we are well prepared to take contracts for the supply and installation of cables and the necessary accessories to make a complete installation.

All cables manufactured by the company are subjected to rigid tests and careful inspection before leaving the factory. We are, therefore, able to guarantee our cable as it leaves the factory, but it is obvious that we cannot extend this guarantee to installed cable unless the installation is done by our own Installation Department. The best cable manufactured can be ruined by handling and installing entrusted to inexperienced workmen.

We can at all times give prices on installations of any magnitude, but at the same time are prepared to undertake small jobs, such as installing potheads or locating and repairing trouble.

For the convenience of our customers, we are able to supply cable jointers and helpers to supervise small installation jobs or to make special splices which would not warrant the customer hiring his own men for the work.



In this section of our catalogue we have listed a wide variety of useful household appliances, and there are many more items that we could have included which we merchandise. Send us your inquiries for any electrical appliances you may be in the market for and you may rest assured that, if it is made, we can get you the description as well as price information you seek.

for
**RADIO
 RECEIVERS *and*
 HOUSEHOLD
 APPLIANCES
 INDEX**

See Below

*See alphabetical index for
 page numbers of listings
 at back of book.*

INDEX

Casseroles	Heaters	Rangettes
Chafing Dishes	Hot Plates	Refrigerators
Clocks	Humidifiers	Resistance Wires
Coffee Urns	Ironers	Sandwich Toasters
Drainers	Irons	Sewing Machine Motors
Fans	Kettles	Toasters
Fan Heaters	Mixers	Vacuum Cleaners
Fires	Percolators	Ventilating Fans
Floor Machines	Radio Receivers	Waffle Griddles
Floor Polishers	Radio Tubes	Washers
Grates	Ranges	Water Heaters

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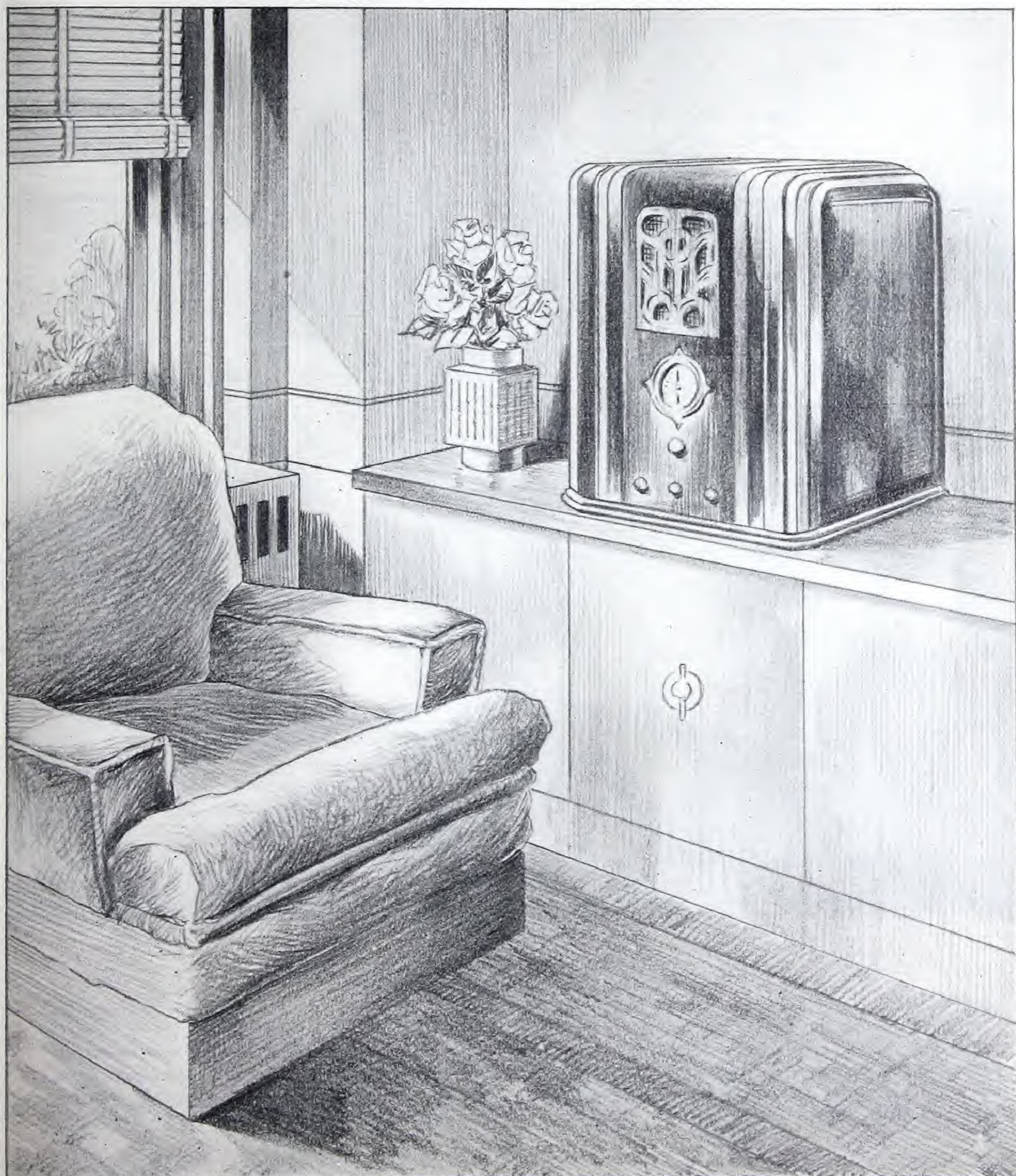


Northern Electric RADIO RECEIVERS

WITH its unparalleled experience of over 50 years in the sound transmission field . . . years which have seen its growth from the Pioneer of sound transmission to Canada's foremost builder of theatre sound systems, broadcast transmitters, public address systems and other scientific sound transmitting equipment . . . Northern Electric is equipped—as is no other organization—to

design Radio Receivers. For Northern Electric is SUPREME IN SOUND.

Complete lines of Electric and Battery models—standard broadcast and all wave . . . Consoles, table and mantel models and automobile receivers—are carried in stock in each of our 16 distributing branches. Illustrated literature and full information regarding the Northern Electric franchise on request.





ELECTRIC RANGES

NORTHERN ELECTRIC introduced the first electric cooking range into Canada twenty-two years ago. Since then Northern Electric has consistently been ahead of the field in pioneering and perfecting new improvements. These ranges are designed and built for the Canadian Home. Modern and attractive in appearance,

they combine the maximum of beauty with perfect performance.

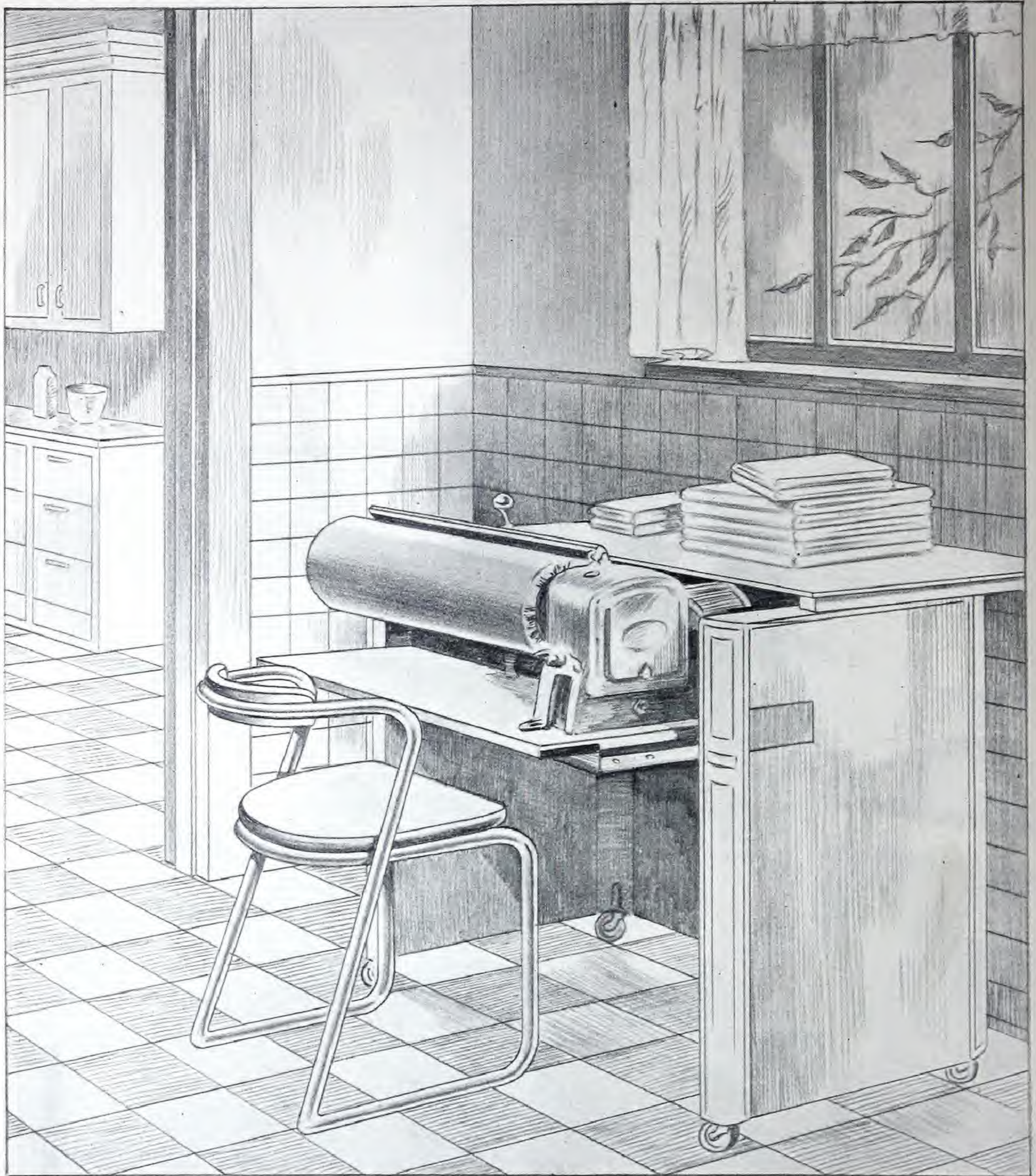
With models changing as new ideas are incorporated, no specific range is illustrated here. A complete line is, however, carried by all our 16 distributing branches. Illustrated literature and full information on request.



ELECTRIC REFRIGERATORS

ALL the mechanical efficiency and all the convenience features that are offered today are embodied in the Refrigerators carrying the Northern Electric guarantee. With designs constantly changing as new ideas are

evolved by engineers, no specific model is illustrated here. A full line of refrigerators is, however, carried by our 16 distributing branches across Canada. Illustrated literature and full details are available on request.

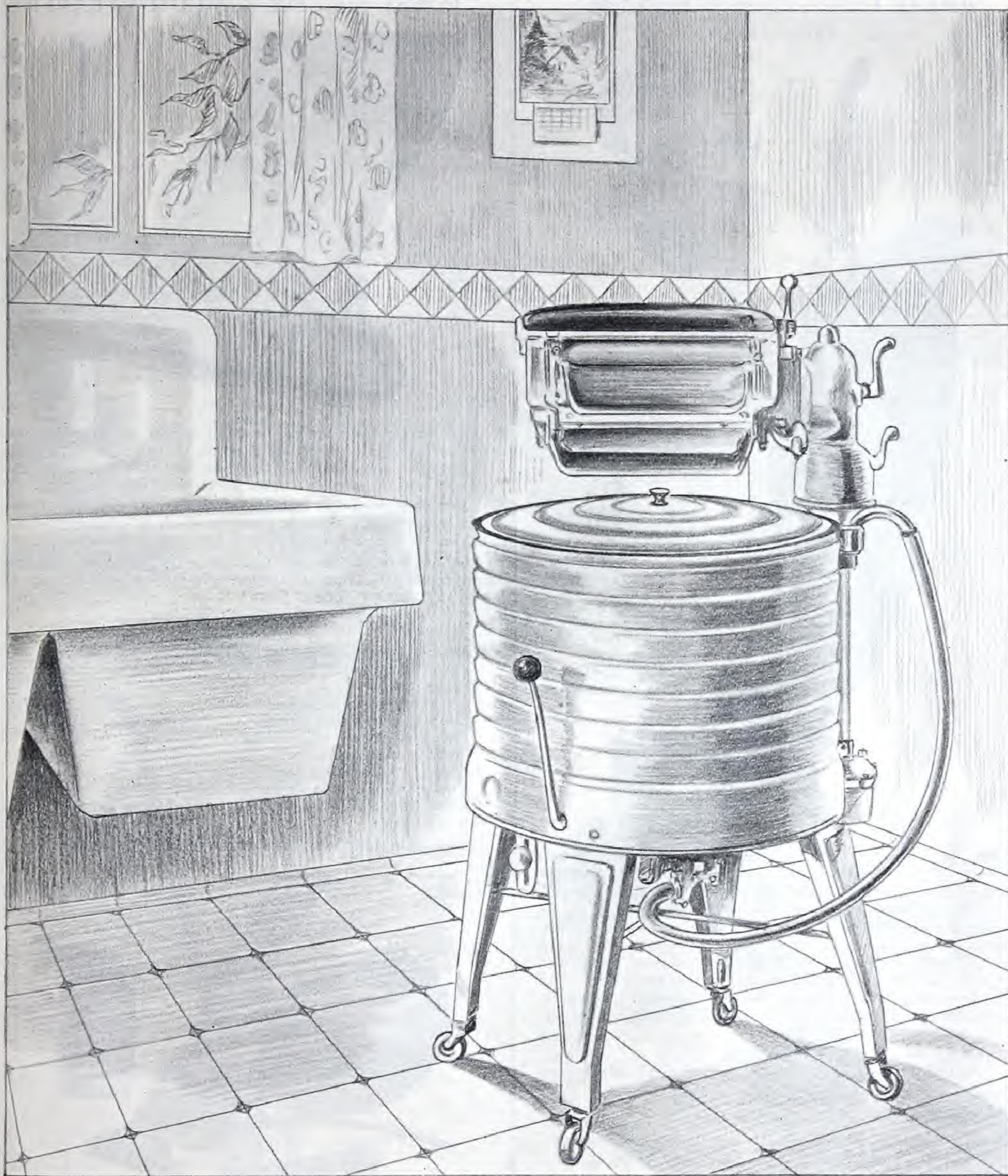


ELECTRIC IRONERS

ALL the latest improvements in electric home ironers have been incorporated in the ironers carrying the Northern Electric guarantee. In addition they have many convenience features which set an entirely new standard in home ironers. While the illustration shown

here does not depict any specific model, it gives some idea of the compactness and ease of operation of these ironers.

A full line is carried by each of our 16 distributing branches. Illustrated literature and full details on request.



ELECTRIC WASHERS

GREATER protection for clothes and greater protection for the user . . . maximum washing efficiency . . . freedom from noise and vibration . . . and a rugged construction that eliminates costly servicing have long been features of washers carrying the Northern Electric

guarantee. The illustration shown here, while not depicting any specific model, gives a general idea of their appearance.

A full line is carried by our 16 distributing branches. Illustrated literature and full details on request.

ROYAL SUPER GRAND VACUUM CLEANER



Two Speed Motor—Head Light—Motor Driven Brush—Greatest Suction Power—New and Better Bag Material—Beautiful Appearance—Easiest Operation—Swiftest Cleaning.

Simple fairness to this splendid new Royal demands words that would seem extravagant were they not so obviously backed by actual facts. The Super Grand offers you everything that you could possibly ask. It gives you ease of operation, thoroughness and swiftness. Its power is so great that even on the low speed (used to do most of your cleaning) a thorough job is done, with the added advantage of quiet operation.

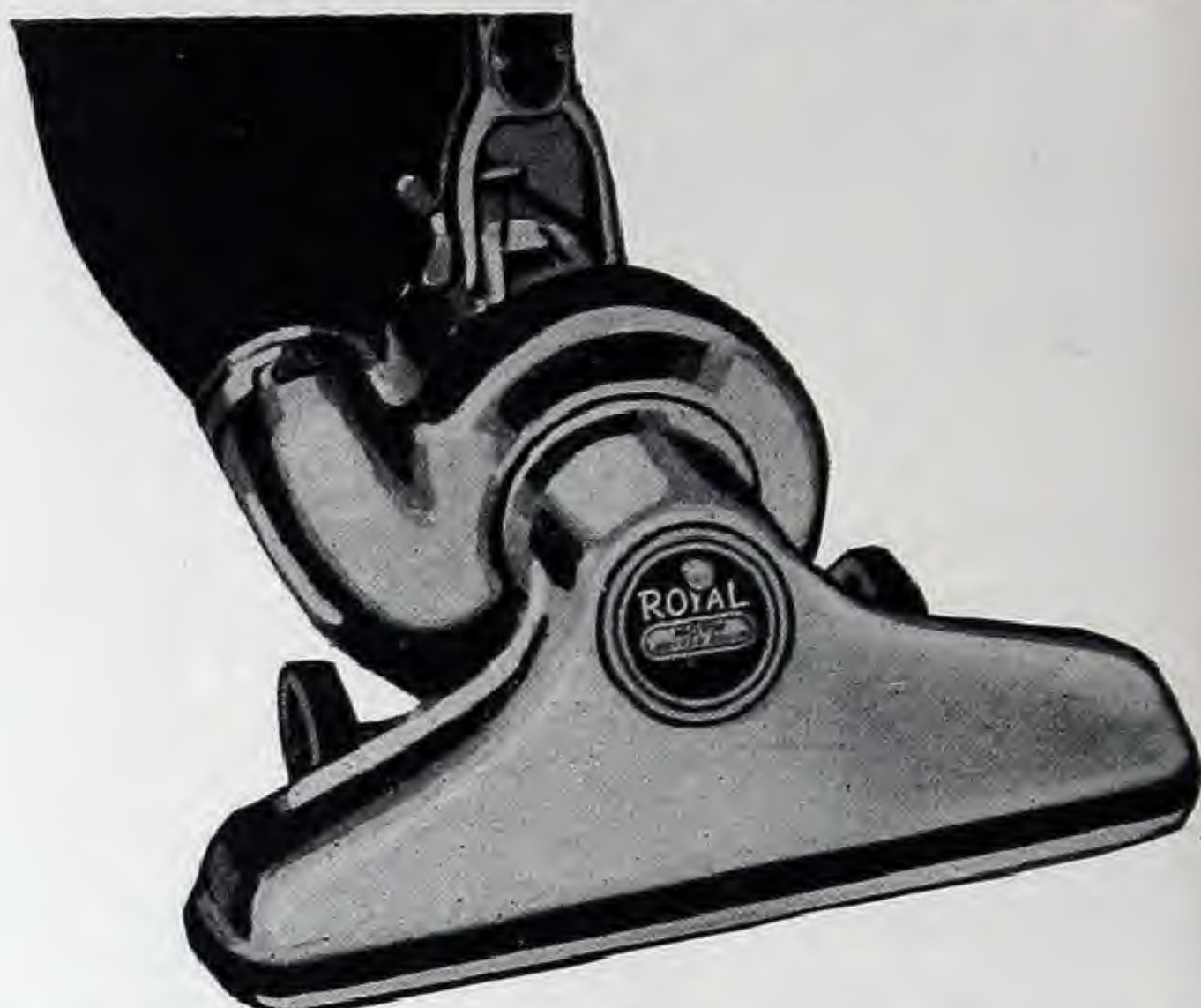
List price..... \$69.50

OUTSTANDING SUPER GRAND FEATURES

- Head Light for illuminating dark corners.
- Two Speed Motor—with switch at finger tips.
- Powerful suction combined with motor driven brush.
- Special Compo Bearings insuring most years of service.
- Patented wide hinged opening bag. EASY to empty.
- New style two color bag of heavy dust tight material.
- Chromium Plated Handle with comfortable grip.
- Handle Lock—holds handle rigidly in any position.
- Positive Nozzle adjustment for most efficient cleaning of rugs of various thickness.
- Wheels with Compo bearings. No squeaking—longer life.
- Double wheels in rear to prevent tipping.
- Super Service, non-kinkable rubber covered cord.

Royal Cleaning Tools: Beautifully finished—most efficient in their many uses—easy to attach—List price, including the famous Royal Sprayer for moth proofing..... \$12.50

ROYAL SPECIAL VACUUM CLEANER



An ideal cleaner for use in small homes and apartments—also just right to use as an extra cleaner. It is full size, rugged and powerful. Built to give long service and to clean swiftly and thoroughly. Easy to use and light to carry.

Not only does this new Royal clean rugs and bare floors, but also with its tools, it cleans everything above the floor. It also uses the Royal Sprayer to spray moth-proofing liquids.

Do not buy any cleaner that cannot use tools efficiently and conveniently. They add practically 50% to the service an electric cleaner gives you.

SPECIAL FEATURES

- Automatically lubricated bearings.
- Powerful Suction.
- Wide nozzle
- Large easy running wheels.
- Convenient trigger switch.
- Patented nozzle adjustment.
- Positive handle lock.
- Easily emptied dust bag.
- Rubber covered super service cord.
- Complete Set of Cleaning Tools—Including Royal Sprayer, only \$12.50.

List Price, revolving brush type but less tools, \$42.50.



ROYALETTE

Quick—Light—Powerful

Rubber Nozzle—Demothing Sprayer—Blower

The ROYALETTE comes in a beautiful highly polished finish—is so easy to use that you'll substitute it for a clothes brush for dusting your clothes and hats—it cleans closed car interiors thoroughly and quickly—it picks up the crumbs from the table—the dust from lamp shades and upholstery—it literally does hundreds of cleaning tasks you've never expected a hand cleaner to do. It's a cleaner of a thousand uses.

List Price..... \$19.50

UNIVERSAL VACUUM CLEANER

Model 95

New—Unique—Different
Economical

Unusually light weight, slightly less than 8 pounds. Specially designed nozzle aided by permanently attached bristle bar permits fast, thorough removal of all surface litter while extra powerful heavy suction removes deeply embedded dirt. Hand cleaner convenience with floor model performance. Toggle switch conveniently located at finger tips beneath pistol grip handle. 20 feet of non-kinking cord. Soft rubber casters prevent marking or scratching of floors or furniture and insures quiet operation. Attractive dust-proof bag, maroon color with gold trim.

Packed one in a carton

Weight packed 12 lbs.

List Price \$22.50



ROYAL ELECTRIC FLOOR POLISHER



The Rotary brush action of the Royal Floor Polisher is the same that is used in the large expensive floor polishers for commercial use. The Royal Polisher is built strong, sturdy and will give many years of satisfactory service.

List Price with extra felt high lustre buffing Pad \$29.50

STAR-RITE HOUSEHOLD MOTOR

For Electrifying Sewing Machines



No. 551

Star-Rite Household Motor

A motor that can be readily installed to instantly electrify any make of sewing machine.

Base, cast iron. Motor casing, drawn steel. Polished nickel finish. Operates clock-wise or counter clock-wise. No bolts or screws to get out of order. Self-aligning bronze bearings. 10 feet of cord, attached to foot control, connection plug near motor. 2-piece attachment plug.

Grinder attachment for sharpening tools, cutlery, etc., and Polisher, for use on pots and pans and all metal objects—obtainable at slight extra charge. AC or DC. Voltage, 110 (32 and 220 Voltage at slight extra cost.) Standard packing, 1. Shipping weight, 12 lbs. The foot control on the Star-Rite Household Motor permits operation at a speed as slow or fast as desired.

List No. 551 Household Motor.....	List Price \$19.95
Polisher attachment.....	List Price 1.15
Grinder attachment.....	List Price 1.00

HAMILTON BEACH SEWING MOTORS

Automatic Chain Stitch Sewing Motor



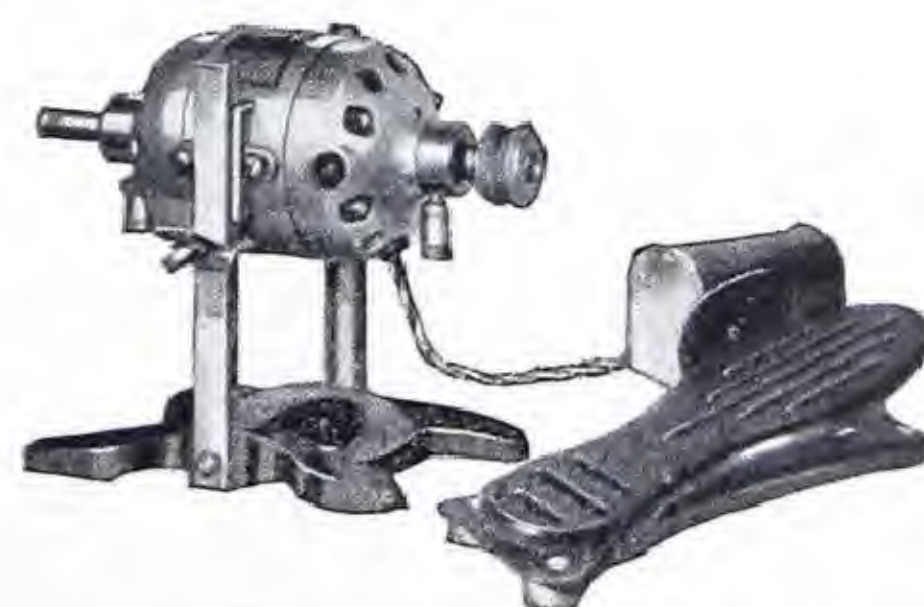
A special bracket for automatic or chain stitch type sewing machines. Attaches permanently. Swings under head when not in use. Gives perfect operation. Electrical characteristics and speed pedal same as Home motor.

List No.	List Price Each
E.Z. Automatic Chain	
Stitch Sewing Type	\$36.40

TAILOR SEWING MOTOR

Heavy Duty

This heavy-duty motor is ideal for tailor shops, glove factories, shirt houses, overall makers, and for all light factory and tailor sewing machines. Fits practically all types and models. Drive-pulley slips under hand wheel then two thumb screws



complete the adjustment. No holes to bore, no tools, clamps, or belts. All motor parts are oversize and extra strong. This insures long life with an absolute minimum of service attention. Motor operates perfectly on either AC or DC current, 105 to 115 volts, 25 to 60 cycles. Can be shifted easily from one machine to another, offering marked power flexibility. Has a bobbin winder attachment, may be run in either direction, and is complete with speed pedal.

List No.	List Price Each
E.Z. Tailor Type.....	\$44.70

KENT FLOOR MACHINE

Model A



Model A

The KENT Floor Machine will not only spread wax and polish, but it will scrub, sand and do a complete refinishing job and maintain all kinds of floors. Wood, Linoleum, Rubber, Terrazzo, Tile, Marble, Cork, Cement, etc.

That the KENT Method provides the quietest, easiest, most effective way of maintaining beautiful floors is attested by the fact that the KENT Floor Machine is used today in thousands of great public buildings where the only consideration is satisfaction and results.

The machines plug conveniently into any electric light socket. They are self-propelling and cost about 2c per hour for current.

MOTOR

Please be sure to specify kind of current machine is to be operated on. If alternating current, give voltage and cycles; if direct current, give voltage.

Equipped with

- 1/4 Horse Power Motor:
A.C. 110 volt, 60 cycle, or D.C. 110 volt, or A.C. 220 volt, 60 cycle.
- 25 feet Super Service Cable
- 1 Palmetto Wax Spreading Brush.
- 1 Tampico Polishing Brush.
- 1 Lamb's Wool Buffer.

\$218.25

(Machine with motor of other voltage or frequency: \$229.75)

ATTACHMENTS

All the weight of the machine, 35 pounds, is on the attachment. All brushes are 11 inches in diameter. The machine comes equipped with the three important waxing and polishing attachments. The steel wool mat is used to burnish floor seals; or in case waxed surface seems slippery, to remove excess wax. The steel wire brush is for heavy scrubbing or for cleaning marble and cement floors. The sandpaper holder with fast cutting sandpaper disc produces a velvet finish on wood floors. Used also for sanding table and desk tops. The steel wool pad is used with the steel wire brush to remove old finish softened by varnish remover. Shipping weight 55 lbs.

FOR WAXING AND POLISHING

Palmetto Waxing Brush.....	\$5.30
Tampico Polishing Brush.....	5.30
Lamb's Wool Buffer.....	3.55
Wax Applicator (Lamb's Wool Mop).....	2.15
Steel Wool Mat, coarse, medium or fine.....	.85

FOR SCRUBBING

Fibre Scrubbing Brush.....	5.30
Floor Squeegee.....	2.50
Water Pan.....	7.05
Steel Wire Brush.....	9.55

FOR REFINISHING

Sandpaper Holder with 10 Discs of Fast Cutting Sandpaper, 5 medium, 5 fine.....	6.35
Sandpaper Holder only.....	4.95
Fast Cutting Sandpaper, fine, per disc.....	.17
Fast Cutting Sandpaper, medium, per disc.....	.22
Fast Cutting Sandpaper, coarse, per disc.....	.28
Steel Wool Pad.....	.50

EXTRA

Super Service Cable, per extra foot.....	.20
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KENT FLOOR MACHINE

Model B

Medium Commercial Size



A general utility machine used for scrubbing, waxing, polishing and sandpapering medium size floor areas.

MOTOR

Please be sure to specify kind of current machine is to be operated on. If alternating current, give voltage and cycles; if direct current, give voltage.

Equipped with

- 1/3 Horse Power Motor:
A.C. 110 volt, 60 cycle, or D.C. 110 volt, or A.C. 220 volt, 60 cycle.

35 feet Super Service Cable.

Any \$6.35 Attachment

\$266.75

Machine with 1/2 H.P. motor, recommended for heavy duty, particularly sanding..... 313.25

(Machine with motor of other voltage or frequency: 1/3 H.P., \$284.75; 1/2 H.P., \$336.75).

ATTACHMENTS

All the weight of the machine is on the attachment: 65 pounds with 1/3 H.P. motor; 80 pounds with 1/2 H.P. motor. All brushes are 11 inches in diameter. The steel wool mat is used to burnish floor seals; or in case waxed surface seems slippery, to remove excess wax. The steel wire brush is for heavy scrubbing or for cleaning marble and cement floors. The bronze wire brush is for use with strong cleaning solutions. The solution tank fits on the machine with valve control from handle allowing the application of solution to floor as needed. The steel wool pad is used with the steel wire brush to remove old finish softened by varnish remover.

Equipped with 35 feet of Extra Heavy Rubber Covered Cable.

Shipping weight: 1/3 H.P. 90 lbs.; and 1/2 H.P. 105 lbs.

FOR WAXING AND POLISHING

Palmetto Waxing Brush.....	\$6.35
Tampico Polishing Brush.....	6.35
Lamb's Wool Buffer.....	3.55
Wax Applicator (Lamb's Wool Mop).....	2.15
Steel Wool Mat, coarse, medium or fine.....	.85

FOR SCRUBBING

Fibre Scrubbing Brush.....	6.35
Steel Wire Brush.....	10.60
Bronze Wire Brush.....	13.75
Floor Squeegee.....	2.50
Water Pan.....	7.05
Solution Tank, 8 quart capacity.....	28.20
Shampoo Brush, for rugs and carpets.....	6.35

FOR REFINISHING

Sandpaper Holder with 18 Discs of Fast Cutting Sandpaper, 6 each, fine, medium, coarse.....	8.10
Sandpaper Holder only.....	5.30
Fast Cutting Sandpaper, fine, per disc.....	.17
Fast Cutting Sandpaper, medium, per disc.....	.22
Fast Cutting Sandpaper, coarse, per disc.....	.28
Steel Wool Pad.....	.50
Carborundum Disc, coarse, medium or fine.....	9.90
Carborundum Stone, coarse, medium or fine.....	1.40
Pumice Pad, for scouring.....	4.25

Extra

Super Service Cable, per extra foot.....	.28
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KENT FLOOR MACHINE

Model C

Large Commercial Size

A heavier machine especially adapted for the sandpapering of floors in new and old buildings, and the scrubbing, waxing, and polishing of large floor areas.

MOTOR

Please be sure to specify kind of current machine is to be operated on. If alternating current, give voltage and cycles; if direct current, give voltage.

Equipped with

1/2 Horse Power Motor:

A.C. 110 volt, 60 cycle, or D.C. 110 volt, or A.C. 220 volt, 60 cycle.

35 feet Super Service Cable.

Any \$9.15 Attachment.

\$370.00

Machine with 3/4 H.P. motor, recommended for heavy duty or commercial sanding..... 417.50

(Machine with motor of other voltage or frequency: 1/2 H.P. \$393.75; 3/4 H.P. \$446.00).

ATTACHMENTS

All the weight of the machine is on the attachment: 85 pounds with 1/2 H.P. motor; 110 pounds with 3/4 H.P. motor. The 15 inch brushes are for faster work on larger areas. The steel wool mat is used to burnish floor seals; or in case waxed surface seems slippery, to remove excess wax. The steel wire brush is for heavy scrubbing or for cleaning marble and cement floors. The bronze wire brush is for use with strong cleaning solutions. The solution tank fits on the machine with valve control from handle, allowing application of solution to floor as needed. The steel wool pad is used with the steel wire brush to remove old finish softened by varnish remover.

Equipped with 35 feet of Extra Heavy Rubber Covered Cable.

Shipping weight: 1/2 H.P. 115 lbs.; 3/4 H.P. 130 lbs.

FOR WAXING AND POLISHING

Palmetto Waxing Brush, 13 inch.....	\$9.15
Palmetto Waxing Brush, 15 inch.....	10.25
Tampico Polishing Brush, 13 inch.....	9.15
Tampico Polishing Brush, 15 inch.....	10.25
Lamb's Wool Buffer.....	3.55
Wax Applicator (Lamb's Wool Mop).....	2.15
Steel Wool Mat, coarse, medium or fine.....	.85

FOR SCRUBBING

Fibre Scrubbing Brush, 13 inch.....	9.15
Fibre Scrubbing Brush, 15 inch.....	10.25
Steel Wire Brush, 13 inch.....	13.40
Steel Wire Brush, 15 inch.....	15.15
Bronze Wire Brush, 13 inch.....	16.20
Floor Squeegee.....	2.50
Water Pan.....	7.05
Solution Tank, 8 quart capacity.....	28.20
Shampoo Brush, for rugs and carpets, 15 inch.....	10.25

FOR REFINISHING

Sandpaper Holder with 18 Discs of Fast Cutting Sandpaper, 6 each, coarse, medium, fine.....	10.95
Sandpaper Holder only.....	7.05
Fast Cutting Sandpaper, fine, per disc.....	.22
Fast Cutting Sandpaper, medium, per disc.....	.28
Fast Cutting Sandpaper, coarse, per disc.....	.35
Steel Wool Pad.....	.64
Carborundum Disc, coarse, medium or fine.....	14.80
Carborundum Stone, coarse, medium or fine.....	1.40
Pumice Pad, for scouring.....	6.35

Extra

Super Service Cable, per extra foot..... .28

KENT FLOOR MACHINE

Model D



Model D

MOTOR

Please be sure to specify kind of current machine is to be operated on. If alternating current, give voltage and cycles; if direct current, give voltage.

Equipped with

1 Horse Power Motor:

A.C. 110 volt, 60 cycle, or D.C. 110 volt, or A.C. 220 volt, 60 cycle.

50 feet Super Service Cable.

Any \$14.80 Attachment.

\$559.75

(Machine with motor of other voltage or frequency: \$585.25).

ATTACHMENTS

The entire weight of the machine, 125 pounds, is on the attachment. All brushes are 20 inches in diameter. The steel wool mat is used to burnish floor seals; or in case waxed surface seems slippery, to remove excess wax. The steel wire brush is for heavy scrubbing or for cleaning marble and cement floors. The solution tank fits on the machine with valve control from handle, allowing application of solution to floor as needed. The steel wool pad is used with the steel wire brush to remove old finish softened by varnish remover.

Equipped with 50 feet Extra Heavy Rubber Covered Cable. Shipping weight 160 lbs.

FOR WAXING AND POLISHING

Palmetto Waxing Brush.....	\$14.80
Tampico Polishing Brush.....	14.80
Lamb's Wool Buffer.....	8.45
Wax Applicator (Lamb's Wool Mop).....	2.15
Steel Wool Mat, coarse, medium or fine.....	1.15

FOR SCRUBBING

Fibre Scrubbing Brush.....	14.80
Steel Wire Brush.....	21.15
Floor Squeegee.....	2.50
Water Pan.....	7.05
Solution Tank, 8 quart capacity.....	28.20
Shampoo Brush, for rugs and carpets.....	14.80

FOR REFINISHING

Sandpaper Holder with 10 discs of Fast Cutting Sandpaper, 3 coarse, 4 medium, 3 fine.....	14.80
Sandpaper Holder only.....	9.90
Fast Cutting Sandpaper, fine, per disc.....	.50
Fast Cutting Sandpaper, medium, per disc.....	.64
Fast Cutting Sandpaper, coarse, per disc.....	.78
Steel Wool Pad.....	.85

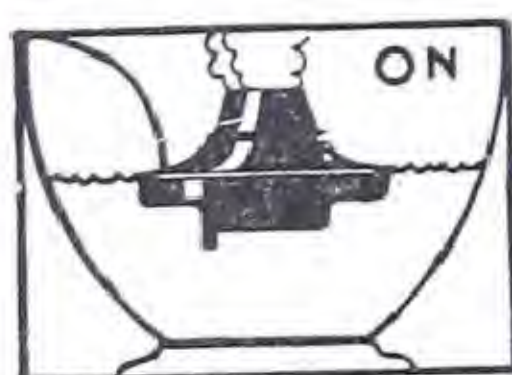
Extra

Super Service Cable, per extra foot..... .28

LEWIS PORTABLE HUMIDIFIER



Lewis Portable Humidifier



Here is the operating mechanism. Sufficient water is admitted to cover the heating element.



As the water supply is exhausted the float tips automatically cutting off the current.

LEWIS PORTABLE HUMIDIFIER

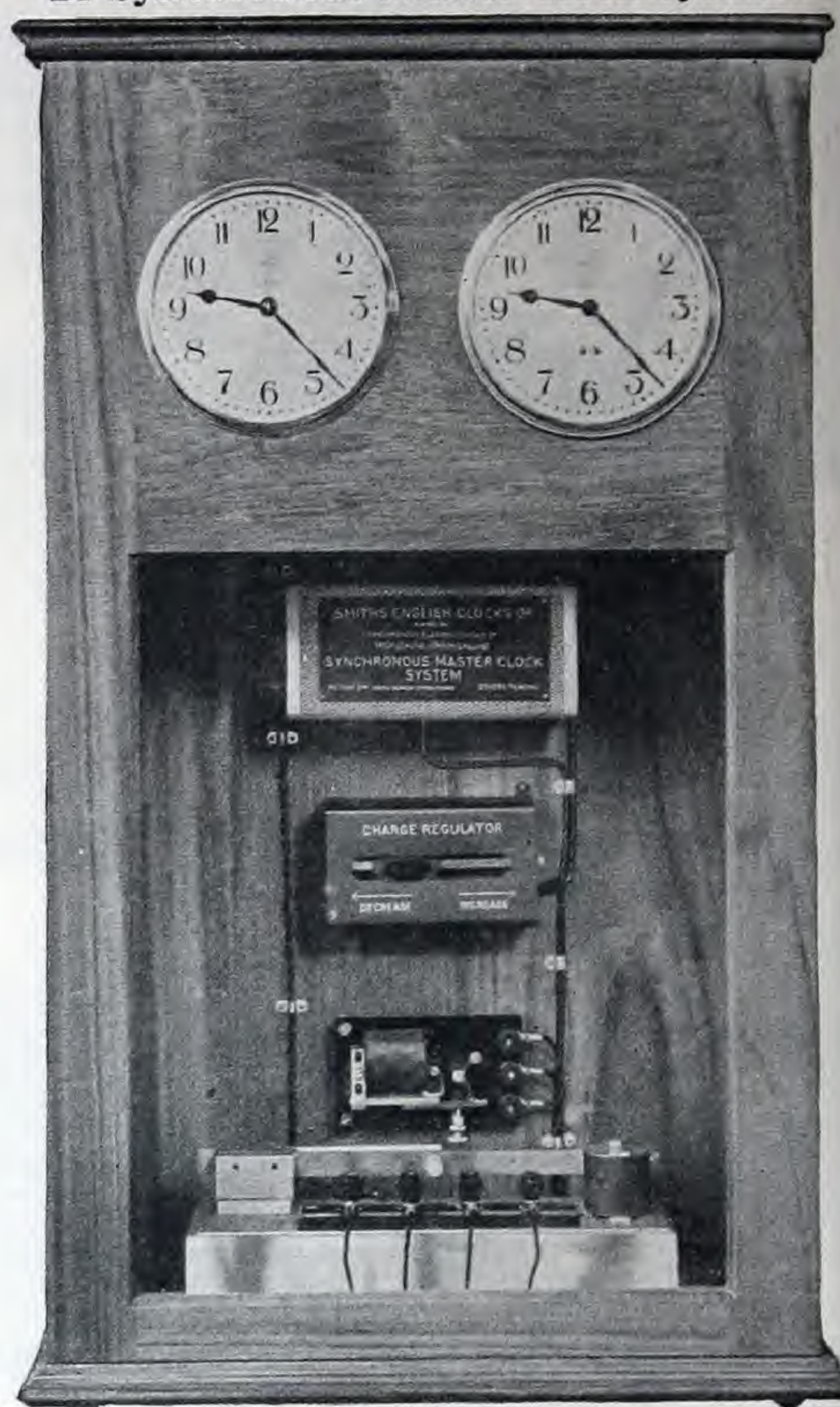
The Lewis Portable Humidifier operates on an entirely new principle—forced evaporation from a restricted heating surface. The operating and heating elements are encased in a float which rides on the surface of the water in the urn. There are no motors, and no fans. Only the water covering the heating element is heated. When the water supply becomes exhausted the unit automatically shuts itself off. Approximately a full pint of water is evaporated every hour and the urn has a capacity for nine or ten hours steady running.

Not only does the healthful vapor from the Lewis Portable Humidifier protect against colds and other winter ills—but in cases where colds have been contracted from outside exposure it is effective in their treatment. Volatile oils may be evaporated with the water for the relief of nasal, throat and lung congestion.

ORNAMENTAL—DECORATIVE

The Lewis Portable Electric Humidifier harmonizes with any setting in which it may be placed. The urn is green like old oxidized copper. To the casual eye it is an antique of some distinction—yet actually it performs the miracle of putting the breath of Spring into the air.

Lewis Portable Humidifier, List Price.....\$18.50

SMITH ELECTRIC CLOCKS
Bi-Synchronous Master Clock System

Intended to maintain accurate time throughout an office, block, factory, hotel or other large institution, the new Smith's Bi-Synchronous Master Clock System provides the advantages of Synchronous Electric Time without the need for every clock to be plugged in to the mains, and it embodies several unique features.

1. The Master Instrument is of the synchronous type. This ensures that accurate time is maintained by the controlled frequency of the A.C. electric mains.

2. It is impossible for the clocks in the System to have an accumulative error.

3. The System is entirely independent of ordinary escapement or pendulum control. It is therefore free from error due to mechanical or temperature variations.

4. Even in the event of a current failure the Master Clock continues to run at correct speed so keeping all the clocks in the System right.

In the event of the current being interrupted, a self-operated change-over switch brings into operation a battery supply of current and a vibrating reed which maintains its oscillations at the same frequency as the time controlled A.C. current. When normal current flows again, operation from the mains is at once automatically resumed.

The System can be retarded or advanced as a single unit when "Summer Time" makes changes necessary; there is no occasion to correct the clocks individually nor any risk of the introduction of discrepancies between them.

This new Smith's Bi-Synchronous Master Clock System operates through "Slave" Clocks which can be supplied in practically any design, either for domestic or commercial purposes. Time Recorder Machines, Bell-Controllers, etc. can of course be incorporated in the System and existing clocks converted.

Prices on application.

SMITH ELECTRIC CLOCKS
Synchronous



Callboy

ETNA ALARM CLOCK
with Floodlight Dial

Pleasing boudoir design with Moulded Case. The Cream Dial with Raised Silvered Zone can be floodlit at will by means of a bulb concealed at the head. Height $5\frac{1}{8}$ "; Width $5\frac{1}{2}$ "; Depth 3". Oxydized Silver finish or Walnut finish. List Price \$9.50



Etna

TANGA
RADIO ALARM
CLOCK

Bakelite walnut case. Length $7\frac{3}{4}$ "; Height $6\frac{1}{2}$ "; Depth $2\frac{1}{4}$ ". Silver Dial Raised Zone.

List Price..... \$12.00



Ceylon

BURNHAM
MANTEL CLOCK

With moulded Bakelite case in Walnut or Mahogany, Gold or Oxidized Silver finishes. Height 6"; Width $7\frac{1}{4}$ "; Dial $3\frac{1}{2}$ " diam. With raised zone dial.

List Price.... \$11.75



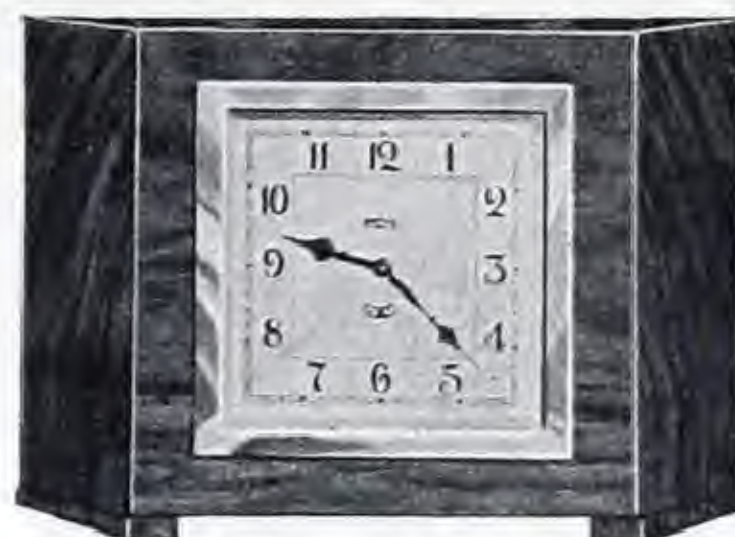
Orient

ORIENT
MANTEL CLOCK

Finished in Oxidized Silver metal case of distinctive design. Height $5\frac{1}{4}$ "; Width $5\frac{3}{4}$ "; Depth $3\frac{1}{2}$ ". Dial $3\frac{1}{2}$ " diam.

List Price..... \$13.50

SMITH ELECTRIC CLOCKS
Synchronous



Darwin

DARWIN
MANTEL CLOCK

Popular model of special value. Solid walnut case. Length 8"; Height $5\frac{5}{8}$ "; Depth $2\frac{1}{8}$ ".

List Price..... \$12.00

ALDWYCH
MANTEL CLOCK

Attractively Carved Design in Solid Wood. Chromium Plated Bezel, Silvered Dial with Raised Silvered zone on Chrome Slip. Height $5\frac{3}{4}$ "; Width $9\frac{1}{2}$ "; Depth $3\frac{1}{2}$ ". Walnut or Oak.

List Price.... \$20.00



Aldwych

BROCKVILLE
MANTEL
CLOCK

Supplied in Walnut or Mahogany. Height 7"; Width $8\frac{1}{2}$ "; Depth 3".

List Price.. \$20.00



Brockville

GLAMIS
MANTEL CLOCK

A modern clock supplied in Walnut or Mahogany. Height $9\frac{3}{4}$ "; Width $9\frac{1}{2}$ ". Dial $5\frac{1}{4}$ " x 7". As Synchronous Electric.

List Price.... \$22.50



Glamis

HADDINGTON
STRIKING CLOCK

Figured walnut inlaid with ebony and rosewood. Chromium plated bezel, self coloured dial with raised silvered zone.

Height $6\frac{1}{2}$ "; Width 13"; Depth $3\frac{1}{2}$ ".

List Price.... \$28.00



Haddington

SMITH ELECTRIC CLOCKS

Synchronous



Kitchen

DUBLIN KITCHEN WALL CLOCK

Wall Clock in spun metal, all chromium case with cream dial, designed for use in kitchens, bathrooms, offices, halls, etc., Outside 9" diam. Dial 6" diam. White finish.

List Price..... \$8.50

DOVER COMMERCIAL WALL CLOCK

Designed for use in factories, etc. Has strong metal case. Outside 15 3/4" diam. Dial 12" diam. Both Interior Type, or waterproof Exterior Type.

12" Dial. Int. \$17.50
12" Dial. ext. 20.00
18" Dial. int. 35.00
18" Dial. ext. 42.00



Commercial



Arun

ARUN FLUSH WALL CLOCK

For interior or exterior, fits flush with a wall or shop front. Artistic Bronze finish Bezel, with fixing holes to facilitate screwing to wooden mount. Back setting for hands.

List Price 18" dial. \$40.00
List Price 24" dial \$45.00

TRURO INTERIOR HANGING CLOCK

Double-sided hanging model for interior use, supplied in Walnut or Mahogany finish. 15 1/4" wide, 7" deep, dial 12" diam.

List Price.....\$53.50



Truro

SMITH ELECTRIC CLOCKS

DOUBLE-SIDED ILLUMINATED ADVERTISING CLOCKS

For Hotels, Restaurants, Shops, etc.



Publicity Type

Double-sided illuminated clock for hotels, restaurants, shops or wherever an outdoor timepiece of distinctive design is required. Constructed of lead-coated sheet steel with wrought-iron bracket, finished in cellulose spray to any desired colour. Standard finish is bronze. Contains lamp holders for illuminating the dial and panels; two independent circuits, one for the clock and one for the lighting. Can be supplied with or without publicity panels.

PUBLICITY MODELS

List No.	Dial Dia.	Height	Dimensions	
			Width	Thickness
H-8	18"	31 1/2"	22 3/4"	9"
H-9	24"	40 3/4"	30 "	9"

MODELS WITHOUT ADVERTISING PANELS

List No.	Dial Dia.	Height	Dimensions	
			Width	Thickness
10	18"	22 1/4"	22 1/4"	9"
11	24"	27 "	27 "	9"

All the above models are also made with 30" and 36" dials. Supplied complete with suspension or wall type bracket.

Prices on application.

UNIVERSAL ELECTRIC WARES

Coffee Urn Sets

Make Perfect Drip Coffee Automatically—the water drips as it heats.



FONTAINE PATTERN

Metal Handles

Ivoroy Grained Faucet Handle

No. E721005—10 Cups—Chromium

E7210 Urn, 7210 Sugar Bowl, Creamer and Tray

Weight packed 24 lbs.

List Price \$118.00



LAFAYETTE PATTERN

Ivoroy Antique Handles

No. E721904—9 Cups—Chromium

E7219 Urn, 7200 Sugar Bowl, Creamer and Tray

Weight packed 18 lbs.

List Price \$100.00



CONTINENTAL PATTERN

Ivory Finish Handles

No. E7131104—11 Cups—Chromium

E71311 Urn, 7070 Sugar Bowl, Creamer and 7220 Tray

Weight packed 13¾ lbs.

List Price \$40.50

Watts 400

All equipped with 6 ft. art silk cord.
Packed one set in a carton.

UNIVERSAL ELECTRIC WARES

Coffee Urn Sets

Make perfect drip coffee automatically—the water drips as it heats.



GRECIAN PATTERN

Metal Handles

Ivoroy Grained Faucet Handle

No. E718904 9 Cups Chromium

E 7189 Urn, 7800 Sugar Bowl, Creamer and Tray

Weight packed, 17½ lbs.

List Price, \$67.00



ALADDIN PATTERN

Metal Handles

Ivoroy Grained Faucet Handle

No. E723904 9 Cups Chromium

E7239 Urn, 7230 Sugar Bowl, Creamer and 7120 Tray

Weight packed, 22½ lbs.

List Price, \$67.00



THE WESTMINSTER PATTERN

Cut Glass Top

Ivoroy Grained Handles

No. E7256904 9 Cups Chromium

E72569 Urn, 725 Sugar Bowl, Creamer and Tray

Weight packed, 18 lbs.

List Price, \$84.00

Watts 400

All equipped with 6 feet art silk cord
Packed one set in a carton

UNIVERSAL ELECTRIC WARES

Coffee Urn Sets

Make Perfect Drip Coffee Automatically—the water drips as it heats

Almost immediately after current is turned on the patented quick-acting pump starts circulating the water and the exclusive UNIVERSAL cone-perforated spreader plate so distributes the liquid through the coffee that a full-flavored beverage is obtained with one-third less coffee.

Units Protected by Patented Safety Fuse Plug. Gold Lined Sugar Bowls and Cream Pitchers.



Hamilton Pattern—Ivory Finish Handles

List No. E7115804, 8 Cups, Chromium.

E71158 Urn, 7070 Sugar Bowl, Creamer and 717 Tray

Weight packed 13 lbs. List Price \$38.50



Colonial Pattern—Black Finish Handles

List No. E7114804, 8 Cups, Chromium.

E71148 Urn, 7440 Sugar Bowl, Creamer and 7220 Tray

Weight packed 13 lbs. List Price \$44.50



Loving Cup Pattern—Black Bakelite Handles

List No. E716904, 9 Cups, Chromium.

E7169 Urn, 740 Sugar Bowl, Creamer and 7550 Tray

Weight packed 17 lbs., Watts 400. List Price \$58.75

List Nos. E7115804 and E7114804 Watts 380

Equipped with 6 ft. Art Silk Cord. Packed one set in a carton.

CANADIAN BEAUTY COFFEE PERCOLATORS



No. 477

Coffee Set—Urn, Cream, Sugar and Tray

No. 477 Percolator Set

A beautiful 4-piece coffee service. Inside of cream and sugar and tray bottom in beautiful satin finish. Percolator in highly finished untarnishable chrome plate. Drop handles, faucet, harmonizing beautifully with the general design. The tray 14" in diameter, the urn holds 8 cups, equipped with fuse to prevent burnouts and also cold water pump.

List Price \$24.75

No. 476 Urn

8 cup urn as shown in 477 set.

No. 476—Percolator only List Price \$17.25



No. 473

No. 473 Percolator

6 cup, chrome plated, panelled sides, black handle. Equipped with cold water pump. Element protected by fuse to prevent burnouts. Complete with 6 ft. silk cord set. Volts 110-115. Watts 450. Shipping weight 4 lbs.

List Price \$11.00

No. 474 Percolator

8 cup, chrome plated, panelled sides, black handle. Equipped with cold water pump. Element protected by fuse to prevent burnouts. Complete with 6 ft. silk cord set. Volts 110-115. Watts 450. Shipping weight 4½ lbs.

List Price \$12.25



No. 474

UNIVERSAL ELECTRIC WARES

Coffee Percolators

Make Perfect Drip Coffee Automatically—the water drips as it heats

Almost immediately after current is turned on the patented quick-acting pump starts circulating the water and the exclusive UNIVERSAL cone-perforated spreader plate so distributes the liquid through the coffee that a full-flavored beverage is obtained with about one-third less coffee.

Units Protected by Patented Safety Fuse Plug.



No. E6626

Beaumonde Pattern
Black Enameled Base
Chromium Plated Body
Black Handle.
Hinged Cover
List No. E6626
Capacity 6 Cups
Weight packed 4½ lbs.
List Price \$14.50



No. E7644

Colonial Pattern
Chromium
Black Bakelite Handle
List No. Cap. Price
E7644 4 Cups \$14.50
E7646 6 Cups 16.25
E7649 9 Cups 17.50
Weight packed 3½, 4¼, 5 lbs. respectively



No. E7626

China Floral Design
Ivory China Body, Colored
Floral Design. Chromium
Plated Mountings
Automatic Thermostat cuts off
current should percolator
boil dry
List No. E6927 Capacity 7 Cups
Operates on A. C. only
Weight packed 7¼ lbs.
List Price \$13.25
Equipped with 6 ft. Art Silk Cord
Watts 400; E6927, Watts 350
Packed one in a carton.



No. E6927

UNIVERSAL ELECTRIC WARES

Coffee Percolators



No. E7847

Colonial High-Boy Pattern
Chromium
Black Handle.
Hinged Cover
List No. E7847
Capacity 7 Cups
List Price \$13.25
Empire Pattern
Plain Pattern
not paneled
List No. E7857
Capacity 7 Cups
Weight packed 4½ lbs.
List Price \$12.50

Puritan Pattern
Chromium
Black Handle
List No. E7273
Capacity 3 Cups
Weight 3½ lbs.
List Price \$8.50
List No. E7276
Capacity 6 Cups
Weight 4 lbs.
List Price \$9.95
List No. E7279
Capacity 9 Cups
Weight 4½ lbs.
List Price \$11.75
List No. E72711
Capacity 11 Cups
Weight 5¼ lbs.
List Price \$13.25



No. E7276



No. 7236

Pilgrim Pattern
Chromium
Black Handle
List No. E7236
Capacity 6 Cups
Weight packed 4 lbs.
List Price \$9.50

Equipped with 6 ft. Art Silk Cord, No. E7236.
Watts 400; E7273 Watts 350, E7847 and E7857 Watts 380.
Packed one in a carton, six in a unit package, No. E72711
packed one in a carton only.
List Nos. E7847 and E7857 packed six in a unit package.

UNIVERSAL ELECTRIC WARES

Coffee Percolators

Empire High-
Boy Pattern
Chromium

Black Handle.
Hinged Cover

List No. E79467

Capacity
7 Cups

Weight packed
4 lbs.

List Price \$11.75



No. 7236



No. E7206

Chromium Black
Handle

List No. E7206

Capacity 6 Cups

Packed 1 in a carton

Weight Packed 4 lbs.

List Price.....\$7.95

Equipped with 6 ft.
art silk cord.

Hot Water Kettle



No. E9263

New improved construction prevents unit from warping and assures its being in perfect contact with kettle at all times thereby preventing any possibility of impaired efficiency.

Unlike any other kettle of its kind the Universal cannot overheat as its Automatic Safety Fuse Plug Protection prevents injury to appliance should water boil dry.

The fastest, most convenient means of supplying small quantities of hot water.

Its 1000 watt unit boils a quart of water in seven and one half minutes—other amounts in proportionate greater or less time.

Black Handle

No. E9263—Aluminum—Capacity 3 Quarts
Operates on A. C. only. Equipped with 6 ft. Cord
Weight packed 5¼ lbs.

Packed one in a carton, three in a unit package.
List Price \$10.95

UNIVERSAL ELECTRIC COFFEE WARES

Electrovac Coffee Makers

The Electrovac offers a convenient way to prepare drip coffee—a way that is fast, sure and economical, producing delicious coffee of unusual clearness every time as it is impossible to make coffee in it without having the water at just the temperature which gives the finest results.

Water, placed in lower bowl, is heated by an electric unit. When upper glass bowl is placed in position, the lower bowl is rendered air-tight. Steam pressure immediately forces hot water to upper bowl where it mingles with the coffee. As lower bowl cools a powerful vacuum is created and coffee in upper bowl is pulled by this vacuum through filter cloth into lower bowl.



No. E7517



No. E6616

No. E7517

No. E75114

Capacity 7 Cups

Capacity 14 Cups

Weight packed 5 to 7½ lbs.

No. E751704 Set Includes

E7517 Electrovac, 710 Sugar Bowl, Creamer and 717 Tray

Weight packed 14 lbs.—Watts 625

Extra Cover for Bottom Bowl

Heat Resisting Glass Upper Bowl

Chromium Plated Bottom Bowl

Tin Lined Inside

Ivory Casein Handles, Knobs and Feet

Push Button Switch in Cord

List No. E7517.....\$22.25

List No. E75114.....27.00

List No. E751704.....39.65

BEAUMONDE PATTERN

No. E6614

No. E6616

No. E6618

Capacity 4 Cups

Capacity 6 Cups

Capacity 8 Cups

Watts 550

Heat Resisting Glass Bowls

Black Enameled Base

Exposed metal Chromium Plated

Black Handles

Push Button Switch in Cord

Weight packed 4, 4½ and 5¼ lbs., respectively

Packed one in a carton

List No. E6614.....\$ 9.95

List No. E6616.....11.95

List No. E6618.....13.25

Watts 400

Packed one set in a carton

All above equipped with 6 ft. Art Silk Cord

UNIVERSAL ELECTRIC WARES

Sandwich Toasters, Waffle Makers and Griddles

Has two sets of interchanging grids—a flat set for toasting large or 3 small sandwiches, frying bacon, eggs, pancakes, eats, cakes, etc., and a waffle set for making all kinds of affles, corn pone, etc.

Expansion hinge allows ample clearance for waffle batter, raise and holds upper grid in upright position or allows it to rest back on the handle for two-plate surface cooking.



No. E6360
BEAUMONDE PATTERN

Black handles and knobs. Push button switch in cord. No. E6360. Black enameled and chromium plated. Size of aluminum cooking plates, $10\frac{1}{8} \times 5\frac{5}{8}$ inches. Furnished with aluminum drip cup to catch excessive fat which flows through drain when cooking chops, etc.

List Price, each..... \$15.95

No. E69770. Same as E6360 except furnished with flat grids only.

Weight packed, $7\frac{3}{4}$ to 9 lbs.

List Price, each..... \$12.95



No. E7360
DE LUXE PATTERN

Black handles and knobs. Push button switch in cord. No. E7360, chromium. Size of aluminum cooking plates, $10\frac{1}{8} \times 5\frac{5}{8}$ inches. Furnished with aluminum drip cup to catch excessive fat which flows through drain when cooking chops, etc.

Weight packed, 9 lbs.

List Price, each..... \$14.50



No. E79770
EMPIRE PATTERN

Toasts 2 large or 3 small sandwiches of varying thickness including "three-deckers," Fries bacon and eggs, meat and fish cakes, etc. Browns pancakes perfectly. Expansion hinge holds upper grid in upright position or allows it to rest back on the handle for two-plate surface cooking.

Black handles and knobs. Push button switch in cord. No. E79770, chromium. Size of aluminum cooking plates, $10\frac{1}{8} \times 5\frac{5}{8}$ inches.

Weight packed, $7\frac{3}{4}$ lbs.

List Price, each..... \$11.95

Watts, 660. Equipped with 6 feet Art Silk Cord. Packed one in a carton, three in a unit package.

UNIVERSAL ELECTRIC WARES

Hospitality Tray Sets



No. E8720 SET COMPLETE

Consists of:

List No. E6360 Combination Sandwich Toaster, Waffle Maker and Griddle.

Black Enameled and Chromium Plated.

Size of Aluminum Cooking Plates, $10\frac{1}{8} \times 5\frac{5}{8}$ inches.

List No. 8620 Walnut Finish Tray with Black Handles, size $21\frac{1}{2} \times 16$ inches.

5-Compartment Crystal Clear Glass Dish, $6\frac{1}{4} \times 14\frac{1}{2}$ inches.

Walnut Trimmed Maple Cutting Block, $5 \times 14\frac{1}{2}$ inches.

Cutting Knife, 7-inch Stainless Steel Blade, Ivoroy Grained Handle.

Tray, Glass Dish, Cutting Block and Knife packed in a carton.

Sandwich Toaster packed in separate carton.

Weight packed, $19\frac{3}{4}$ lbs. complete

List No. E6360 Toaster only..... List Price \$15.95

List No. 8720 Hospitality Tray Set List Price \$26.75



No. E8620 SET COMPLETE

List No. E6722 Oven Toaster, Black Enameled and Chromium Plated Toasts two slices of bread, $4 \times 4\frac{3}{4}$ inches, at the same time.

List No. 8620 Walnut Finish Tray with Black Handles, size $21\frac{1}{2} \times 16$ inches, 5-Compartment Crystal Clear Glass Dish, $6\frac{1}{4} \times 14\frac{1}{2}$ inches, Walnut Trimmed Maple Cutting Block, $5 \times 14\frac{1}{2}$ inches.

Cutting Knife, 7-inch Stainless Steel Blade, Ivoroy Grained Handle.

Tray, Glass Dish, Cutting Block and Knife packed in a carton. Toaster packed in a separate carton.

Weight packed, $16\frac{3}{4}$ lbs. complete.

List No. E6722 Toaster only..... List Price \$11.75

List No. 8620 Hospitality Tray Set List Price \$22.50

Automatic Oven Toaster



No. E7732

Toasts both sides at the same time in the uniform heat of an enclosed oven. Instantly adjustable for any degree of brownness. By simply setting a lever, the kind of toast desired is automatically delivered entirely free from oven. Current remains on continuously thus giving speed and uniformity to the toasting.

EMPIRE PATTERN

2-Slice Toaster

List No. E7732 Chromium

Bakelite Handles and Fibre Feet. Push Button Switch in Cord.

Takes slice of bread $4\frac{1}{4} \times 4\frac{3}{4}$ in.

Watts 660

No. E7732 packed one in a wooden case. Weight packed $12\frac{1}{2}$ lbs.

List Price..... \$23.50

UNIVERSAL ELECTRIC WARES

Universal Toasters

Long life Nichrome Wire Units Toast Fast and Uniformly.

BEAUMONDE
PATTERN
DOUBLE-QUICK
OVEN TOASTER

Toasts both sides of two slices at a time. Bread rack tips out and down on hinge.

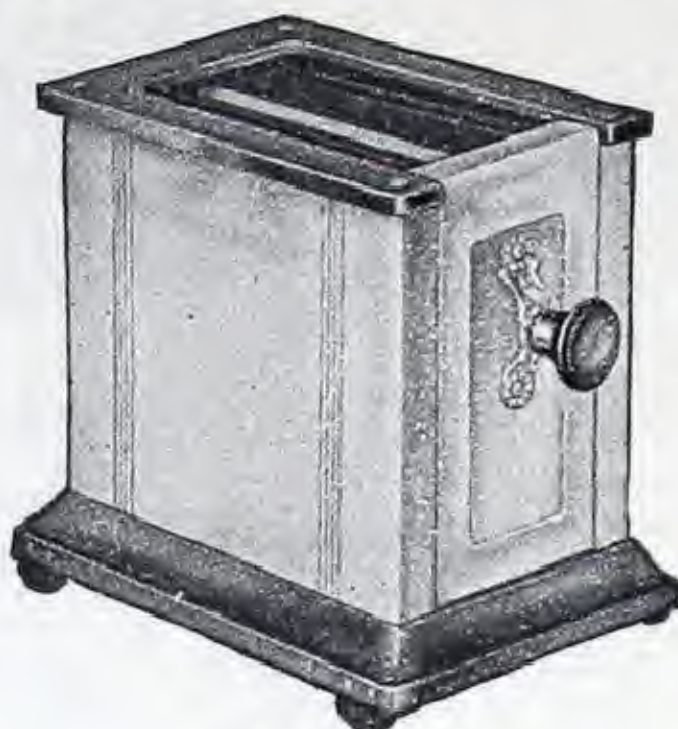
Black Enamelled Top and Base.

Chromium Plated Sides and Ends.

Black Bakelite Handles and Fibre Feet.

List No. E6722 takes slice of bread 4 x 4 $\frac{3}{4}$ in. Watts 660.

Weight packed 4 $\frac{3}{4}$ lbs. List Price \$11.75



No. E6722

DOUBLE-QUICK
OVEN TOASTER

Meets the demand for a large capacity toaster where the ordinary single slice type is not fast enough to meet family requirements.

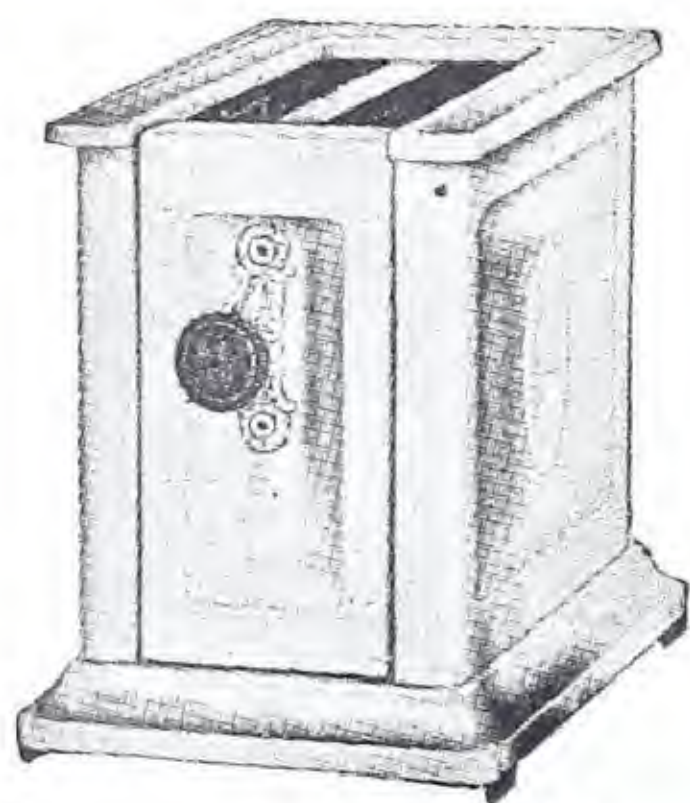
Black Bakelite Handles and Fibre Feet.

List No. E7722 Chromium, takes slice of bread 4 x 4 $\frac{3}{4}$ in.

Watts 660.

Weight packed 4 $\frac{3}{4}$ lbs.

List Price \$9.95



No. E7722

GRECIAN
PATTERN
TURN-EASY
TOASTER

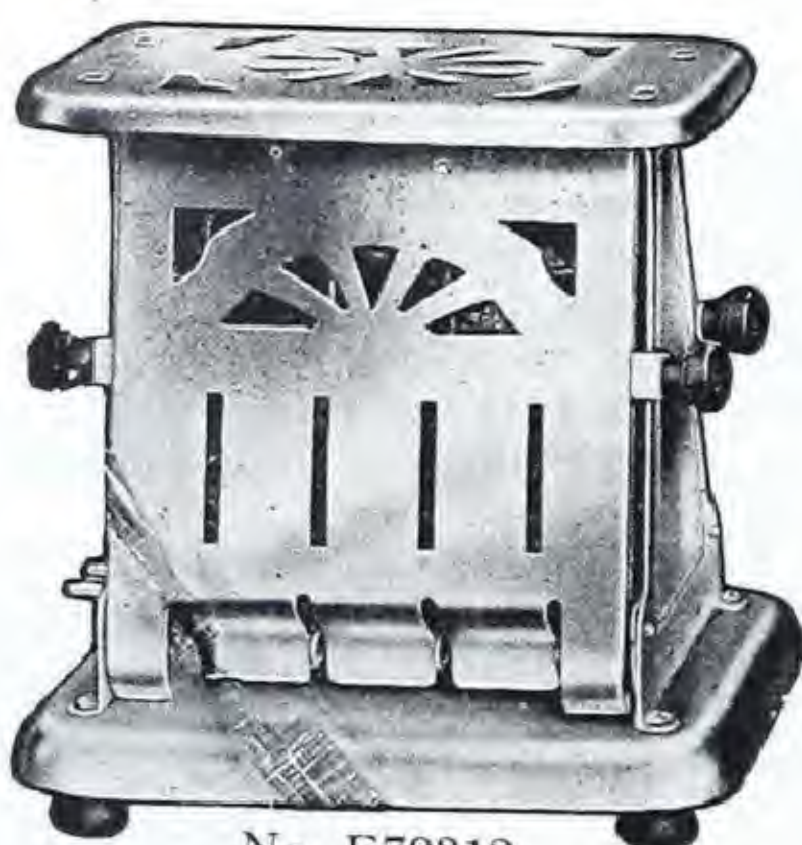
Opening the bread rack turns the toast.

Black Knobs and Feet. List No. E79312 Chromium takes slice of bread 5 x 4 $\frac{3}{4}$ in.

Weight packed 3 lbs.

Watts 625.

List Price \$4.75



No. E79312

TURN-EASY
TOASTER

Opening the bread rack turns the toast.

Black Enamelled Top, Base and Ends, Chromium Plated Bread Racks. Black Knobs and Feet.

List No. E7612 takes slice of bread 5 x 4 $\frac{3}{4}$ in.

Weight packed 3 $\frac{1}{2}$ lbs. Watts 625.

List Price \$4.95



No. E7612

Equipped with 6 ft. Art Silk Cord. Packed one in a carton, three in a unit package.

UNIVERSAL ELECTRIC WARES

Universal Toasters

Long Life Nichrome Wire Units Toast Fast and Uniformly

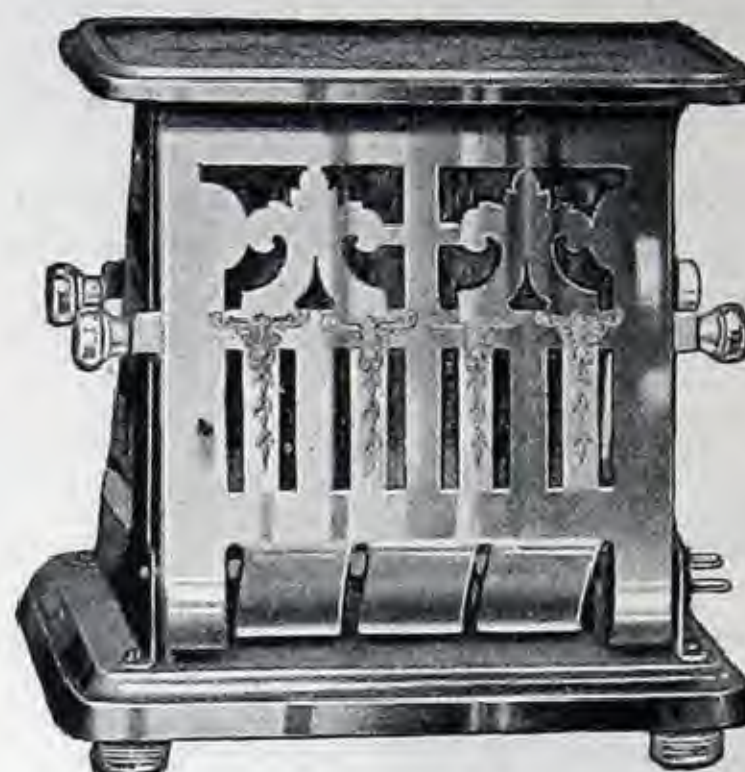
OLD ENGLISH
PATTERN
TURN-EASY TOASTER

Opening the bread rack turns the toast.

Ivory Casein Knob and feet.

No. E7812 chromium takes slice of bread 5 x 4 $\frac{3}{4}$ inches. Watts, 625. Weight packed, 3 lbs.

List Price \$6.75



No. E7812

BEAUMONDE
PATTERN
TURN-EASY TOASTER

Opening the bread rack turns the toast.

Black enamelled top, base and ends, chromium plated bread racks, black knobs and feet.

No. E6612 takes slice of bread 5 x 4 $\frac{3}{4}$ inches.

Watts, 625. Weight packed, 3 $\frac{1}{2}$ lbs.

List Price \$5.75



No. E6612

DE LUXE PATTERN
TURN-EASY TOASTER

Opening the bread rack turns the toast.

Black knobs and feet.

No. E7312 chromium, takes slice of bread 5 x 4 $\frac{3}{4}$ inches. Watts, 625. Weight packed, 3 lbs.

List Price \$5.50



No. E7312

TURN-EASY TOASTER

Opening the bread rack turns the toast.

Black enamelled top and base, chromium plated bread racks and ends, black knobs and feet.

No. E3612 takes slice of bread 5 x 4 $\frac{3}{4}$ inches.

Watts, 625. Weight packed, 3 lbs.

List Price \$4.25



No. E3612

Equipped with 6 feet of Art Silk Cord. Packed one in a carton, three in a unit package.

CANADIAN BEAUTY TOASTERS

No. 405C

Automatic Toaster

Fully automatic, operated by pressing down lever at front; when toast ready it drops down on tray at bottom of toaster.

There are five distinct toasting periods as indicated on front. All parts beautifully embossed and finished in chrome plating.

Standard cord set supplied. Volts 110-115. Watts 660.

Shipping weight 6½ lbs. Standard Case 6.

List No. 405C.....List Price \$12.95



No. 405C



No. 409

Volts 110-115. Watts 600.

Standard Case 12.

Shipping weight 3½ lbs.

List No. 409.....List Price \$4.60

No. 409 Panelled Style Turnover Toaster

Modernistic design. Highly finished polished chrome plate. Side, top and toast rack beautifully embossed. Element constructed from clear India mica, wound with nickel chrome resistance wire. Toasts uniformly even the largest slice of bread. Equipped with cool fibre handles. Design eliminates crumb accumulation.

No. 406 New Style Turnover Toaster

Toaster constructed from cold Rolled Steel, highest grade, chrome plated and with heavy base. Element constructed from solid mica and wound with nickel chrome resistance ribbon. Toaster will toast largest slice of bread evenly. Toast rack equipped with cool fibre handles. Easy to clean.

Volts 110-115. Watts 600.

Standard Case 12.

Shipping Weight 3 lbs.

List No. 406.....List Price \$3.20



No. 406

UNIVERSAL ELECTRIC WARES

Chafing Dishes

Quick, thorough cooking without scorching or burning. Water placed in the lower pan is soon brought to the boiling point. Food pan rests snugly in the water pan and all the heat goes into the food. Ideal for preparing the again popular dish, Welsh Rarebit.

Black Handles, cover and food pan silver lined, water pan tin lined—Capacity 3 pints.

Two heats: 160 and 400 watts.

Equipped with Universal safety fuse plug.



No. E740—Chromium
Weight packed 12½ lbs.
List price \$23.75



No. E721—Chromium
Weight packed 6 lbs.
List price \$15.85



BEAUMONDE PATTERN

No. E621—Black Enamelled and Chromium Plated
Weight packed 6 lbs.

List Price \$17.50

Equipped with 6 ft. art silk cord. Packed one in a carton. No. E740 is packed in a wooden case.

UNIVERSAL ELECTRIC WARES

Adjustable Automatic Waffle Makers

These models automatically regulate and maintain the heat by a simple and accurate adjustable thermostatic control. A soft signal light glows while grids are preheating. When proper baking temperature is reached it signals the fact by going out. After batter is poured it shines steadily while waffle is baking and goes out when waffle is perfectly done. Adjustable Automatic Models operate on A.C. only.



No. E7124 Automatic

Chromium. Black handles, knob and feet. Weight packed 7½ lbs. List Price.....\$13.50



No. E7424 Automatic

Chromium. Bakelite handles, knob and feet. Weight packed 7½ lbs. List Price.....\$14.95

Watts 660. Equipped with 6 ft. Art silk cord. Packed one in a carton, three in a unit package.

CANADIAN BEAUTY WAFFLE IRON



No. 425 WAFFLE IRON

Beautifully embossed chrome plated with ebonized wood handles. 8" aluminum grids, expansion hinge which acts as stabilizer minimizing likelihood of batter bubbling over. Equipped with automatic heat indicator.

Height, 5¼". Diameter at flanged base, 11¼".

Standard cord set.

Standard case 3. Shipping weight, 5 lbs.

List Price.....\$8.75

UNIVERSAL ELECTRIC WARES

Non-automatic Waffle Makers

Heat indicators show when grids are at the correct baking temperature.



No. E69384

BEAUMONDE PATTERN

Black enamelled and chromium plated with black handles and feet. With heat indicator. Weight packed 7½ lbs. List Price.....\$9.95

No. E7104
ChromiumNo. E7404
ChromiumNo. E7304
ChromiumNo. E7504
Chromium

List No.	Description	Finish	Wgt. Lbs. Packed	List Price
E7104	Bakelite Handles and feet	Chromium	7½	\$7.95
E7504	Bakelite Handles and feet	"	7½	8.75
E7404	Bakelite Handles and feet	"	7½	9.50
E7304	Bakelite Handles and feet	"	7	9.50

Watts 660. Equipped with 6 ft. Art Silk Cord. Packed one in a carton, three in a unit package. With heat indicator

UNIVERSAL ELECTRIC WARES

Casseroles



No. E-965

Inexpensively cook a dinner dish for as many as eight. Cooks meats and vegetables tenderly and deliciously with all their original flavor and nutritiousness—they shrink less and taste better. Cost less than half a cent per hour to operate. Cooking may be started on high heat, then safely cooked on low while the housewife is away.

Finished in Ivory Enamel with Green Enamel Band at Top. No. E965 Aluminum Interior and Cover.

No. E9965 Porcelain Enamelled Interior and Cover.

Two Heats, Low 100, High 325 Watts.

Lining is surrounded with a thick wall of high insulating material and encased in a steel outer shell.

Connects to any electric light socket. Capacity 3 quarts.

Inside diameter 6 $\frac{3}{4}$ inches. Outside diameter 9 inches.

Weight packed 7 lbs. Equipped with 6 feet Art silk cord.

Packed one in a carton, three in a unit package.

No. E965.....List Price \$7.25

No. E9965.....List Price 7.95

Oven Cookers

For All Kinds of Electric Cookery in the home



No. E9604

Roasts meats and bakes biscuits, cakes, etc., nicely brown. Stews, Boils, Steams and Fricassees—does everything within its capacity that a standard size electric range oven will do and with the same delicious perfection of results.

Cooks a 3 $\frac{1}{2}$ lb. roast with two kinds of vegetables in separate pans—sufficient food for the average family meal.

Operates from any electrical outlet. Cooks largely by convection heat and costs less than a flat iron to use. May be operated in a horizontal position for such cooking operations as baking bread and biscuits.

The thick insulation between its aluminum lining and strong steel case keeps the food deliciously hot for hours, making it very convenient for hot picnic dinners, for it is easily carried anywhere.

Equipped with 3 aluminum food containers, two 1-quart and one 2-quart capacity, round grid, gem pan, baking pan, oblong rack and two pan lifters.

Two Heats, 125 and 500 Watts.

Cooking Well, 10 inches deep, 6 $\frac{3}{4}$ inches in diameter.

Height over all 13 $\frac{1}{2}$ inches.

Finished in Sage Green Enamel with Black Band at Top.

No. E9602 same as E9604 but without baking pan, 2 gem pans and oblong rack. Equipped with 6 feet cord.

Weight packed 14 to 15 lbs. Packed one in a carton.

No. E9604.....List Price \$15.85

No. E9602.....List Price 14.25

UNIVERSAL MIXER BEATER



No. E781

Portable. May be used over stove or elsewhere and in any bowl or pan.

Tilt Back Motor. Bowls and beaters easily removed—batter drips back into bowls.

Unbreakable Steel Bowls. Do not break like glass.

Chromium Beaters. Easily attached and detached by simple spring lock.

No. E781. Mixer-beater, beverage mixer (as illustrated). List Price, \$25.85.

No. E782. Same as above but equipped with No. 811 juicer attachment. List Price, \$28.25.

No. E784. Same as above but equipped with both No. 811 juicer attachment and No. 803 slicer, shredder and grater attachment. List Price, \$35.25.

Will do all mixing, blending, beating, whipping, creaming, stirring more thoroughly than by hand and in a fraction of the time required.

Small bowl; diameter 5 $\frac{1}{2}$ ", capacity 1 qt. Large bowl; diameter 9", capacity 3 qts. Revolving tray diameter, 7 $\frac{3}{16}$ ". Height over all, 14 $\frac{1}{4}$ ". Size of base 13 x 7 $\frac{1}{2}$ ". Acid-resisting porcelain enamelled bowls, ivory with green decorations. Base has rubber feet. Operates on A.C. or D.C. current.

Weight packed, 15, 18, 20 lbs. respectively.



No. 811

The electrically operated juicer coaxes the last drop of juice from all citrus fruits. It is fast, easy to operate. Easy to clean.

Diameter of bowl, 6". Die cast aluminum ridged reamer.

List Price..... \$5.00

VEGETABLE SLICER, SHREDDER AND GRATER ATTACHMENT



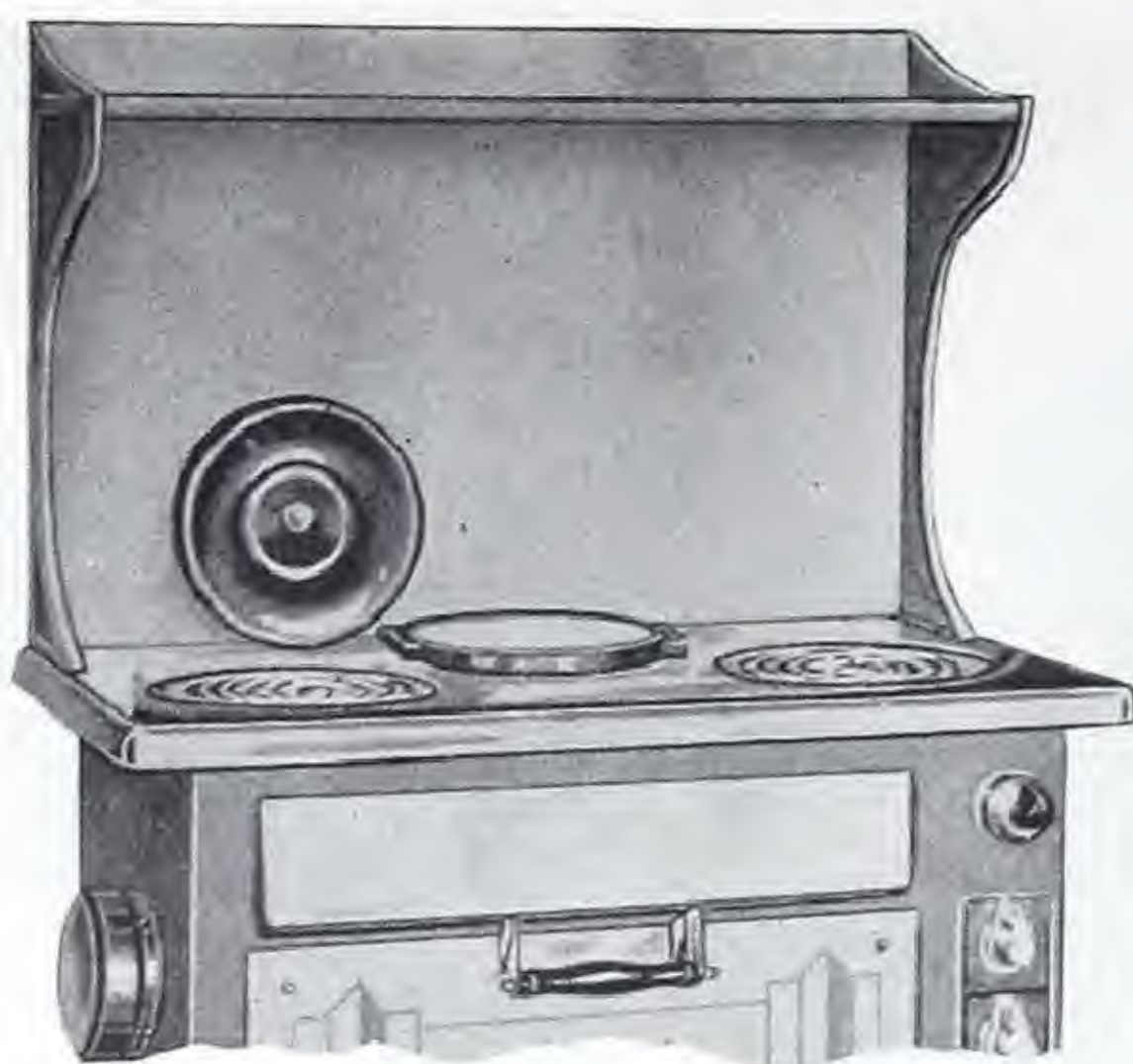
No. 803

Note: To operate this attachment it is necessary to have the No. 811 juice extractor.

List Price..... \$5.00



CANADIAN BEAUTY RANGES



No. 321K Range

Similar in every respect to No. 321 excepting larger cooking surface, size 15" x 29½" and casserole feature. This feature comes in response to popular demand and can be used as an auxiliary baker for pot roasts, puddings, etc., when oven is otherwise engaged.

List Price \$48.00



No. 322 Range

Cabinet type for heavy duty permanent wiring.

Height to top of cooking surface, 32½".

Size of Cooking Surface, 19" x 19".

Overall Height, 40⅝".

Cooking Surface equipped with two 7¾" elements, 1500 watts.

Oven equipped with Bottom and Top Elements.

Appliance receptacle supplied.

All elements controlled 3-heat range switches.

Large Warming Oven, 14" x 18" x 7".

Baking Oven heavily insulated and strongly made. Equipped with automatic control.

Size of Oven, 15¾" x 15¾" x 11".

Standard Finish, Ivory and Green or Two-tone Grey.

Volts, 110-220. 3 wire amps. 49.

Watts, 5,390.

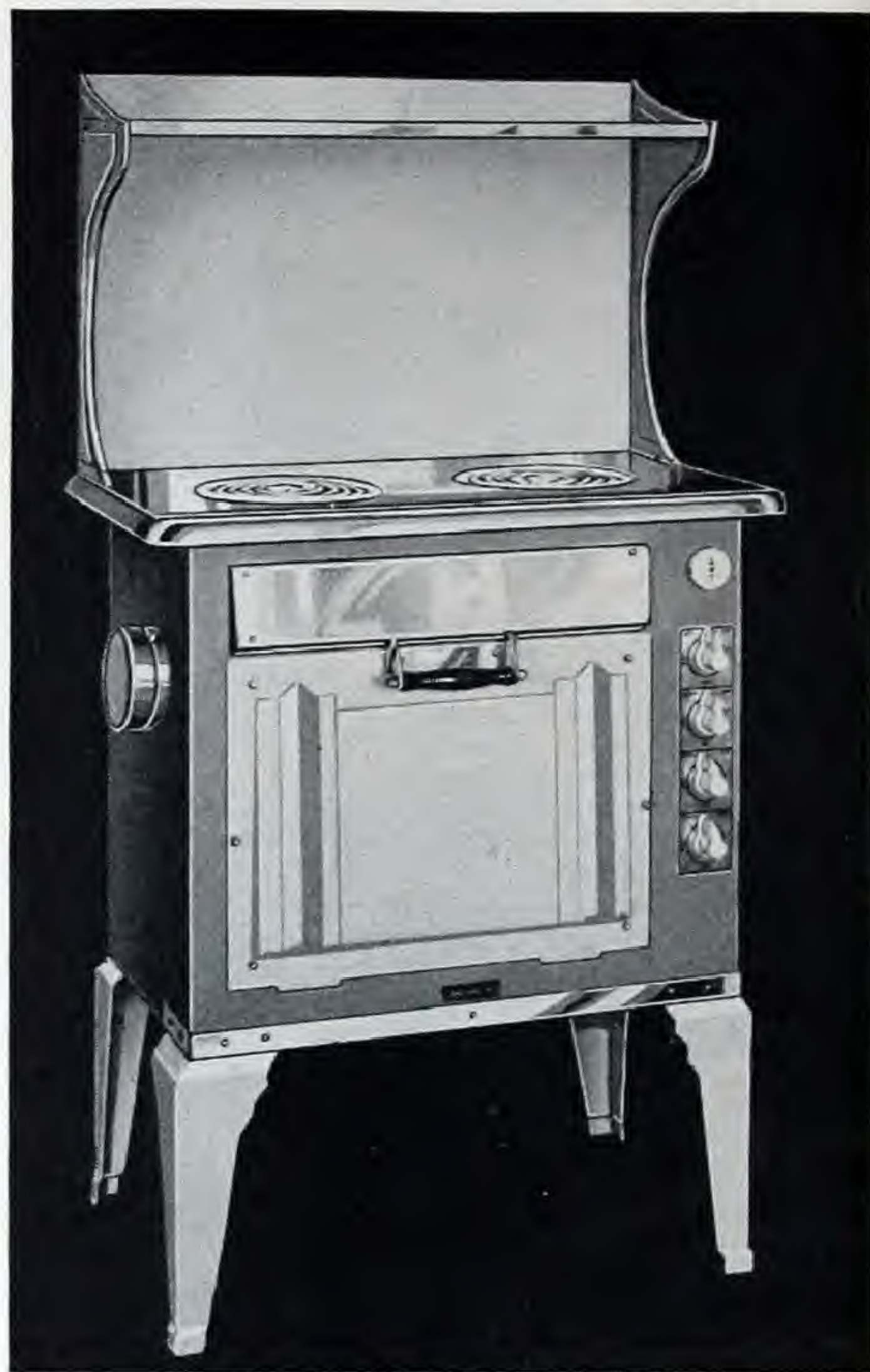
Standard case, 1. Shipping Weight, 150 lbs.

List Price \$55.00

No. 322T

With automatic control. List Price \$62.00

CANADIAN BEAUTY RANGES



No. 321 Range

A Canadian Beauty Range that will fill cooking and baking requirements of the average Canadian home equipped with heavy wiring. Cooking surface provides for 2 large size elements 7¾" with 3 heat graduations, making for a most flexible cooking unit, allowing from a slow simmering fire of 660 watts to a quick, aggressive heat of 1500 watts.

Surface elements give a total of 3000 watts.

Size of cooking surface, 15" x 27".

Height to top of back, 50¾". Height to top of cooking surface, 33¼".

Oven, 17" x 13¼" x 12¾", equipped with top and bottom elements automatically controlled.

Appliance receptacle supplied, all connections monel metal. Hinged top.

Standard Finish, Green with Ivory or Two-tone Grey.

Volts, 110-220. Watts, 5390.

List Price \$45.00

No. 321T

With automatic control, List Price \$45.00

CANADIAN BEAUTY RANGETTES

The cabinet type Canadian Beauty Rangette adds a modern touch to the kitchen. Possessing all the eye appeal of larger more costly, heavy type ranges, its design provides for many advantages for the housewife. Just the right height for convenient use with generous warming oven space 14" x 18" x 7" and extra large, heavily insulated baking oven. Every woman will appreciate the time and labour-saving features of the cabinet type design. The large flat surface on top of the oven will prove to be a handy emergency receptacle when baking. Perfect ventilation is another feature of these rangettes, minimizing sweating and smoking ovens.

This rangette provides for 1320 watts most efficiently arranged for convenient baking and cooking. Just plug in to any wall or base receptacle.



No. 222T Rangette

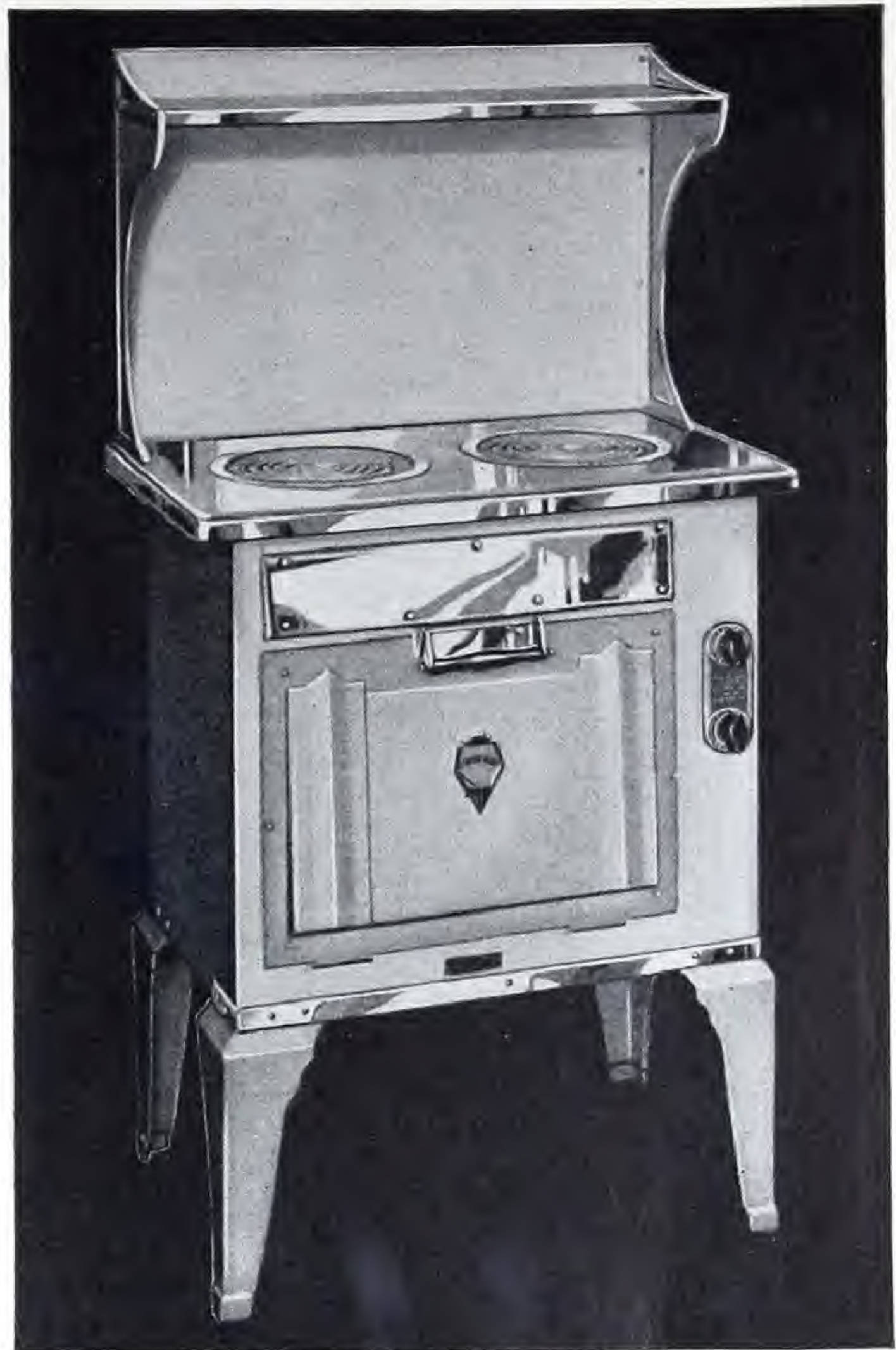
No. 222T and No. 222 Rangettes

New Cabinet Type Rangette. Height to top of cooking surface, 32½". Size of cooking surface, 19" x 19". Equipped with two 7¾" range elements, also top and bottom oven elements. All elements controlled by special switches clearly marked. Maximum wattage 1320. Other features of this rangette are automatic oven ventilation, hinged top to allow for easy servicing, extra large warming oven. Baking oven size 15¾" x 15¾" x 11". Standard finish: Light Green and Ivory and two-tone Grey.

List No. 222T Rangette with thermostat control.....List Price \$53.50

List No. 222 Rangette, without thermostat control.....List Price \$46.00

CANADIAN BEAUTY RANGETTES



No. 221T—No. 221 Rangettes

Where space is at a premium this popular Canadian Beauty Rangette offering will serve admirably for the small family's need of a serviceable compact baking and cooking unit.

While Canadian Beauty Rangette No. 221 is moderately priced, it has not been built to a price, all materials and workmanship are of the highest class.

Size of cooking surface, 15" x 24¼".

Height to top of back, 50¾".

Height to top of cooking surface, 33¼".

Two top cooking elements, 7¾" dia., 1320 watts.

Size of oven, 17" x 13¼" x 12¾", equipped with bottom and top elements.

All elements controlled by special switches, clearly marked showing elements they control.

Standard Finish: Green and Ivory or Two-tone Grey.

Hinged Top, polished chrome plated.

Nos. 221 and 221T come with or without high back.

List No. 221T, equipped with thermostat oven control.....List Price \$37.50

List No. 221 without oven thermostatic control.....List Price \$31.75

List No. 21B, High Back for 221 Range..List Price \$3.00

CANADIAN BEAUTY TABLE RANGETTES



No. 217

No. 217 Rangette

Size of cooking surface $23\frac{1}{2}" \times 14\frac{3}{4}"$.

Height to top of back rail $34\frac{1}{4}"$.

Height to top of cooking surface $30\frac{3}{4}"$.

Top equipped with one $7\frac{3}{4}"$ and one $5\frac{3}{4}"$ element. Watts 1320.

Size of oven $15\frac{3}{4}" \times 11\frac{1}{4}" \times 11\frac{1}{4}"$. Equipped with bottom and top elements.

All elements controlled by special switches, giving the greatest combination of heats.

Standard Finish: Ivory and Green or Two-tone Grey.

Top polished and chrome plated.

No. 217 comes with and without high back.

List No. 217 Rangette.....List Price \$27.75

List No. 17B High Back for No. 217 Rangette..... 3.00

CANADIAN BEAUTY TABLE RANGETTES



No. 216K

Size of cooking surface $24\frac{1}{4}" \times 11\frac{1}{4}"$.

Height to top of back rail $19\frac{1}{2}"$.

Height to top of cooking surface 15".

Size of oven $10" \times 12\frac{1}{2}" \times 7\frac{3}{8}"$.

Cooking surface equipped with one element $7\frac{3}{4}"$ diameter 1,320 watts and one 500 watt element below casserole.

Oven equipped with one element in bottom. Left to element acting as top element for oven.

All elements controlled by one rotary switch in combination with two-way toggle switch, giving the greatest combination of heats on 1,320 W. Special Roasting Pan, porcelain enamelled, two-piece, size $8" \times 12" \times 5"$ supplied. Come complete with cord and tandem blade plug cap, for use on base or wall receptacle.

Finish: Baked Enamel in Ivory and Green color combination with chrome plated top. Volts 110-115. Watts 1,320.

List No. 216K.....List Price \$20.50



No. 216

No. 216 as 216K but without casserole feature. Cooking surface providing for one $7\frac{3}{4}"$ element 1,320 watts and on $5\frac{3}{4}"$ element 660 watts.

List No. 216.....List Price \$14.90

CANADIAN BEAUTY ELECTRIC HOT PLATES



No. 218

No. 218 Combination Hot Plate and Casserole

Total Length..... 22 $\frac{7}{8}$ "
Total Width..... 12 $\frac{3}{4}$ "
Total Height..... 5 $\frac{3}{8}$ "

Size of Cooking Surface, 20 $\frac{1}{2}$ " long, 10" wide.
Large Element—1320 watt, 7 $\frac{3}{4}$ " diameter, equipped with 3-heat switch, operating high, medium, low and off.
Element in Well for Casserole—660 watt, 5 $\frac{3}{4}$ " in diameter, also operated by 3-heat switch, giving high, medium, low and off.

This switch combination is so designed that the power consumption cannot exceed 1320 watts.

Element for casserole can be operated when large element is in either medium or low.

Size of Casserole—Diameter 7". Depth 3 $\frac{5}{8}$ ". Total diameter of flange and cover 8 $\frac{1}{2}$ " with a total height to top of cover of 5 $\frac{1}{2}$ ". Inside, white porcelain. Outside, brown porcelain. Volts, 110 to 115. Watts, 1320.

List No. 218 Hot Plate and Casserole. List Price \$10.50

No. 215 Single Burner

Enamel

Equipped with one 5 $\frac{3}{4}$ " range element 1320 watts, controlled by one three-heat switch. Size 14" x 14" x 5" high. Baked enamel finish. Color combinations, blue, black, green and ivory. Complete with cord and plug cap for use off wall or base receptacle. Volts 110-115, watts 1320. Well protected, long life element.



No. 215

List No. 215 Hot Plate..... List Price \$5.25

No. 215C—Same as above only in chrome plated finish.

List No. 215C Hot Plate..... List Price \$6.75



No. 289

List No. 289 Hot Plate..... List Price \$1.75

No. 289 Single Burner

Size 10 $\frac{3}{4}$ " x 10 $\frac{3}{4}$ " x 5" high. 5 $\frac{3}{4}$ " element. Complete with cord and plug supplied in the following finishes—light grey with green legs, green with ivory legs and ivory with green legs. Very modern in design. Volts 110-115. Watts 600.

CANADIAN BEAUTY ELECTRIC HOT PLATES



No. 285

No. 285 Two Burner Hot Plate

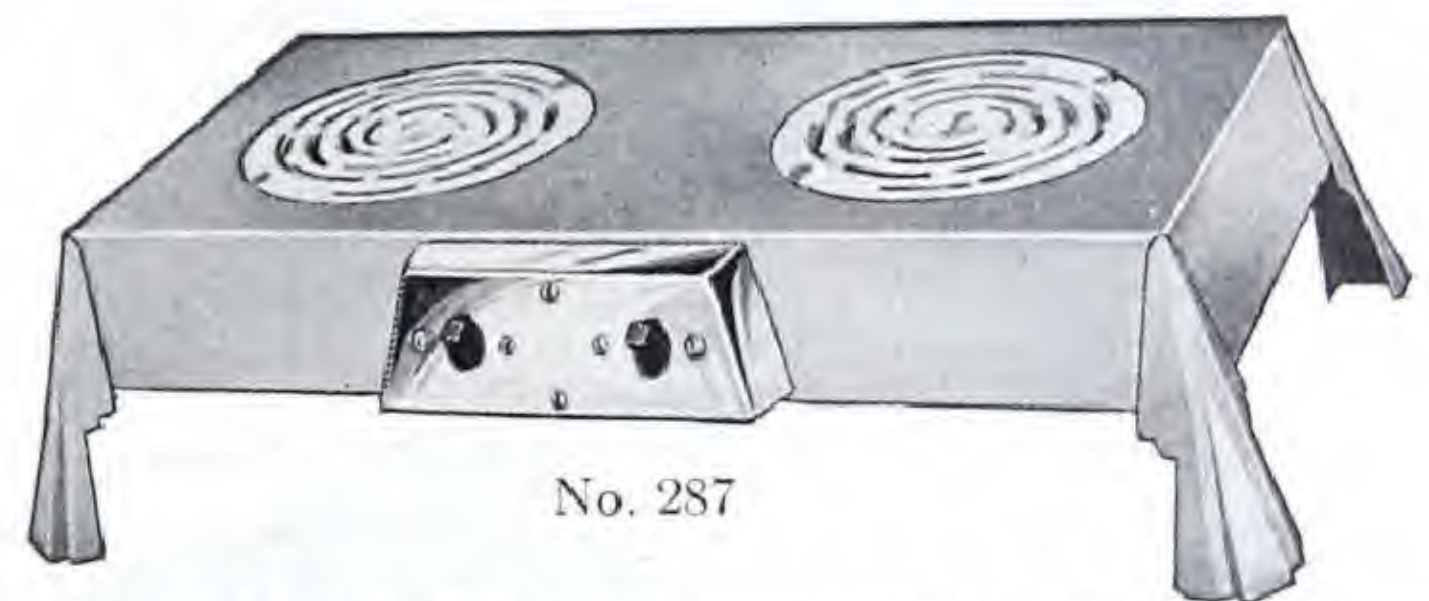
Size 12" x 21 $\frac{1}{2}$ " x 5" high. Left element 7 $\frac{3}{4}$ ", 1200 watts. Right element 660 watts. Controlled by one switch as follows—1st snap left element on high, 2nd snap left element 600 watts, right element 660 watts, third snap right element 660 watts, fourth snap all off. Supplied with cord and plug cap, for use on wall or base receptacle. Standard Finish: Color combinations of Blue, Black, Green and Ivory, baked enamel. Volts 110-115, watts 1260.

List No. 285 Hot Plate..... List Price \$5.25

No. 285C—Same as above only finished in full chrome plate.

List No. 285C. Hot Plate..... List Price \$7.50

List No. 285H. Hot Plate with two switches..... List Price \$7.00



No. 287

No. 287 Two Burner Hot Plate

Size 10 $\frac{3}{4}$ " x 20" x 5" high, equipped with two 5 $\frac{3}{4}$ " range type elements each controlled by off and on switch. Finished in the following color combinations, grey with blue legs, green with ivory legs, and ivory with green legs. Complete with cord and plug cap for use on wall or base receptacle. Volts 110-115, watts 1320.

List No. 287 Hot Plate..... List Price \$3.50

No. 287F—Same as above in construction, wattage and finish only elements controlled by one three-heat and one single heat switch.

List No. 287F Hot Plate..... List Price \$5.00

List No. 287H, with three heat switches. List Price \$6.20



No. 220

No. 220 Two Burner Hot Plate

Equipped with two 7 $\frac{3}{4}$ " range elements of 1500 watts each, controlled by three heat switches. Size 14" x 26" x 5" high. Full chrome plated finish. This is a heavy duty plate for permanent installation in homes equipped with heavy wiring. An ideal installation for heavy duty in the laundry. Volts 110-220, 3000 watts.

List No. 220 Hot Plate..... List Price \$12.00

UNIVERSAL ELECTRIC WARES

Hot Plates

Very convenient for the Home, Shop or Laboratory



No. E9586

No. E9586
NICKEL
Black Handle,
Fibre Tip Feet
Cooking Top,
6 in. diameter
Watts 550
Weight packed
1½ lbs.
List Price \$4.25

No. E795 CHROMIUM
Black Handle and Feet
Cooking Top, 4½ in. diam.
Watts 400

Weight packed 2¼ lbs.
List Price \$5.50



No. E795



No. E797

No. E797 CHROMIUM
Black Handle and Feet
Cooking Top, 6 in. diam.
Two Heats, 300 and 500
Watts
Weight packed 5¾ lbs.
List Price \$7.95

Equipped with 6 ft. Art Silk Cord. Packed one in a carton.
No. E9586 three in unit package.

Canadian Beauty Electric Hot Plates

No. 282 Hot Plate
Single Burner

Single burner, 5¾" range type heating element. Constructed from cold rolled steel. Chrome plated finish with green enamelled legs. 7½" diameter. Operates from any ordinary circuit. Complete with cord and plug. A most compact yet practical little cooking unit. Volts 110-115, 600 watts.



No. 282

List No. 282 Hot Plate.....List Price \$2.30

Canadian Beauty Kettle

No. 472

Watts 1320. Capacity 3 pints. Will boil this quantity in 5 minutes. Exceptionally attractive panelling of highly polished aluminum. Cool handle equipped with base safety fuse. Comes complete with waterproof rubberized cord and connection plug cap.

List Price.... \$6.35



No. 472 Electric Kettle

UNIVERSAL MILK WARMER



No. E7930

Heats water in which baby's milk bottle is immersed. May be used as a water or liquid food heater.
Black Handle and Knob.

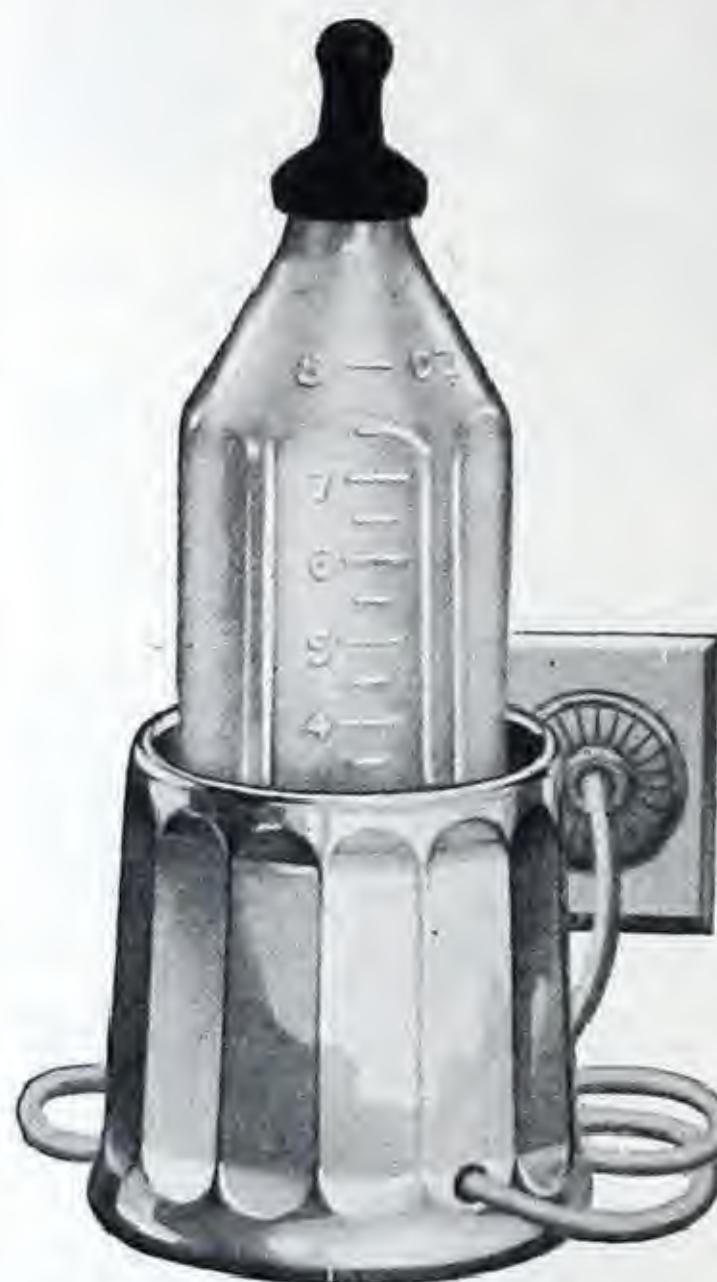
No. E7930
CHROMIUM
Watts 400
Capacity of bottle, 8 oz.
Capacity of container, 24 oz.
Weight packed 3½ lbs.
Packed one in a carton
List Price \$10.75

HANKSCRAFT BOTTLE WARMER

The new Junior Model Baby Bottle Warmer

Heats Baby's bottle, then shuts current off automatically. Heats all standard sizes of bottles. Fully guaranteed. Works on 110 volt alternating current. Choice of blue or pink.

Model No. 673.....\$2.95



No. 673

For quickly heating (by immersion) a small quantity of water or other liquids. Perforated Safety Stand keeps heater in upright position.

Diameter of Stand 2 in.

No. E7701 CHROMIUM
300 Watts

Heating capacity, ordinary drinking glass
List Price \$4.85

No. E7702 CHROMIUM
500 Watts

Heating capacity, one to two pints.
List Price \$6.40
Weight packed 1 lb.
Packed one in a carton

UNIVERSAL WATER HEATER

Immersion
Type



No. E7702

HANKSCRAFT EGG COOKER



No. 193

Cooks Four Eggs Automatically by Electricity in Live Steam.

It operates on the principle of passing electric current through water, using the amount of water as a timing factor. The electricity turns the water to steam and cooks the eggs. When the tablespoonsful of water is gone the eggs are done and the current is shut off.

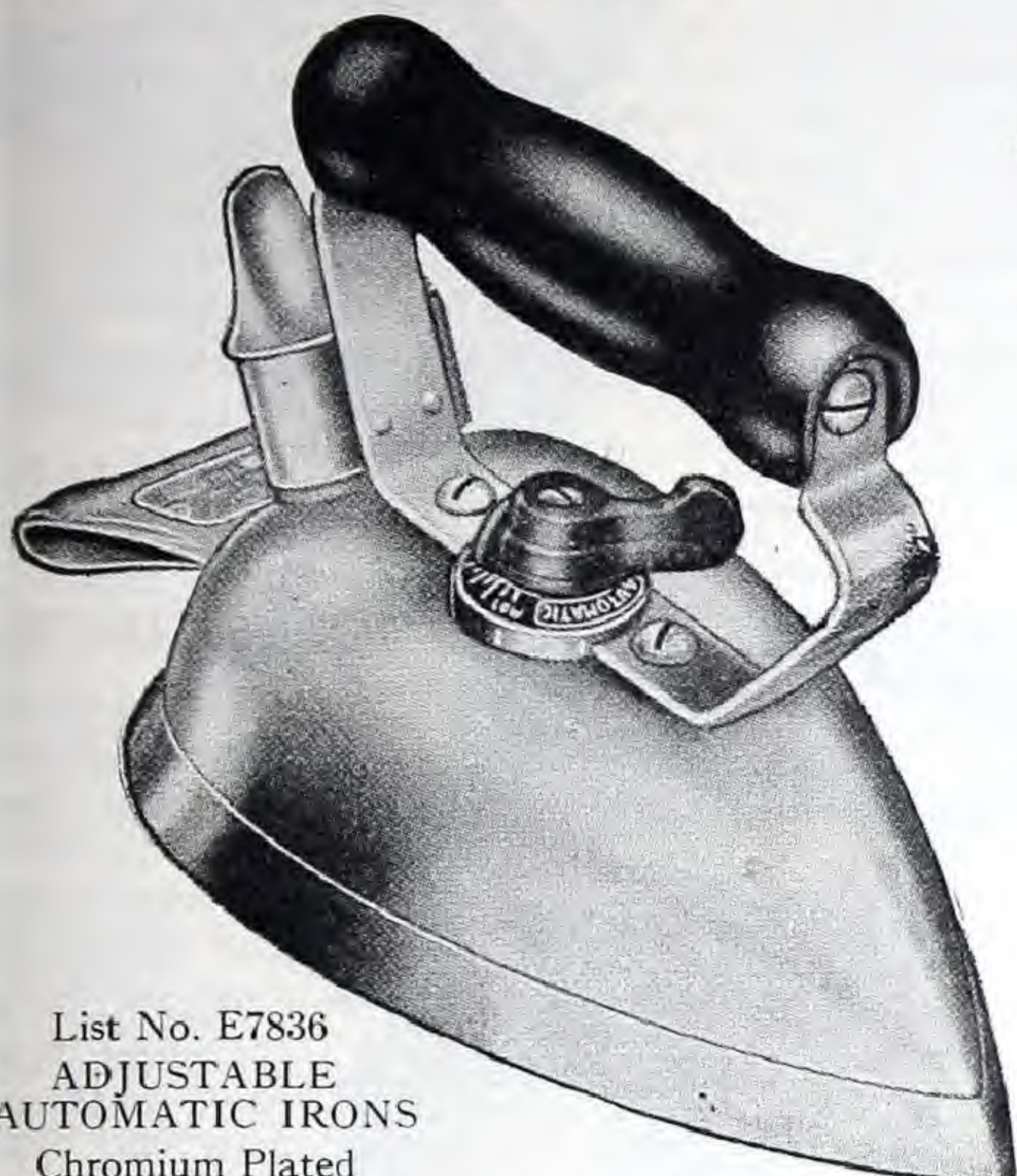
Finished in ivory and chrome or copper.

No. 193.....\$3.95

UNIVERSAL ELECTRIC IRONS

Wrinkle-Proof Round Heel Irons

Round Heel, an exclusive UNIVERSAL feature, irons backward and sideways as easily as forward without wrinkling the fabric. Finely tapered point and beveled sole plate slip easily under buttons and into finest pleats. Long life mica unit distributes heat evenly from point to heel.



List No. E7836
ADJUSTABLE
AUTOMATIC IRONS
Chromium Plated
6 lbs. 800 Watts

List No. E7836 Mahogany Handle List Price \$8.65
List No. E7816 Black and Ivory White Handle \$8.65
Light Weight, Full Size Irons
List No. E7833 3½ lbs. 800 Watts List Price \$9.95
List No. E7133 3½ lbs. 1000 Watts List Price \$9.95
Weight packed 4¾ to 7 lbs. Above operate on A.C. only.



List No. E7709
NON-AUTOMATIC
IRONS

Mahogany Handle
Weight of Iron, 6 lbs. 580 Watts

List No. E7709 Chromium Plated List Price \$4.75
Light Weight, Full Size Iron
List No. E7703 3½ lbs. Black and Red Handle
Weight packed 4½ to 7 lbs. List Price \$4.75

Equipped with 6 ft. Cord. Packed one in a carton, six in a unit package.

UNIVERSAL ELECTRIC IRONS

Standard Household Irons

High grade, long life mica Nichrome units distribute heat evenly from point to heel. Large heat storage capacity permits much of the ironing to be done on stored heat. Tapered points and bevelled edges for easier ironing.



No. E7976

ADJUSTABLE AUTOMATIC IRON

Chromium plated. Mahogany handle. No. E7976
6 lbs., 700 watts. List Price, \$6.95
Weight packed, 6¾ lbs. Operates on A.C. only.



No. E7770

NON-AUTOMATIC IRON

6 lb. Irons. 580 watts. Black handle.
No. E7770 Chromium. List Price \$4.25
No. E9507 Nickel. List Price \$3.50
Weight packed, 6½ lbs.

Boudoir and Tourist Iron



No. E7043

Mahogany handle. Weight of iron, 3 lbs. No. E7043
chromium finish, round heel, List Price, \$4.75.
Weight packed, 3½ lbs.

Equipped with 6 feet cord. Packed one in carton, six in a unit package.

CANADIAN BEAUTY IRONS



No. 478

Volts 110-115. Watts 540.

Shipping Weight 6½ lbs. Standard case 6.

No. 478.....List Price \$2.45

No. 478 IRON

Constructed with heavy cast iron sole plate, cold rolled steel top, handle strap and backstand. New element construction with resistance wire laid in porcelain and insulated from sole plate with solid mica.

Finished in high polished nickel.

Standard Cord Set.



No. 480

No. 480 IRON

Modern and practical stream-lined design. Panelled top. Embossed handle strap. New style well-balanced backstand. Tapered sole plate. Improved thumb rest. Best chrome plate all over. Element constructed from solid mica wound with nickel chrome resistance ribbon. Mahogany finished handle. Complete with cord set.

Volts 110-115. Watts 540.

Shipping Weight 7 lbs. Standard case 6.

No. 480.....List Price \$3.70



No. 495

No. 495 A.C. IRON

Automatic adjustable iron equipped with cool, well shaped handle and thumb-rest. Element constructed from solid mica wound with nickel chrome resistance ribbon. Very modern in design. Complete with cord set.

Sole plate tapered and streamline body.

Chrome plated finish.

Volts 110-115. Watts 1,000. A.C. Current only.

Shipping weight 7½ lbs. Standard case 6.

No. 480 Iron.....List Price \$7.65

CANADIAN BEAUTY IRONS

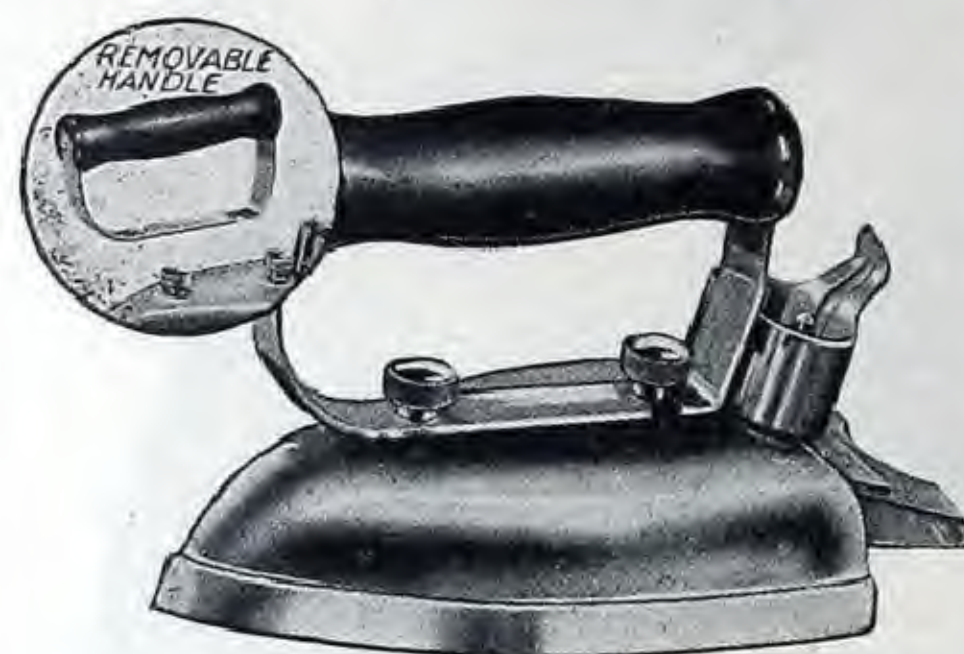
No. 479 Iron

Constructed with heavy cast iron sole plate, cold rolled steel top, handle strap and backstand. New element construction with resistance wire laid in porcelain and insulated from sole plate with solid mica. Cool, well shaped mahogany handle. Complete with cord set. Finished in best chrome plate. Standard cord set. Volts 110-115. Watts 540. Shipping weight 6½ lbs. Standard case 6.

List No. 479.....List Price \$2.8



No. 479



No. 484

No. 484 Iron

3-lb. Traveller Iron equipped with removable handle. Element constructed from mica wound with nickel chrome resistance ribbon.

Chrome Plate finish. Standard Cord Set. Volt

110-115. Watts 300. Shipping weight 4 lbs. Standard case 6

List No. 484.....List Price \$3.4

No. 475 Junior Iron

Chrome plated with Jade Green top and handle. Silk cord to match. Volts 110-115. Watts 200.

Weight 1¾ lbs. Shipping weight 2 lbs. Standard shipping carton 12.

List No. 475.....List Price \$1.60



No. 475

Nos. 103-8 Tailors' Irons

Specially designed to meet the needs of tailors. Heat quickly and are guaranteed to give lasting service. Watts 800, 850 and 900.

Volts 110-115. A



Nos. 103 to 108

Attached 8-ft. cord and plug. Stand included. All tailors' iron equipped with 3-heat switch.

List No.	Weight, lbs. each	Std. pkg.	List Price each
103	10	1	\$15.50
104	12	1	16.60
105	14	1	17.75
106	16	1	18.85
107	18	1	19.95
108	20	1	22.15

UNIVERSAL ELECTRIC WARES

Laundry and Tailor Irons



**HEAVY
LAUNDRY
IRONS**
For heavy flat
work and
pressing
Nickel Plated
No. E908
8 lbs. 650 Watts
Detachable
Cord
List Price \$7.10
No. E910
10 lbs.
800 Watts
List Price \$9.50

Cord permanently attached
Requires Special Wiring

Furnished in 106-114V, 115-120V, 215-230V, 235-250V
Weight packed 9¾ to 11¼ lbs.

EXTRA HEAVY LAUNDRY AND TAILORS' IRONS

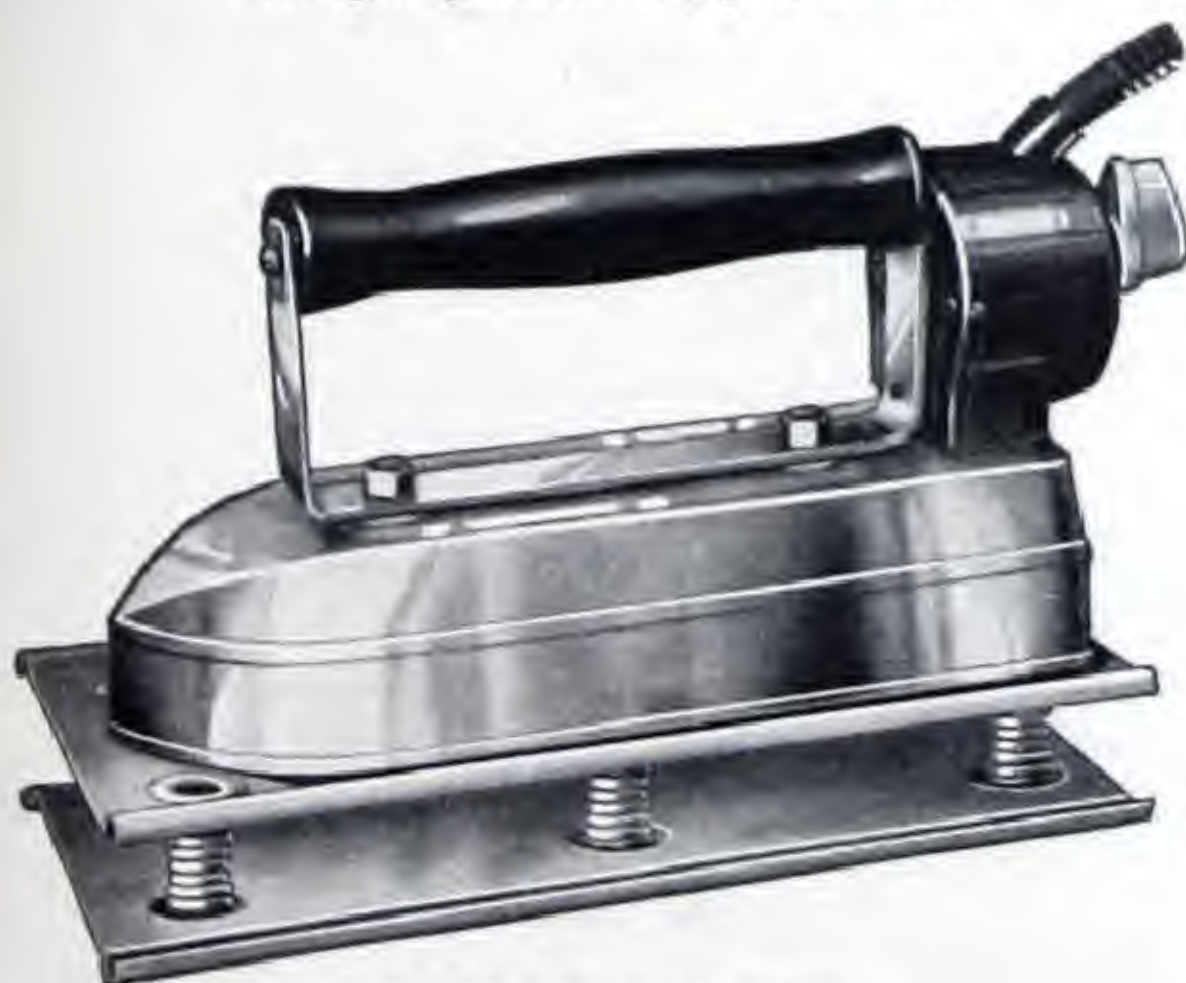
Aluminumized
Hood, Nickel
Plated
Sole Plate
Cord
permanently
attached
Requires
special Wiring



Furnished in 106-114V, 115-120V, 215-230V, 235-250V
Sole Plate 5½ x 8 in.

No. E912 12 lbs. 850 Watts
List Price.....\$12.50

No. E915 15 lbs. 900 Watts
List Price.....\$14.50
Weight packed 18¼ to 21 lbs.



TAILORS' IRONS

3-Heat Reversible Switch
Requires Special Wiring
Cord permanently attached

Furnished in 106-114V, 115-120V, 210-225V, 230-240V

No.	Wgt.	Inches	Low	Med.	High	List Price
E9115	15 lbs.	3¾x10¾	212	425	850	\$21.85
E9120	20 lbs.	3¾x10¾	225	450	900	23.40
E9125	25 lbs.	4 x12	250	500	1000	26.50

Weight packed 20½, 25¼, 30½ lbs., respectively.

PENBERTHY "FILOORDRAIN"

For Filling or Emptying Washing Machines, etc.



Style B

The "Penberthy" Filordrain is not a complicated machine ; it is as simple in its arrangement as is the common hose nozzle. There are no moving parts, nothing to get out of order or adjustment, which together with the fact that it requires no attention and only water for power, makes it an ideal addition to any home.

It allows you to run cold water, hot water or a mixture of hot and cold water at any desired temperature into your tub or washing machine.

Style B is Filordrain with five feet of first quality hose attached.

List Price, Style B.....\$2.25



Style A

A small, inexpensive device for transferring water to a higher level, using city water pressure as power. It does away with the necessity of lifting heavy pails of dirty water drained from the tub, sloppy, dirty floors, made so when taking out drain plug or in lifting the pail to the sink, or through letting water drain through floor trap. It saves labor for the housewife and can be used for any number of purposes.

Style A is Filordrain only.

List Price, Style A.....\$2.00

Style A

PENBERTHY FAUCET ADAPTER

A simple device for changing smooth or plain faucets into threaded ones. Fits any standard half-inch faucet. The lower end of the rubber tube or gasket is fastened securely into the brass casting. It will last a lifetime. It is the best and least expensive article of its kind on the market. Simple in construction—easily installed—just slip it on the nose of the faucet, being sure the screw is at the back, and tighten the screw. It gives you a thread as strong and rigid as if it were one piece. Threaded with ¾" standard hose thread.



Saves buying a new faucet when you want to use a Filordrain, garden hose, water motor or any device of this type.

List Price, Each.....\$0.40

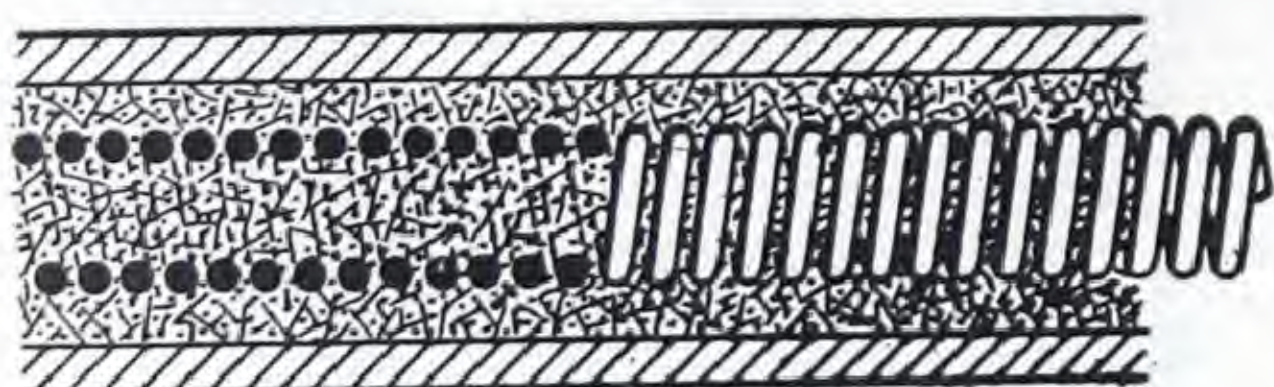
MAJESTIC TUBULAR HOT WATER HEATERS

With Backer Patented Elements

CONSTRUCTION OF THE ELEMENT



Before Treatment in autoclave

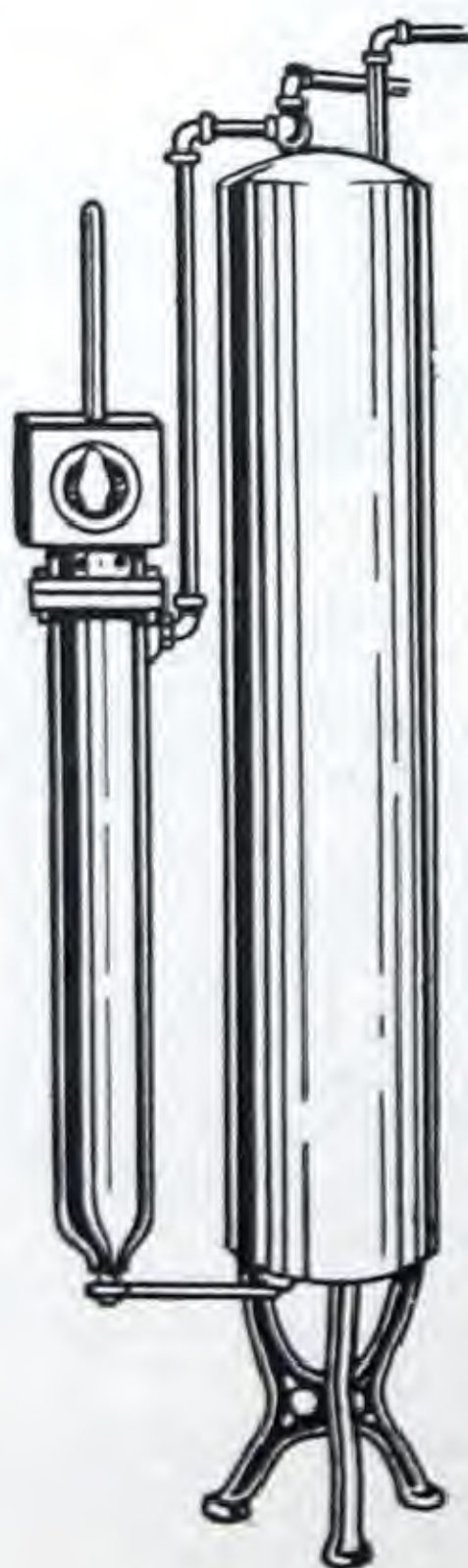
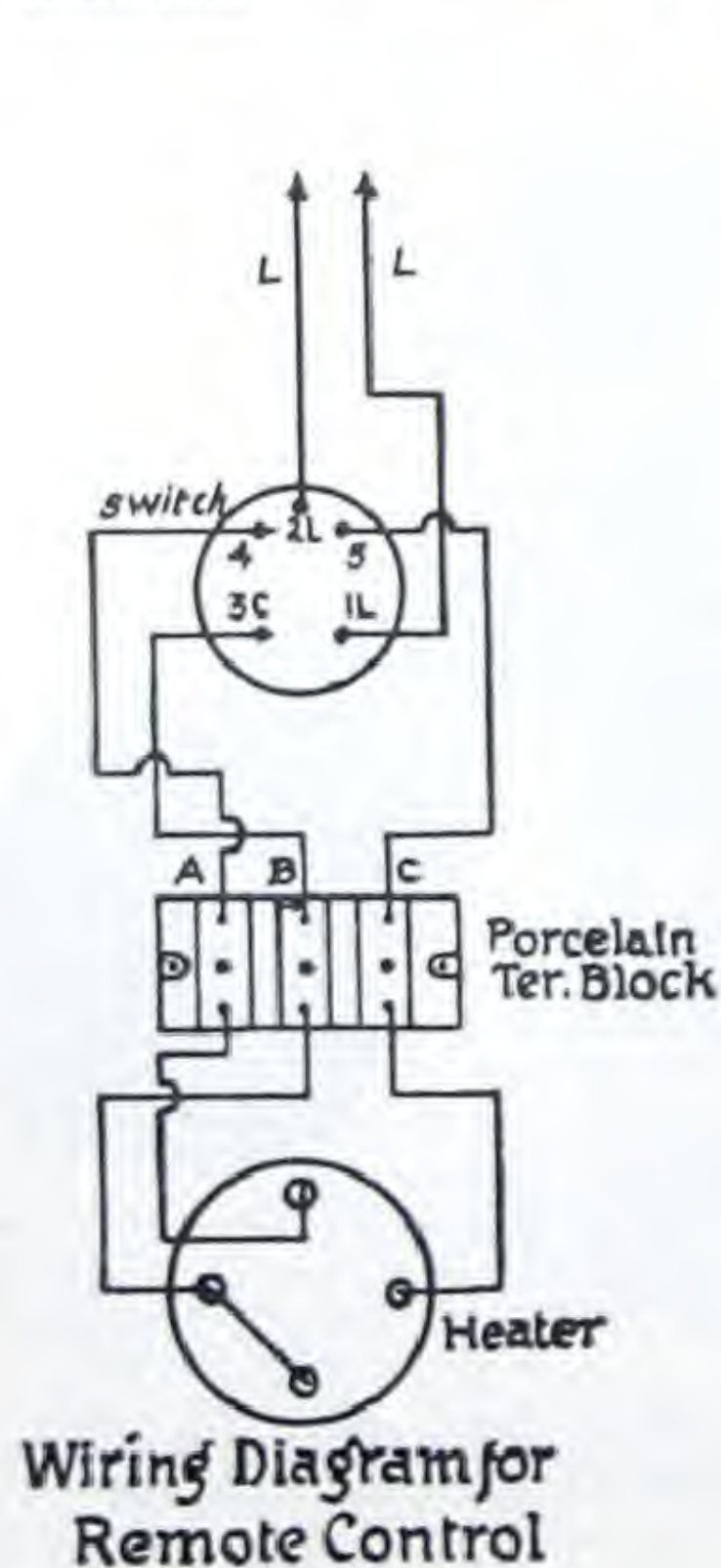


After treatment in autoclave all magnesium is now converted into magnesium oxide.

Construction of the Element

The tubular elements are produced by the well known Backer process of electric insulation. The outside tube (a) is a seamless drawn copper tube. Into it is placed a magnesium metal tube (b) (made by coiling up magnesium ribbon). The coiled up resistance wire (c) (high-grade nickel chromium), is inserted into the magnesium tube and into the centre of the resistance wire coil is inserted a magnesium wire (d).

The tube is now placed in an autoclave and treated with steam of very high pressure, whereby the magnesium metal is converted into chemically pure crystalline magnesium oxide. During the conversion the magnesium oxide expands to approximately double the volume of the original magnesium metal, whereby the resistance coil becomes imbedded in the oxide, in such a way that the insulating oxide layer between the wire coil and the outside tube is of absolutely even thickness, a result which cannot be attained by any other method of insulation.



MAJESTIC TUBULAR HOT WATER HEATERS

With Backer Patented Elements



Remote Control Switch with Pilot Light.



No. 32A
Circulation
Type



No. 29A
Immersion Type



Circulation
Type

IMMERSION TYPE

No. 26

1" pipe size plug.
3 1/4" outlet box. Total length, 11 5/8".
Length of tube outside head, 8 5/8".
Volts, 110-115. Watts, 500.

List No. 26, List Price. \$5.80

No. 27

1" pipe size plug.
3 1/4" outlet box. Length of heater, 13 1/4".
Volts, 110-115. Watts, 600.
Length of tube outside head, 10 1/4".
Shipping weight, 2 lbs. 2 oz.

List No. 27, List Price. \$6.35

No. 28

1" pipe size plug.
3 1/4" outlet box. Length, 13 1/4".
Length of tube outside head, 10 1/4".
Volts, 110-115. Watts, 750.
Shipping weight, 2 lbs. 2 oz.

List No. 28, List Price. \$7.40

No. 29-A

1" pipe size plug.
3 1/4" outlet box. Length, 13 5/8".
Single tube.
Volts, 110-115. Watts, 1000.
Shipping weight, 2 lbs. 4 ozs.

List No. 29A, List Price. \$7.90

No. 29-B

1" pipe size plug.
3 1/4" outlet box. Single tube. Length, 11 5/8".
Volts, 220. Watts, 1000.
Shipping weight, 2 lbs. 3 ozs.

List No. 29-B, List Price. \$8.45

MAJESTIC TUBULAR HOT WATER HEATERS

WITH BACKER PATENTED ELEMENTS

Circulation Type

No. 33

3 heat reciprocating switch attached to heater.
For connection to 3/4" water supply pipes.
Length of heater 26 1/4".
Standard voltage 220. Watts 3000.
Shipping weight 24 lbs.

List No. 33.....List Price \$25.55

No. 33-A

Three heat for remote control.
Supplied with 3 heat reciprocating switch.
Pilot light receptacle and nickel plated front plate.
For connection to 3/4" water supply pipes.
Length of heater 26 1/4".
Standard voltage 220. Watts 3000.
Shipping weight 26 lbs.

List No. 33-A.....List Price \$34.80

No. 34

Circulation type flat rate and booster.

Flat rate tube 660 watts, 110 volts. Booster tube 2000 watts, 220 volts. Booster heater tube can be supplied for 110 volts. Standard heater supplied with single heat switch for booster tube, attached to heater. Can also be supplied for remote control.

For connection to 3/4" water supply pipes.
Length 26 1/4".
Standard voltage—

Booster heater tube 220 volts, 2000 watts.

Flat rate heater tube 110 volts, 660 watts.

Can be supplied with booster heater tube 110 volts.
Shipping weight 25 lbs.

List No. 34.....List Price \$26.40

No. 35

3 heat reciprocating switch attached to heater.
For connection to 7/8" water supply pipes.
Length 38 3/8".
220 volts only. Watts 5000.
Shipping weight 38 lbs.

List No. 35.....List Price \$42.25

No. 31

3 heat reciprocating switch attached to heater.
For connection to 3/4" water supply pipes.
Length 23 1/2".
Can be supplied for remote control when so ordered.
Voltage 220. Watts 2000.
Shipping weight 21 1/2 lbs.

List No. 31.....List Price \$24.80

No. 32

Single heat with switch attached to heater.
For connection to 3/4" water supply pipes.
Length 26 1/4".
Voltage 220. Watts 3000.
Shipping weight 22 lbs.

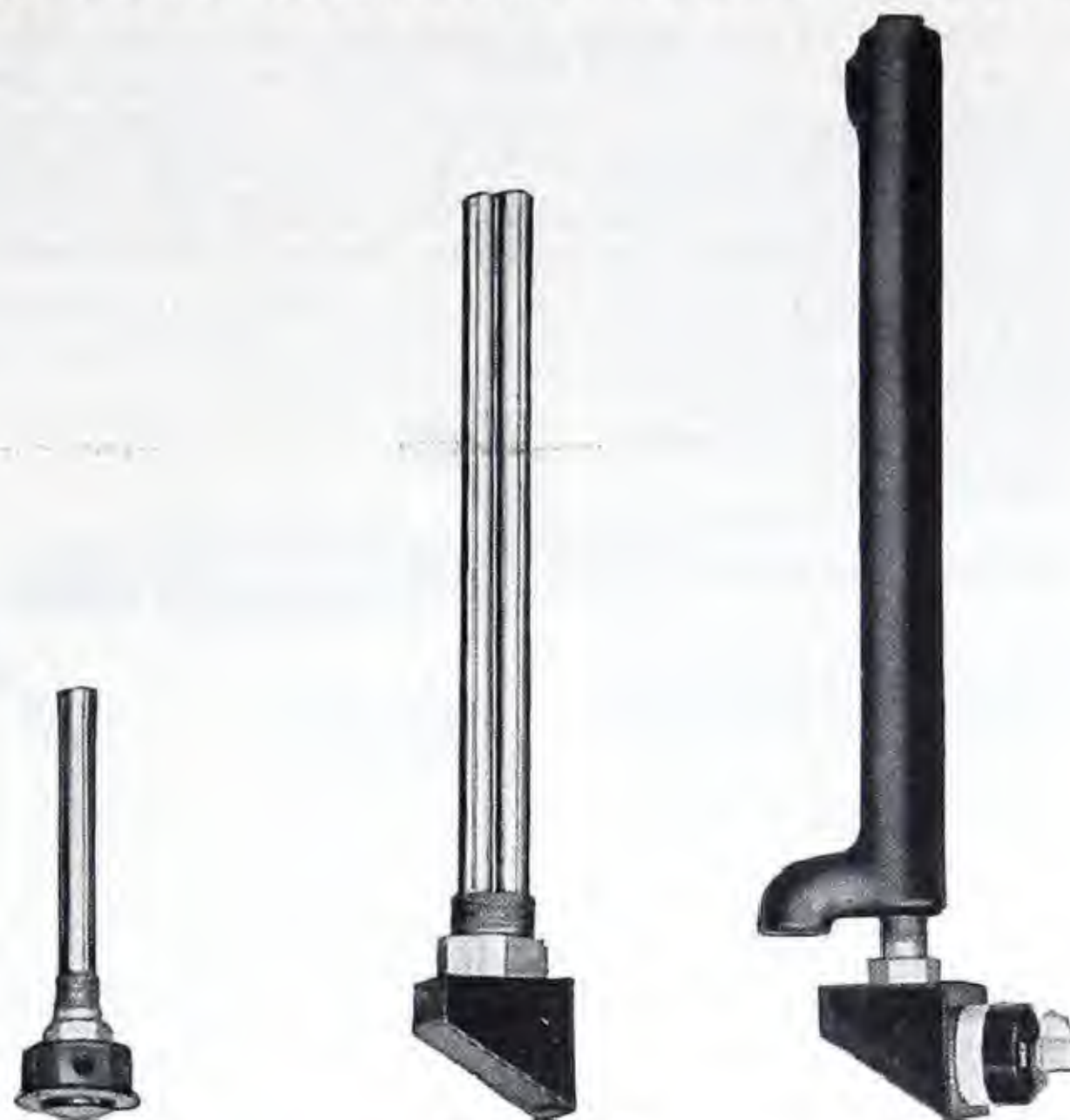
List No. 32.....List Price \$21.60

No. 32-A

Single heat for remote control.
Single heat tumbler switch, pilot light receptacle and Bakelite plate.
For connection to 3/4" water supply pipes.
Length 26 1/4".
Voltage 220. Watts 3000.
Shipping weight 23 lbs.

List No. 32-A.....List Price \$23.75

RED SEAL ELECTRIC WATER HEATERS



Immersion Type

Two Tube Immersion Type

Circulation Type

IMMERSION TYPE (Without Switch)

Watts	Voltage	Outlet Box	Diam. Tube	Thread	Length from bottom thread to end	List Price
Octagon						
500	110	3 1/4"	1"	1"	11 1/4"	\$ 8.50
750	110	3 1/4"	1"	1"	11 1/4"	8.50
1000	110	3 1/4"	1"	1"	11 1/4"	8.50
Angle						
1500	110-220	3 1/2x4 1/4"	7/8"	1"	12"	12.36
2000	110-220	3 1/2x4 1/4"	7/8"	1"	14 1/2"	16.48
3000	220	3 1/2x4 1/4"	7/8"	1"	21 3/4"	20.60
4000	220	3 1/2x4 1/4"	2 7/8"	2"	21 1/2"	25.75
5000	220	3 1/2x4 1/4"	2 7/8"	2"	21 1/2"	25.75
Octagon						
500	220	3 1/4"	1"	1"	11 1/4"	8.24
750	220	3 1/4"	1"	1"	11 1/4"	9.27
1000	220	3 1/4"	1"	1"	11 1/4"	9.79
* 500	110-220	3 1/4"	1"	1"	11 1/4"	11.85
* 750	110-220	3 1/4"	1"	1"	11 1/4"	11.85
* 1000	110-220	3 1/4"	1"	1"	11 1/4"	11.85
Angle						
* 2000	110-220	3 1/2x4 1/4"	7/8"	1"	14 1/2"	19.57
* 3000	220	3 1/2x4 1/4"	7/8"	1"	21 3/4"	24.72

* With 3-heat switches.

CIRCULATION TYPE (Without Switch)

Octagon						
500	110	3 1/4"	1"	1"	11 1/4"	\$14.94
750	110	3 1/4"	1"	1"	11 1/4"	14.94
1000	110	3 1/4"	1"	1"	11 1/4"	14.94
Angle						
1500	110-220	3 1/2x4 1/4"	7/8"	1"	14 1/4"	18.54
2000	110-220	3 1/2x4 1/4"	7/8"	1"	17 1/4"	23.02
3000	220	3 1/2x4 1/4"	7/8"	1"	23 1/2"	27.55
4000	220	3 1/2x4 1/4"	2 7/8"	2"	21 1/2"	46.35
5000	220	3 1/2x4 1/4"	2 7/8"	2"	21 1/2"	46.35
Octagon						
500	220	3 1/4"	1"	1"	11 1/4"	14.42
750	220	3 1/4"	1"	1"	11 1/4"	15.45
1000	220	3 1/4"	1"	1"	11 1/4"	15.97
* 500	110-220	3 1/4"	1"	1"	11 1/4"	17.91
* 750	110-220	3 1/4"	1"	1"	11 1/4"	17.91
* 1000	110-220	3 1/4"	1"	1"	11 1/4"	17.91
Angle						
* 2000	110-220	3 1/2x4 1/4"	7/8"	1"	17 1/4"	26.11
* 3000	220	3 1/2x4 1/4"	7/8"	1"	23 1/2"	31.67

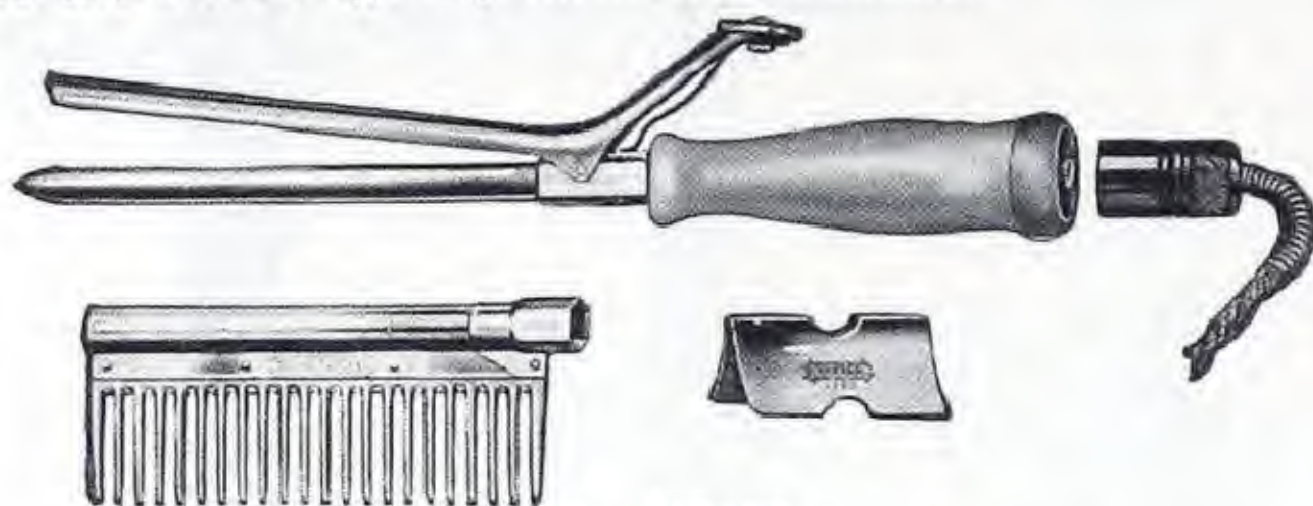
* With 3-heat switches.

SUCCESS WATER HEATERS

Watts	Voltage	List Price
500	110.....	\$5.15
750	110.....	5.15
1000	110.....	5.15

UNIVERSAL CURLING IRONS

Universal Curling Irons crimp the hair into beautiful glossy waves or curl it into fluffy individual curls, as desired, with little effort and at a negligible cost. The rods heat fast and evenly along their entire length, practically eliminating danger of scorching. Strong spring clamps hold hair firmly in position. Tapered points slip smoothly into the hair without catching or snarling. All models are beautifully finished with colored enameled handles to fit harmonizingly into the most elegantly furnished boudoirs.



No. E7801

DE LUXE MODEL WITH COMB

Hair Dryer made of Aluminum. Detachable swivel connector plug facilitates movement of curler and prevents cord twisting.

Chromium Plated Rod and Clamp
Lavender Handle with Green Trim
and Green Button

No. E7801 Without Hair Dryer, List Price....\$4.00

No. E78011 With Hair Dryer, List Price..... 4.85

Weight packed 1 lb.

Packed one in a display carton, 12 in a unit package



No. E7502

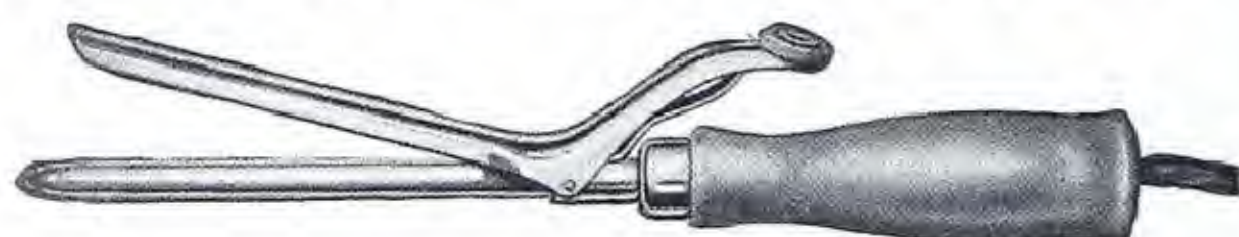
Chromium Plated Rod and Clamp
No. E7502 Lavender Enameled Handle
Permanently Attached Cord

List Price \$2.45

Weight packed 11 oz.

Packed one in a carton, 3 in a unit package

Four unit packages (one dozen) in a large package



No. E9505

Nickel Plated Rod and Clamp
No. E9505 Gray Enameled Handle
Permanently Attached Cord

List Price \$1.50

Weight packed 11 oz.

Packed one in a carton, 12 in a unit package



No. E7503

With detachable connector plug for easily disconnecting curler and curling the hair on stored heat without need or bother of disconnecting cord at outlet.

Chromium Plated Rod and Clamp
No. E7503 Green Enameled Handle

List Price \$2.85

Weight packed 9 oz.

Packed one in a carton, 12 in a unit package.

All equipped with 6 ft. Art Silk Cord

CANADIAN BEAUTY CURLING IRONS



No. 454

CURLING IRON

Chrome Plated $\frac{3}{8}$ " Tube with 5 ft. silk swivel cord, and pull off plug. Supplied in the following colors: Blue, Green, Pink and Ivory. Volts 110-115. Watts 20. Weight 5 oz. Shipping weight $\frac{1}{2}$ lb. Standard shipping carton 12 assorted.

List No. 454 Curling Iron.....List Price \$2.00



No. 451 CURLING IRON

Chrome Plated $\frac{5}{16}$ " Tube with 5 ft. Silk Swivel Cord attached. Supplied in the following colors: Blue, Green, Pink and Ivory. Volts 110-115. Watts 20. Weight 5 oz. Shipping weight $\frac{1}{2}$ lb. Standard shipping carton 12 assorted.

List No. 451 Curling Iron.....List Price \$1.50

CANADIAN BEAUTY CURLING TONG HEATER

No. 52

CURLING IRON HEATER



This is a beautiful new design heater, suitable for use in

the home or beauty parlor. There is accommodation for two pairs of curling irons. Left hole,

high heat. Right hole, low heat. The element consists of a porcelain tube wound with best resistance wire. Complete with detachable plug. Watts 125. Volts 110-115. Weight 2 lbs. Shipping weight $2\frac{1}{4}$ lbs. Standard Shipping Carton 12.

List No. 52 Curling Tong Heater.....List Price \$4.25

No. 52C CURLING IRON HEATER

Finished in chrome.

List No. 52C Curling Tong Heater.....List Price \$4.75

SUPREME ELECTRIC HAIR DRYER



A switch controls a stream of air, hot or cold as desired, which blows its air to the roots of the thickest hair.

Supplied in three beautiful colours, mahogany, jade green or walnut, also in nickel plated finish or chromium finish.

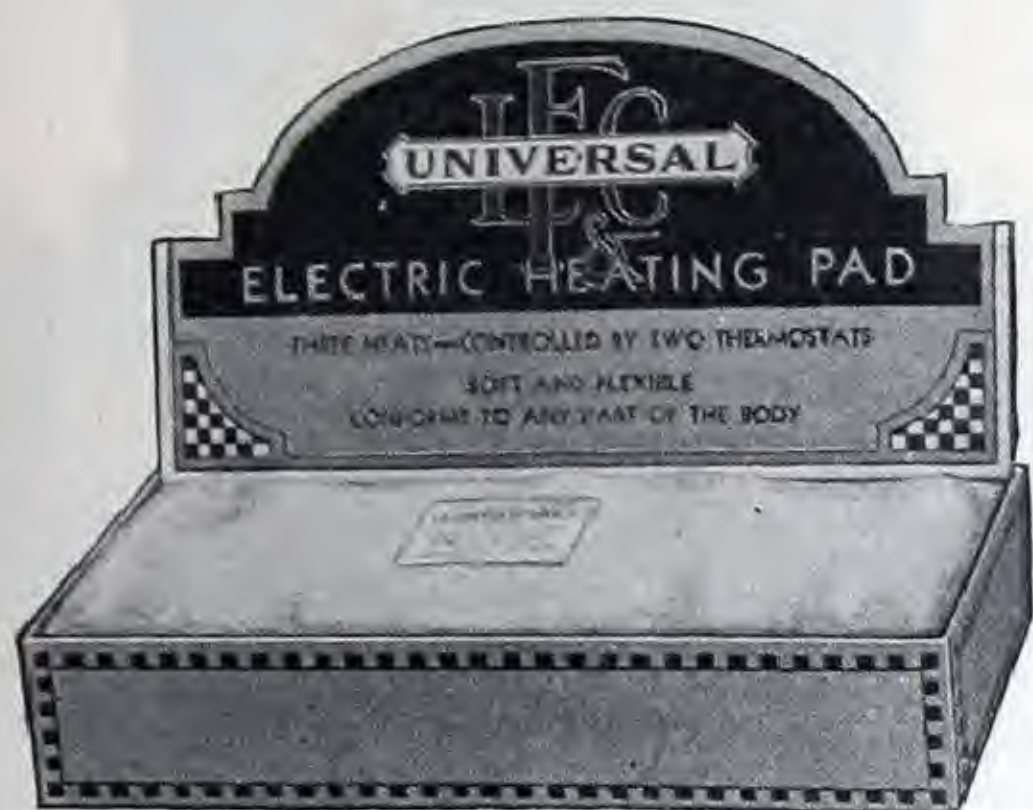
110 V. 550 W.

Packed one in a carton. Weight 4 lbs.

Finish	Volts	Watts	List Price
Jade Green	110	550	\$10.85
Mahogany	110	550	10.85
Walnut	110	550	10.85
Nickel	110	550	10.85

UNIVERSAL ELECTRIC WARES

Heating Pads



THREE-HEAT PAD

Complete with removable muslin cover for dry applications. Three speeds controlled by switch in cord. Two thermostats provide heat regulation. Watts 65-40-25.

No. E9147 Peach Eiderdown Cover

Weight Packed 2¼ lbs.

Packed one in a carton, six in unit package

List Price \$4.75



THREE-HEAT PAD

Complete with separate washable muslin slip and waterproof cover. Three speeds controlled by switch in cord. Two Thermostats provide heat regulation. Watts 65-40-25.

No. E9344 Orchid Eiderdown Cover

Weight Packed 2¼ lbs.

Attractively Colored Display Box, six in unit package

List Price \$6.50

Pads equipped with 9 ft. Art Silk Cord; others with 6 ft. cord.

UNIVERSAL ELECTRIC WARES

Heating Pads

Bring almost instant relief from pain caused by cramps, congestion, rheumatism, lumbago or neuralgia. Light and fleecy, pliable as flannel, soft as eiderdown. In dark, position of control lever can be determined by raised projections on switch. Non-Radio interfering. Size 12 x 15 in. All pads wrapped in cellophane.



DE LUXE MAINTAINED THREE-HEAT PADS

Three separate heats, 185° F., 150° F., 115° F., are held by four automatic heat regulating thermostats—twice the number employed in other pads—an exclusive patented Universal feature. Watts 65.

List Price

†No. 99444 Orchid Eiderdown Cover..... \$8.95

†No. 99646 Green Eiderdown Cover..... 8.95

No. E9930 Pearl Gray Eiderdown Cover..... 8.75

†Approved by Ontario Hydro Electric Commission.

Complete with separate washable muslin slip and waterproof cover, safe, sanitary heat for either wet or dry applications.

Weight Packed 2½ lbs.

Packed one in a carton, six in unit package

Pads equipped with 9 ft. Art Silk Cord.

CANADIAN BEAUTY HEATING PAD



No. 60 Heating Pad

Attractively packaged to make sales

No. 60 Heating Pad

12 x 15 Heating Pad equipped with three heat indicating switch and two automatic thermostats for safety and temperature regulation.

Element made from nichrome wire wound on asbestos core and insulated with pure asbestos braiding. 10 ft. silk cord supplied.

Extra cover supplied to keep pad clean and dry. Cellophane wrapped in beautiful display box.

Cover of pad pure wool, Kenwood blanket cloth, in blue color.

Volts 110-115. Watts 60.

Shipping Weight 2 lbs. Standard Case 6.

List No. 60 Heating Pad.....List Price \$5.65

No. 60A

Same as above only in rose colored cover and cord.

List No. 60A Heating Pad.....List Price \$5.65

MAJESTIC NU-GLOW FIRES

Live, Flickering, Illuminated Grates



No. 68B

Height, 21½"; width, 28½"; depth, 18¾"; shipping weight, 90 lbs.; watts, 3000.

Model No. 68A, same as above. Watts 1320.

Model 681, same as above. Watts, 1000. With 6 ft. cord for use off wall or base receptacle. Weight, 75 lbs.

List No.	Finish	List Price
681	Nu-Glow Grand De Luxe, 1000 W...Standard	\$37.00
68A	Nu-Glow Grand De Luxe, 1320 W...Standard	37.00
68B	Nu-Glow Grand De Luxe, 3000 W...Standard	40.00



No. 69B

Height, 23"; width, 38"; depth, 18½"; shipping weight, 125 lbs.; watts, 3000.

Model 69A, same as above, Watts, 1320.

Model 691, same as above. Watts, 1000. With 6 ft. cord for use off wall or base receptacle. Weight, 105 lbs.

List No.	Finish	List Price
691	Nu-Glow, 1000 W., Wrought Iron.....	\$47.50
69A	Nu-Glow, 1320 W., Wrought Iron.....	47.50
69B	Nu-Glow, 3000 W., Wrought Iron.....	55.00

All grates may be obtained in the following finishes: Brass, Copper, Wrought Iron and Baked Antique, as also "Summer Fires," meaning without heat feature.

MAJESTIC NU-GLOW FIRES

Live, Flickering, Illuminated Grates



No. 65B

Height, 20"; width, 19½"; depth, 15"; shipping weight, 65 lbs. Watts, 3,000.

Model No. 65A, same as above. Watts 1320.

Model No. 651, same as above. Watts, 1000. With 6 ft. cord for use off base or wall receptacle. Weight, 55 lbs.

List No.	Finish	List Price
651	Nu-Glow Colonial, 1000 W.....Standard	\$22.00
	Same in Baked Antique finish.....	18.00
65A	Nu-Glow Colonial, 1320W.....Standard	22.00
	Same in Baked Antique finish.....	18.50
65B	Nu-Glow Colonial, 3000 W.....Standard	27.50
	Same in Baked Antique finish.....	23.50



No. 67B

Height, 21½"; width, 21½"; depth, 16¼"; shipping weight, 65 lbs.; watts, 3000.

Model No. 67A, same as above. Watts, 1320.

Model 671, same as above. Watts, 1000. With 6 ft. cord for use off wall or base receptacle. Weight, 60 lbs.

List No.	Finish	List Price
671	Nu-Glow DeLuxe, 1000 W.....Standard	\$29.00
	Same in Baked Antique finish.....	24.00
67A	Nu-Glow DeLuxe, 1320W.....Standard	29.00
	Same in Baked Antique finish.....	24.00
67B	Nu-Glow DeLuxe, 3000 W.....Standard	33.00
	Same in Baked Antique finish.....	29.00

MAJESTIC NU-GLOW FIRES

Live, Flickering Illuminated Grates



No. 63B

No. 63B BABY GRAND

Height, 18½"; width, 18½"; depth, 11"; shipping weight, 45 lbs.; watts, 3000.

Model No. 63A, same as above. Watts, 1320.

Model 631, same as above. Watts, 1000. Equipped with cord for use off wall receptacle.

List No.	Finish	List Price
63	Summer Fire only, no heat	Standard \$9.00
	Same in baked antique finish	7.50
631	Nu-Glow Baby Grand, 1000 W.	Standard 15.50
	Same in baked antique finish	14.00
63A	Nu-Glow Baby Grand, 1320 W.	Standard 15.50
	Same in baked antique finish	14.00
63B	Nu-Glow Baby Grand, 3000 W.	Standard 17.00
	Same in baked antique finish	15.50



No. 64B

Height, 20"; width, 20"; depth, 15¼"; shipping weight, 65 lbs.; watts, 3000.

Model No. 64A, same as above. Watts 1320.

Model 641, same as above. Watts, 1000. With 6 ft. cord for use off wall or base receptacle. Weight, 55 lbs.

List No.	Finish	List Price
641	Nu-Glow Grand, 1000 W.	Standard \$22.00
	Same in baked antique finish	18.00
64A	Nu-Glow Grand, 1320 W.	Standard 22.00
	Same in baked antique finish	18.50
64B	Nu-Glow Grand, 3000 W.	Standard 27.50
	Same in baked antique finish	23.50

PORTABLE ELECTRIC HEATERS



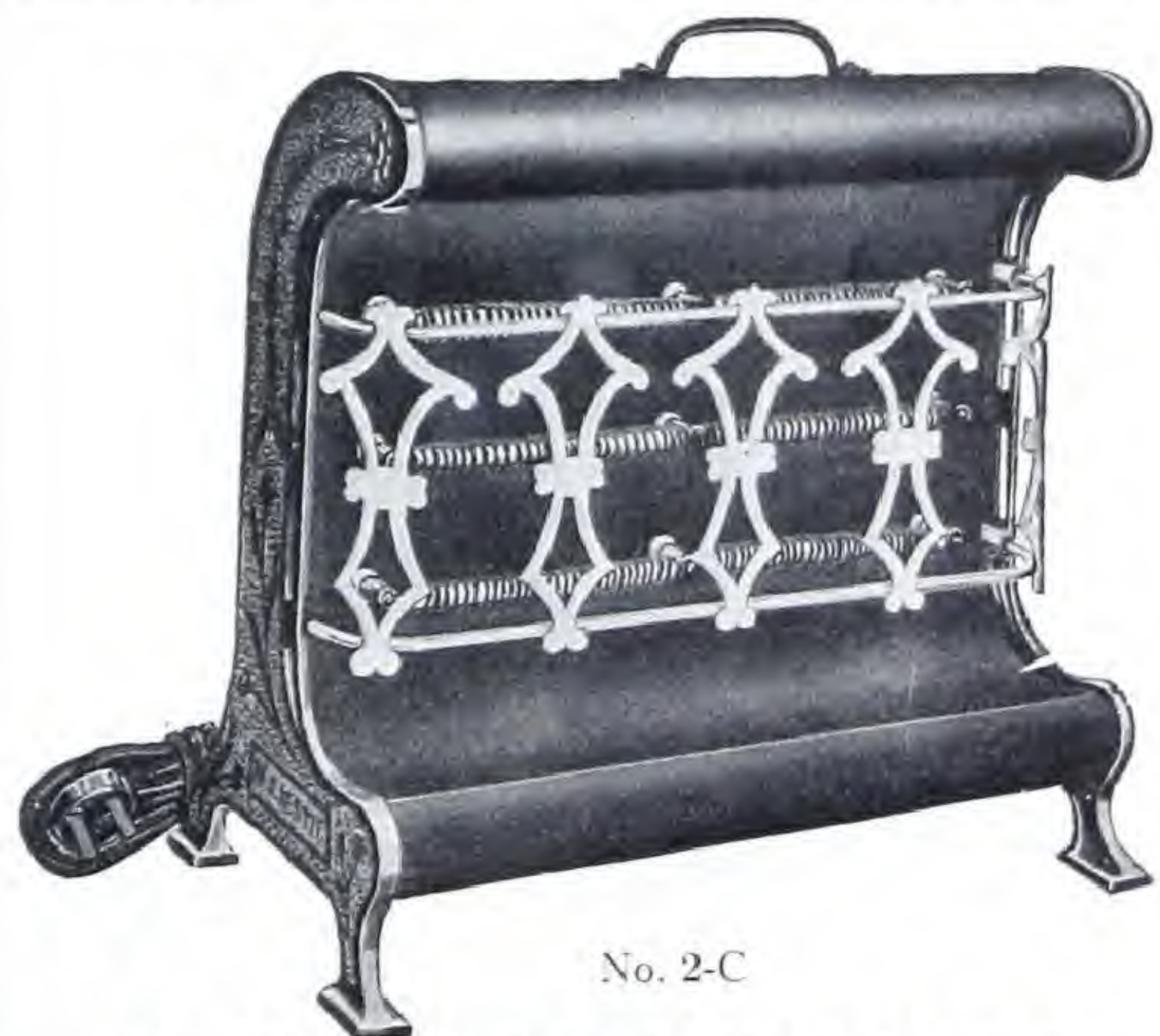
No. 2-A

No. 2-A Grate Type Nu-Glow Heater

The Majestic Portable No. 2-A is designed to meet the need of those who want a de-luxe radiant heater for the home. Beautifully finished in bronze and burnished brass, with chrome reflector artistically wrought fire box and element guard, this heater typifies the last word in engineering and designing skill of an organization famous for its good products.

Size 17¾" high, 15¾" wide, 8¾" deep. Shipping weight 30 lbs. Volts 110-115. Wattage 1200. This heater is equipped with switch so that live fire can be used with or without heat. Shipping weight 30 lbs.

List No. 2-A List Price \$14 70



No. 2-C

No. 2-C Grate Type Portable Heater

Embodied in this grate type portable heater is a combination of ultra-modern design, sound construction and perfected heating principles. Reflector finished in chrome, and end castings are finished in gold and brown. Six horizontally placed heating elements radiate a sun-like warmth, unfluctuating and comforting. Tastefully designed chrome guard adds a most pleasing effect to this heater.

This popular heater comes complete with cord and plug cap for attaching to base or wall receptacle. Capacity 1100 watts. Volts 110-115. Size 14½" x 14½" x 8½". Shipping weight 17 lbs.

List No. 2-C List Price \$8.70

PORTABLE ELECTRIC HEATERS



No. 5-C

No. 5-C Heater

A very popular number, improved as to appearance and embodying every advance in heater science. New style octagon embossed reflector adjustable so that heat can be directed where desired. Well balanced design on sturdy base.

No. 5-C has Chrome Plated Reflector and standard finish is Mahogany or Crystal Black.

No. 5 Heater has Coppered Reflector and is finished in Pastel Ivory with Brown highlighting. Heater comes complete with cord and attachment plug. Volts 110-115, Watts 660, Reflector 13". Shipping weight 7 lbs.

List No. 5-C. Heater.....List Price \$4.50
List No. 5. Heater.....List Price \$4.15



No. 6-C

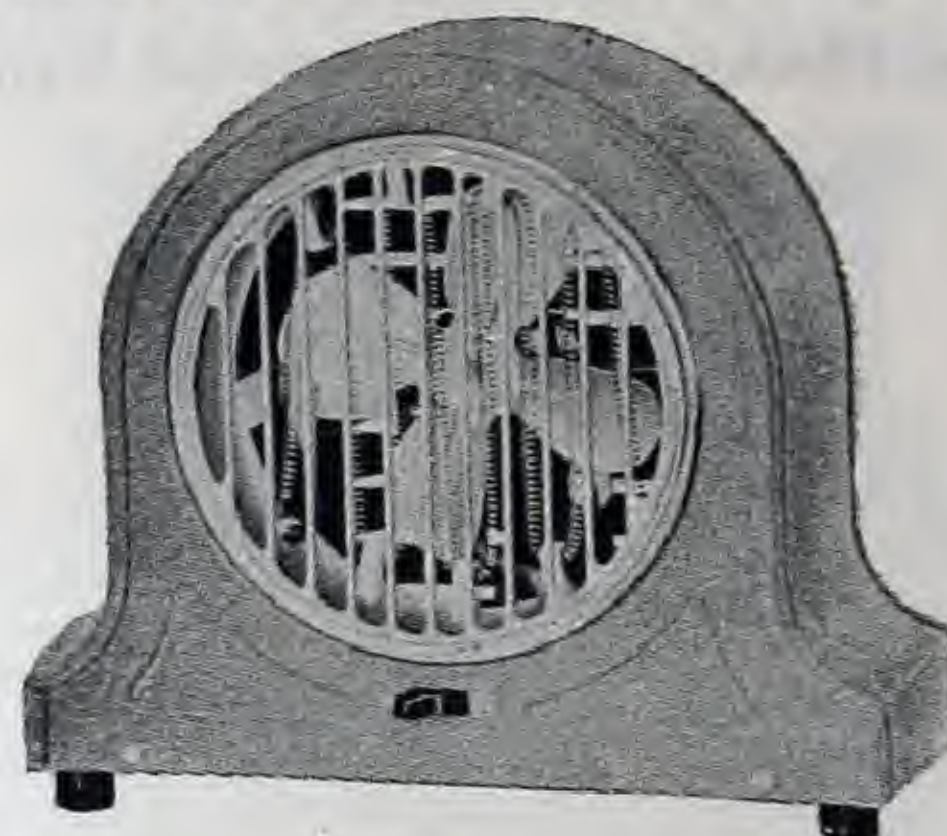
No. 6-C Heater

This Canadian Beauty Heater with its large reflector in Chrome, and mounted on an artistically finished base decorated in Gold with Brown and Pastel.

Ivory with Brown highlighting, is certain to be a popular number. Bowl is mounted on an adjustable cradle and so enables heat to be directed at any angle desired. This heater comes complete with cord and attachment plug cap. Capacity 1100 watts. 110-115 volts. Reflector 14". Shipping weight 12½ lbs.

List No. 6-C. Heater.....List Price \$5.95

UNIVERSAL FAN HEATERS



No. E798

Forces warm air into the room at the rate of 235 cubic feet per minute. The circular housing which surrounds both fan and element eliminates air pockets and assures maximum output of forced heated air.

List Price
No. E798 French Green-Gray Enamel Moire Finish. \$11.50
No. E7981 Ivory Enamel Moire Finish..... 11.90
No. E7983 Black Enamel Moire Finish..... 11.90

Chromium Plated Guard
Height 9¾ inches Base 11½ in. wide, 4½ in. deep
Watts, 1320
Weight packed 8¾ lbs.
Non-radio interfering motor
Operates from a convenience outlet but not a lamp socket.

MAJESTIC AIRFLOW HEATERS



7 Major Uses

1. The most efficient portable heater.
2. Fast, convenient hair drier.
3. As an air conditioner.
4. As a medicator or perfumator.
5. As a kitchen exhaust fan.
6. As a clothes drier.
7. As a window defroster.

No. 401 MAJESTIC AIRFLOW HEATER

A well-built appliance of pleasing appearance embodying the latest in Electric Heater designs. It is equipped with a fan creating a forced circulation of air.

A special switch is attached to the Heater:

First snap—Element on high in combination with the fan.

Second snap—Element on low in combination with the fan.

Third snap—Element off and fan operating.

Fourth snap—All off.

The Heater is finished in combination of chrome and enamel. Motor for fan can be furnished for 60 or 25 cycle.

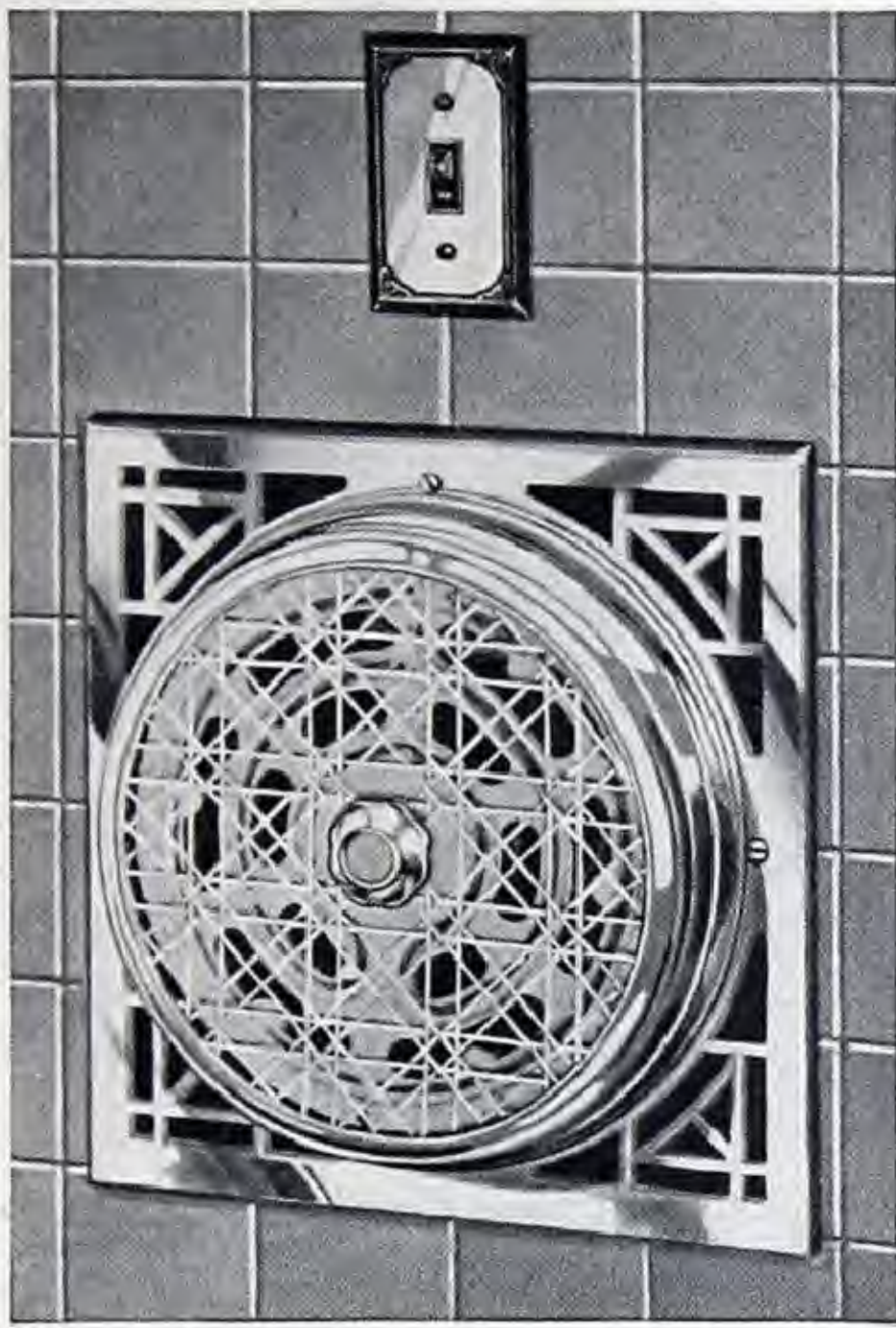
To be operated from wall or base receptacle. Volts 100-115. Watts 1320.

No. 401 Airflow Heater.....List Price \$16.75

No. 400 Heater—same as above. One heat only.

No. 400 Airflow Heater, no switch.....List Price \$14.50

MAJESTIC AIRFLOW HEATERS



No. 402 Wall Type

- Silent in operation.
- Beautiful in appearance.
- Will not interfere with radio reception.
- Safe, simple and economical to operate.
- Approved by Ontario Hydro Electric Commission.
- Fully enclosed.
- Fully guaranteed.
- Every home, office and store a prospect.

No. 402 WALL TYPE BATHROOM HEATER COMBINATION HEATER AND HAIR-DRIER

An inexpensive, thoroughly efficient hair-drier, passing all Hydro requirements, and fully guaranteed. Silent in operation.

This drier overcomes the one great objection to home shampooing. It will pay for itself many times over from this standpoint alone.

Will prove to be a great comfort in the bathroom in chilly weather, and as an emergency drier for stockings, etc.

Can be installed at very low cost.

Designed for permanent installation, and operated with one heat only.

It is furnished with outlet box for conduit wiring, and includes flush type tumbler switch with Bakelite flush plate.

The construction of the element same as No. 400 Majestic Airflow. Same motor and fan.

Standard finish, Chrome plate guard. Volts 110-115. Watts 1320.

List No. 402 Airflow Heater.....List Price \$20.00

UNIVERSAL SAFETY FAN



A new type "all-around" guard of closely spaced rings of heavy gauge wire make it the Safest Fan on the market. This guard provides the maximum of protection against accident and yet does not materially cut down or interfere with the proper air delivery of the fan.

No. 310 French Green-Gray Moire Finish

Non-Oscillating Single Speed

Non-radio Interfering motor

35 Watts 110 Volts 60 Cycles AC 1550 R.P.M.

10 inch blades develop 550 cubic feet of air per minute

Width 11 in. Height 13 in.

Durable 8 ft. Green Cord

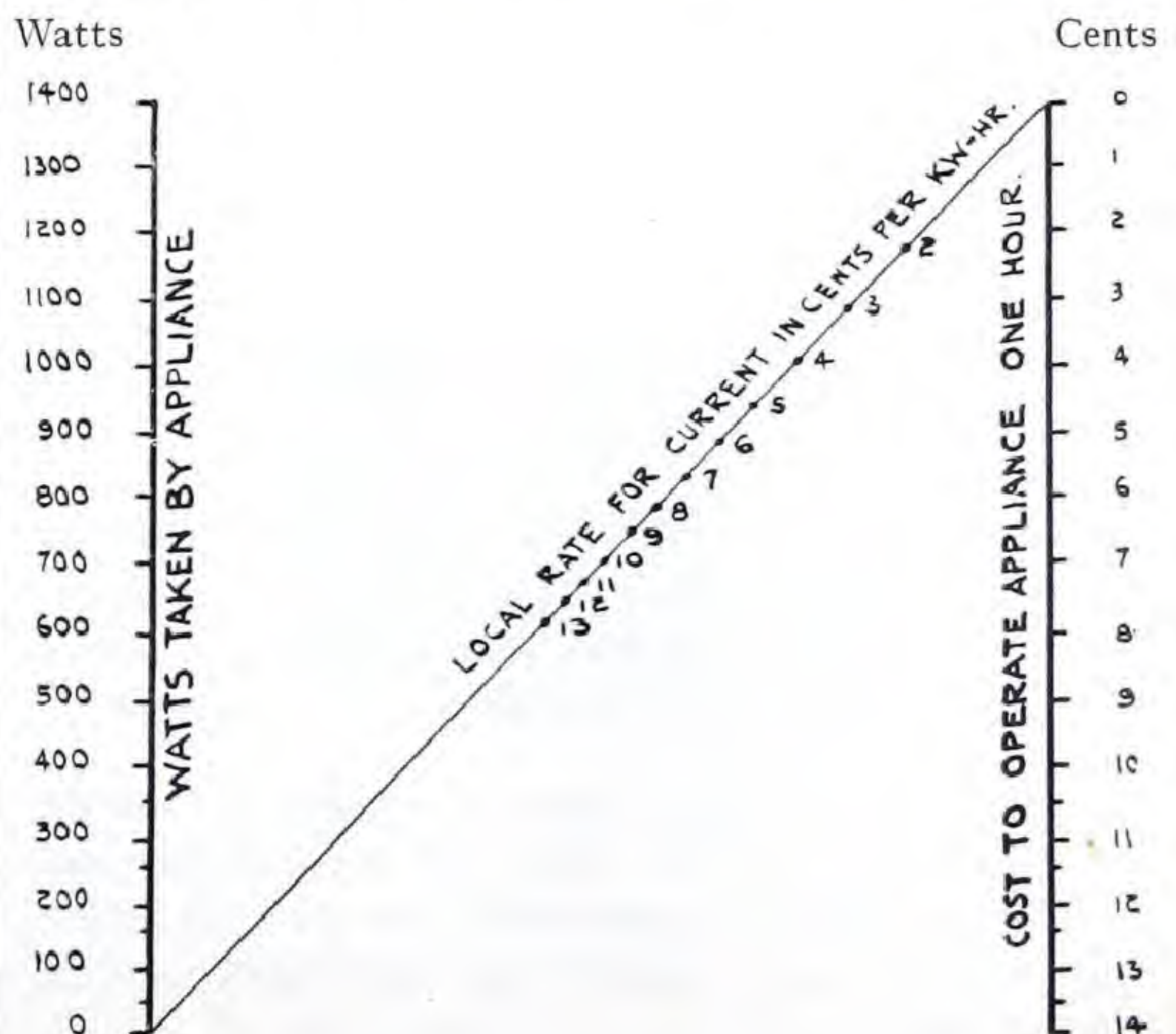
Weight 8½ lbs. Weight packed one in a case, 17 lbs.

Performance data subject to variation 10% plus or minus.

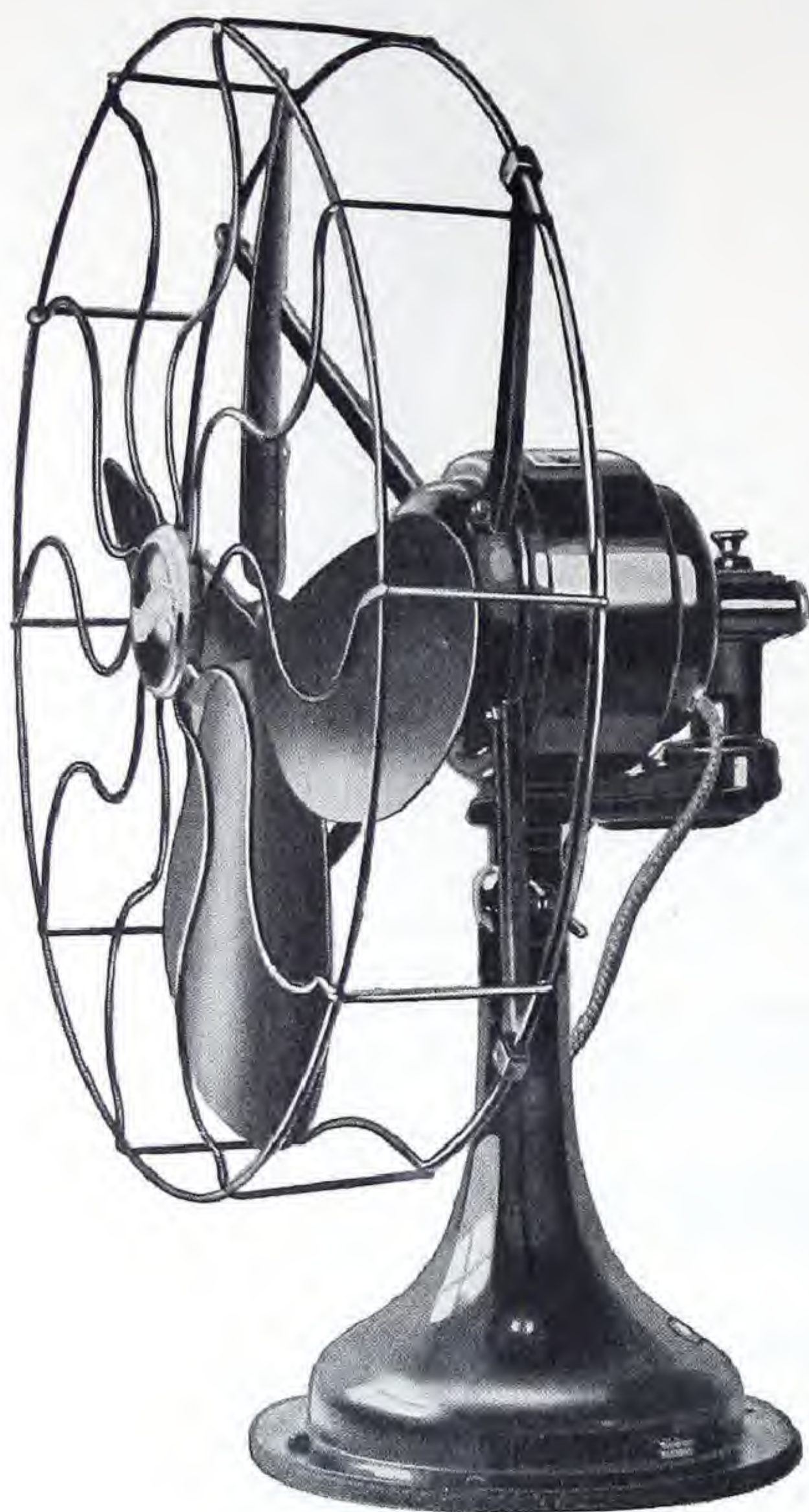
List Price \$13.50

HOW TO FIGURE COST OF OPERATING ANY ELECTRICAL APPLIANCE

Lay a rule across this chart. Place ruler edge at the left of chart on proper watts taken by appliance, then running across raise or lower the rule in center to point on center line giving local rate. You can now read the costs in cents to operate an appliance for one hour. The answer is on line with your ruler's edge as it appears at extreme right. The answer is in cents.



WESTINGHOUSE FANS



16 Inch Oscillating

WESTINGHOUSE FAN MOTORS

Powerful, Quiet, Economical

Westinghouse Fan Motors have built into them all the experience and skill Westinghouse has gained in the construction of millions of fan motors.

The 12 and 16 inch fans have slow speed motors, 1000 RPM which gives more quiet operation and longer life than the ordinary 1500 RPM fan motor.

Westinghouse Fan Motors are noted for their high efficiency in moving great volumes of air for the current consumed. Rivetted laminations and large bearings prevent vibration. Lubrication is required only once a season.

The 10, 12 and 16 inch fans are provided with moulded Micarta blades which are lighter and stronger than metal blades and are easier to keep clean. They are much superior to metal for quiet operation and permanently retaining correct shape.

WESTINGHOUSE FANS



12 Inch Oscillating

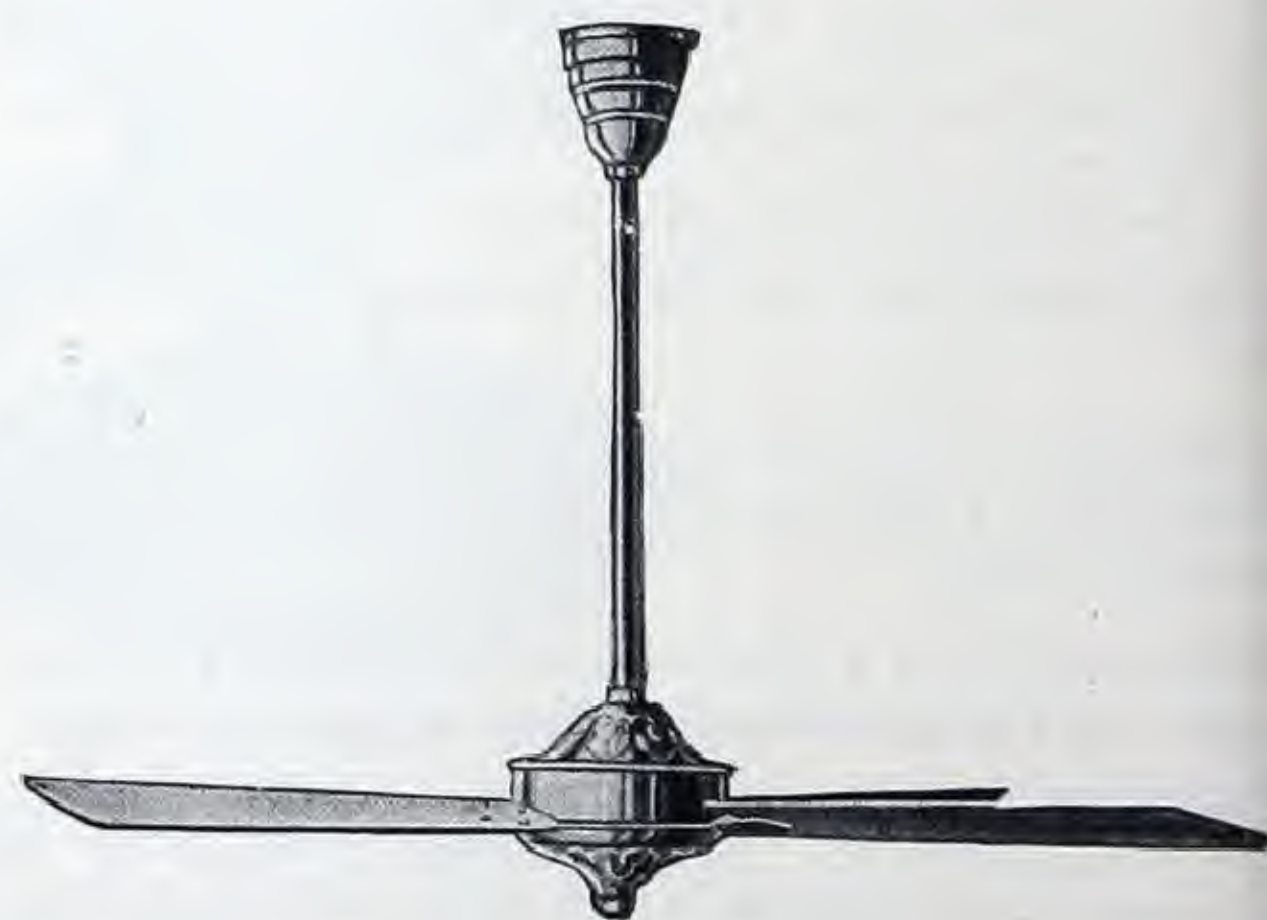
OSCILLATING FANS

The Westinghouse Oscillating Fan is designed to sweep the far corners of a large room several times a minute.

Made in four sizes with capacities ranging from 365 to 1720 cubic feet per minute, they provide for every requirement. The fan may be tilted either upward or downward and may be mounted if desired in either a vertical or horizontal position.

The oscillating movement may be instantly adjusted for either a 45° or 90° arc or for a steady blow.

The sturdy guards, joints and control switch are in every way superior in quality and construction to the ordinary fan.



CEILING FANS

Westinghouse Ceiling Fans keep refreshing air constant in circulation at the very minimum cost for current. The extremely quiet operation together with automatic oiling system is designed to give many years of service with minimum of attention.

Attractive in design and finish, they are the ideal installation for shops and stores.

WESTINGHOUSE FANS

60 CYCLE FANS—100-120 VOLTS

Type	Diam. Inches	No. of Blades	No. of Speeds	List Number	List Price
Non-Oscillating			1	*420550	\$ 6.90
"	8	4	1	*770572	
"	10	4	3	517733	
"	10	4	3	803018	13.25
"	12	4	3	*516909	17.00
Oscillating	8	4	1	517520	28.00
"	10	4	1	517723	13.75
"	10	4	3	803008	19.00
"	12	4	3	12FL3	23.00
"	M12	4	3	800373	36.00
"	16	4	3	*516873	40.00
"	M16	4	3	800377	40.50
Ceiling	36	4	3	653373	48.00
"			3	802627	56.00
"	52	4	3	517192	
"			3	52C3	
Exhaust Horizontal	12	4	1	516931	68.00
"	16	4	1	516942	34.00
Exhaust Vertical	12	4	1	516946	38.00
"	16	4	1	516948	38.00
					42.00

25 CYCLE FANS—100-120 VOLTS

Non-Oscillating	8	4	1	*420550	\$ 6.90
"	10	4	1	517736	17.50
"	10	4	3	803021	20.00
"	12	4	3	*516903	30.00
Oscillating	8	4	1	653431	17.00
"	10	4	1	517728	22.00
"	10	4	3	803013	25.00
"	12	4	3	516853	38.00
"	16	4	3		40.50
Ceiling	36	4	1	699829	59.00
"	52	4	3	699022	72.00
Exhaust Horizontal	12	4	1	516925	36.00
"	16	4	1	516936	41.00

D.C. FANS—100-120 VOLTS

Non-Oscillating	8	4	1	*420550	\$ 6.90
"	10	4	1	517736	17.50
"	12	4	3	516901	33.00
Oscillating	8	4	1	653431	17.00
"	10	4	1	517728	22.00
"	12	4	3	516851	38.00
"	16	4	3	516864	41.00
Ceiling	52	4	3	653439	75.00
Exhaust Horizontal	12	4	1	516923	37.00
"	16	4	1	516934	41.00
Exhaust Vertical	12	4	1	516945	41.00
"	16	4	1	516947	45.00

*Present stock only, no more of these styles will be ordered.

M—Master Aire Fans with capacitor motors.

SPECIAL FEATURES

220 Volt Fans—For 220 volt fans, both A.C. and D.C. Oscillating and Non-Oscillating, also Exhaust Fans, add to schedule price \$2.00; on Ceiling Fans add \$3.00 Net.

30 Volt Fans—D.C.—For 30 volt D.C. fans, use price of corresponding 110 volt D.C. Fans, plus \$2.00 Net.

Ceiling Fans—Style number and price of ceiling fans include fan and wall ring with suspension details.

Exhaust Fans—Style number and price of exhaust fans include fan and wall ring without speed regulator or connector.

Regulator for Fans—A.C. and D.C. 100-120 Volts.

Style—Any style of Alternating Current or Direct Current Regulator.....List Price \$8.00

WESTINGHOUSE FANS

Standard and Special Finishes

Where the finish of the fan is not specified, the standard finish as described in catalogue will be supplied. For special finishes, plated other than chrome, and special spray, the additional net charge will be as follows:

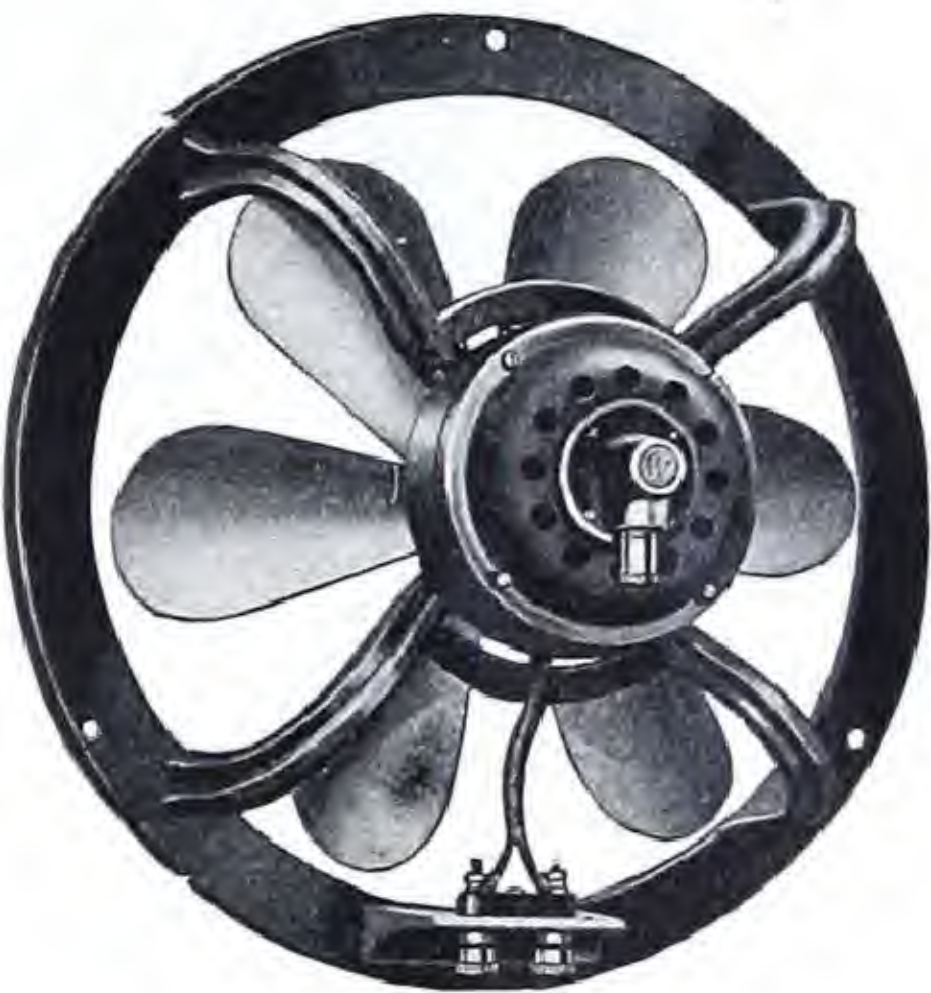
For A.C. and D.C. Desk and Bracket Fan Motors, special finish on motor body, base and guard, 8" and 10", add..... \$3.00

For A.C. and D.C. Desk and Bracket Fan Motors, special finish on motor body, base and guard, 12" and 16", add..... 4.00

For A.C. and D.C. Ceiling Fan Motors, for special finish on motor bodies, metal feet of blades and casing of Hanger Rod for Ceiling Fan Motors, including the ceiling canopy, add..... 8.00

For chromium plated fans, all sizes, add to regular retail price..... 10.00

Cords and Plugs—Desk and bracket type fans are equipped with cord and separate plug—no allowance will be made when cord and plug are omitted.



EXHAUST FANS

Wherever necessary to renew the air completely in a few minutes, Westinghouse exhaust fans may be depended upon for noiseless and efficient operation.

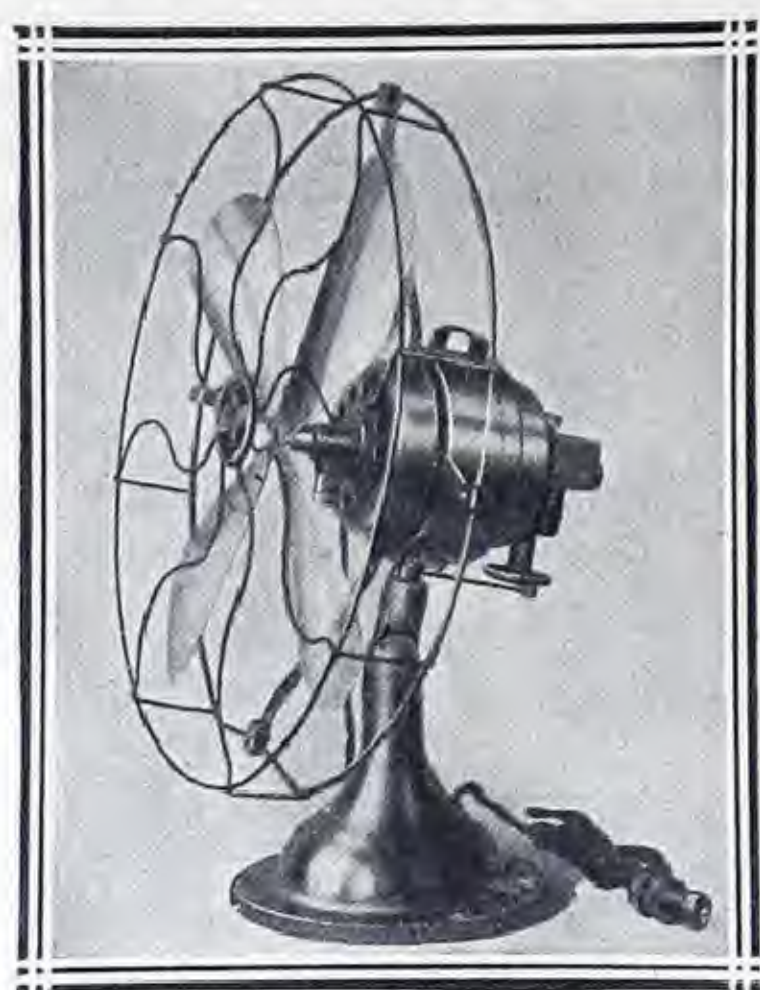
The motors are single speed, but a speed regulator may be supplied. They require repacking only at long intervals.



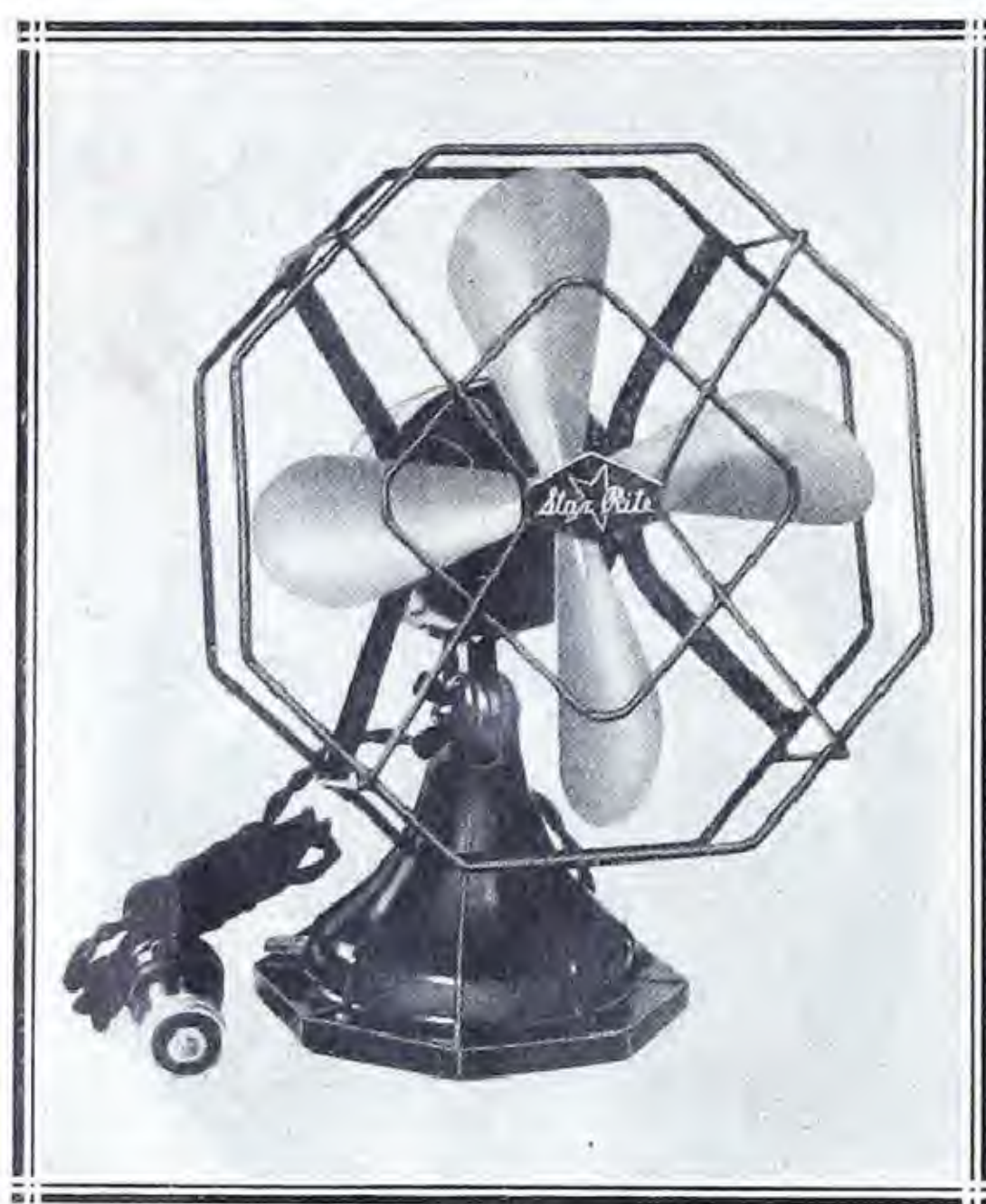
Starrite Ventilating Fans

List No.	Description	List Price
420	10" Universal, Ivory Finish.....	16.95
421	10" Induction, 60 cy.....	15.00

STAR-RITE FANS



No. 416 16" Oscillator



No. 422 8" Non-oscillating

Desk or Wall Fans

Outstanding value in fans. The pleasing modernistic design of base and guard, the smooth, noiseless operation, and the improved dependable oscillating mechanism (motor cannot be injured if oscillation is obstructed) mark the quality high spots of these fans. No interference to radio in inductor models. Adaptable for table use or wall mounting, and an adjustable screw in base permits operation as either a stationary or oscillating fan. Finish black with highly polished brass finished blades. Complete with cord and plug (cap only).

List No.	Description	List Price
422M	8" straight, Induc., 60 cycle.....	\$ 4.95
422UM	8" straight, Universal.....	8.95
431M	8" oscill., Induc., 60 cycle.....	8.95
431UM	8" oscill., Universal.....	11.50
423M	10" straight, Induc., 60 cycle.....	7.95
424M	10" straight, Universal.....	14.50
426M	10" oscill., Induc., 60 cycle.....	11.95
429M	10" oscill., Universal.....	16.50
414	12" oscill., Induc., 60 cycle.....	32.00
414A	12" oscill., 25 cycle.....	35.00
416	16" oscill., Induc., 60 cycle.....	35.00
416A	16" oscill., 25 cycle.....	38.00

UNIVERSAL ELECTRIC WARES

Soldering Irons

Simple and Rigid in Construction
Long Life Heating Unit easily replaced

Solid Copper Tips, Large Cool Handles. Nickel Plated Finish.



No. E9130

No. E9130	Watts 150
Diameter of Tip	$\frac{3}{8}$ in.
Length Overall	14 $\frac{1}{4}$ in.
Weight of Tip	3 oz.
Total Weight	1 $\frac{1}{2}$ lbs.
Weight packed	1 $\frac{7}{8}$ lbs.
List Price.....	\$8.75

Available in higher wattages up to 370 watts and in diameter of tips up to 1 $\frac{1}{2}$ ".

Soldering irons are equipped with 6 ft. cord. Packed one in a carton.

VULCAN ELECTRIC SOLDERING IRONS



No. 10

All "Vulcan" irons equipped with 6 foot approved heater cord and attachment plug cap. They will operate from any lighting socket on either A.C. or D.C.

The bevel and thread of each tip exactly fits the heating head, resulting in exceptional heat conduction efficiency. To replace tips, tap on alternate sides and then unscrew. For best results use only genuine Vulcan Tips.

The Vulcan construction is very simple, consisting of but five complete parts, all easily replaceable. (A Tip, a hermetically sealed heating head, a handle, a cord and a plug).

All Vulcan irons are adjustable in length. Terminals are readily accessible by simply sliding the handle off the stem onto the cord.

List No.	Watts	Net Weight	Tip Dia.	List Price Complete
10	44	10 oz.	$\frac{7}{16}$ "	\$ 6.00
20	50	10 oz.	$\frac{7}{16}$ "	8.00
30	60	12 oz.	$\frac{1}{2}$ "	10.00
40	90	13 $\frac{1}{2}$ oz.	$\frac{1}{2}$ "	11.25
50	120	18 oz.	$\frac{7}{8}$ "	12.75
60	175	22 oz.	1"	14.75
70	220	28 oz.	1 $\frac{1}{8}$ "	17.25
80	310	37 $\frac{1}{2}$ oz.	1 $\frac{3}{8}$ "	20.00
90	430	50 $\frac{1}{2}$ oz.	1 $\frac{5}{8}$ "	23.00

No. 10 is specially designed for light Radio Repairs and home use, while No. 90 is recommended for automobile radiators, copper sinks, roofs, leaders, heavy metal patterns and all heavy soldering work.

Always specify voltage when ordering standard voltages. Standard voltages 32-110-115-120-220-230-240-250 volts. Special voltages \$1.00 extra. (No. 10 Iron supplied only in 32-110-115 and 120 volts).

UNIVERSAL GLUE POTS

Interior of Vessel made of Pure Aluminum
Water Jacket made of Cast Iron
Black Handle

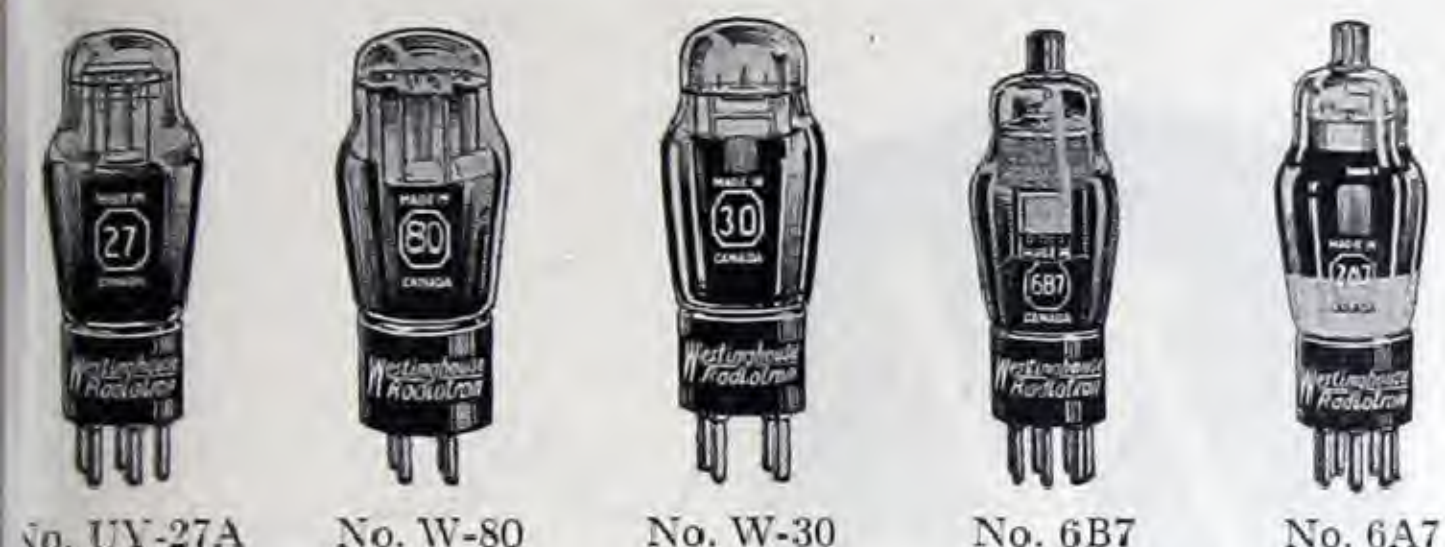


No. E952	1 quart
Diameter	8 in.
Two Heats	110-440 Watts
List Price.....	\$14.75
No. E953	2 quarts
Diameter	9 $\frac{1}{2}$ in.
Three Heats	165-330-660 Watts
List Price.....	\$17.75
Weight packed	11 to 18 lbs.

Glue Pots equipped with 6 ft. Cord. Packed one in a carton.

RADIO RECEIVING SET TUBES

Westinghouse Radiotrons



Type	Description and Filament Voltage	List
-A-6	Pentagrid Converter—2.0	\$2.50
-C-6	Pentagrid Converter—2.0	2.75
-A-3	Power Amplifier Triode—2.5	2.50
-A-5	Power Amplifier Pentode—2.5	1.75
-A-6	Duplex Diode High-Mu Triode—2.5	1.85
-A-7	Pentagrid Converter—2.5	2.40
-B-7	Duplex-Diode Pentode—2.5	2.40
-Z-3	Rectifier—Full Wave—5.0	1.75
-A-4	Power Amplifier Pentode—6.3	2.15
-A-6	Class "B" Twin Amplifier—6.3	2.20
-A-7	Pentagrid Converter—6.3	2.40
-B-7	Duplex-Diode Pentode—6.3	2.40
-C-6	Triple Grid Detector Amplifier—6.3	1.85
-D-6	Triple Grid Super-Control Amplifier—6.3	1.75
-F-7	Triode Pentode—6.3	2.75
12-Z-3	Rectifier—Half-Wave—12.6	1.75
25-Z-5	Rectifier Doubler—25.0	1.75
00-A	Detector—5.0	2.50
01-A	Detector Amplifier—5.0	1.10
01-B	Detector Amplifier—5.0	1.10
01-C	Detector Amplifier—5.0	1.10
WI	Rectifier—Half-Wave—6.3	2.10
IV	Rectifier—Half-Wave—6.3	1.55
UX-10	Power Amplifier Oscillator—6.5	4.00
WD-11	Detector Amplifier—1.1	3.00
WX-12	Detector Amplifier—1.1	3.00
UX-12-A	Amplifier, Detector—5.0	1.30
15	Pentode—2.0	4.40
19	Class "B" Twin Amplifier—2.0	2.00
UX-20	Power Amplifier—3.3	1.75
WX-20	Power Amplifier—3.3	1.75
UX-21-B	Power Amplifier—5.0	3.00
UX-22	R. F. Amplifier—3.3	2.20
UY-24-A	R. F. Amplifier—2.5	1.75
WX-25	Amplifier Detector—5.0	1.30
UX-26	Amplifier—1.5	1.10
UY-27-A	Detector Amplifier—2.5	1.15
W-30	Detector Amplifier—2.0	1.30
W-31	Power Amplifier—2.0	1.30
W-32	R. F. Amplifier—2.0	2.25
W-33	Power Amplifier Pentode—2.0	1.95
W-34	Super-Control R. F. Amplifier Pentode—2.0	2.25
W-35-A	Super-Control R. F. Amplifier—2.5	1.75
W-36	R. F. Amplifier—6.3	1.70
W-37	Detector, Amplifier—6.3	1.25
W-38	Power Amplifier Pentode—6.3	1.75
W-39-44	Super-Control R. F. Amplifier Pentode—6.3	1.80
UX-40	Voltage Amplifier—5.0	1.30
W-41	Power Amplifier Pentode—6.3	1.70
W-42	Power Amplifier Pentode—6.3	1.80
W-43	Power Amplifier Pentode—25.0	2.00
UX-45	Power Amplifier—2.5	1.20
W-46	Dual Grid Power Amplifier—2.5	1.70
W-47	Power Amplifier Pentode—2.5	1.60
W-48	Power Amplifier Tetrode—30.0	4.50
W-49	Dual Grid Power Amplifier—2.0	1.70
UX-50	Power Amplifier—7.5	4.00
W-53	Class "B" Twin Amplifier—2.5	2.15
W-55	Duplex Diode Triode—2.5	1.75
W-56	Super-Triode Amplifier Detector—2.5	1.25
W-57	Triple-Grid Detector Amplifier—2.5	1.75
W-58	Triple-Grid Super-Control Amplifier—2.5	2.25
W-59	Triple-Grid Power Amplifier—2.5	2.40
W-71-A	Power Amplifier—5.0	1.20
W-75	Duplex-Diode Triode—6.3	1.75
W-76	Super-Triode Amplifier Detector—6.3	1.30
W-77	Triple-Grid Detector Amplifier—6.3	1.85
W-78	Triple-Grid Super-Control Amplifier—6.3	2.35
W-79	Class "B" Twin Amplifier—6.3	2.55
W-80	Rectifier—Full-Wave—5.0	1.10
W-81	Rectifier—Half-Wave—7.5	4.00
W-82	Mercury Vapor Rectifier—Full-Wave—2.5	1.45
W-83	Mercury Vapor Rectifier—Full-Wave—5.0	1.55
W-83 V	High Vacuum Rectifier—Full-Wave	3.00
W-84	Rectifier—Full-Wave—6.3	2.00
W-85	Duplex-Diode Triode Amplifier—6.3	1.80
W-89	Triple-Grid Power Amplifier—6.3	1.85
UV-99	Detector, Amplifier—3.0-3.3	2.00
UX-99	Detector, Amplifier—3.0-3.3	2.00
WX-99	Detector, Amplifier—3.0-3.3	2.00

ELECTRICAL RESISTANCE WIRES

CHROMEL "A"

This is the first nickel-chromium alloy ever made for resistance purposes. Its composition is 80 per cent. nickel and 20 per cent. chromium.

It is an accepted fact that this alloy resists oxidation more vigorously than any other base metal combination. It has become the standard alloy for electrical heating elements which run at temperatures between 1400° F. and 2000° F. and which are exposed to the air. Some of its specific applications are in ranges, radiant heaters, grills, hot plates, and electric furnaces.

Chromel "A" is used almost universally in the heating elements of industrial and laboratory electric furnaces. On these applications durability is the first requisite. The temperature is generally high, and the operation continuous.

CHROMEL "C"

This is a nickel-chromium-iron alloy containing about 25 per cent. iron and 11 per cent. chromium.

The iron content somewhat lowers its durability at high temperatures, yet it is very satisfactory for certain uses. Although not quite so resistant to oxidation as Chromel "A" or "B," yet it finds extensive use in flat-irons, toasters and other devices.

It is well suited for electrically heated devices operated at rather low temperatures, or where the heating elements are enclosed, as in flat-irons, and thus protected to a certain degree against oxidation.

For radio rheostats, Chromel "C" is particularly suited, because of its very high resistance—about 65 times that of copper—and because atmospheric conditions cannot cause it to corrode. It allows the construction of permanent and compact apparatus.

COPEL AND NICKEL-MANGANESE

Copel is an alloy of 55 per cent. copper and 45 per cent. nickel.

Its principal characteristic is a temperature-coefficient that is practically nil. This property suggests its use in certain electrical instruments where an extremely low, or negligible, temperature-coefficient is desired.

Copel is practically non-corrosive under ordinary atmospheric conditions, and has a fairly high electrical resistance, the average being 298 ohms per cir. mil foot at 75° F. These two properties recommend it for use in rheostats, particularly for radio work.

Copel is also a good alloy for "hot" resistance purposes where the temperature is not above 800° F.

HOSKINS PURE NICKEL

No. 651

Nickel, No. 651, is the purest obtainable. This purity is evidenced by the very low resistivity of the wire, and its very high temperature coefficient of resistance. The value of this coefficient depends on the temperature range as follows, from which may be calculated the resistance at various temperatures:

Temperature Range, °F.	Coefficient per °F.
68° to 200°	.0035
68° to 400°	.0039
68° to 600°	.0045
68° to 800°	.0046
Temperature Range, °C.	Coefficient per °C.
20° to 93°	.0063
20° to 204°	.0070
20° to 316°	.0081
20° to 427°	.0083

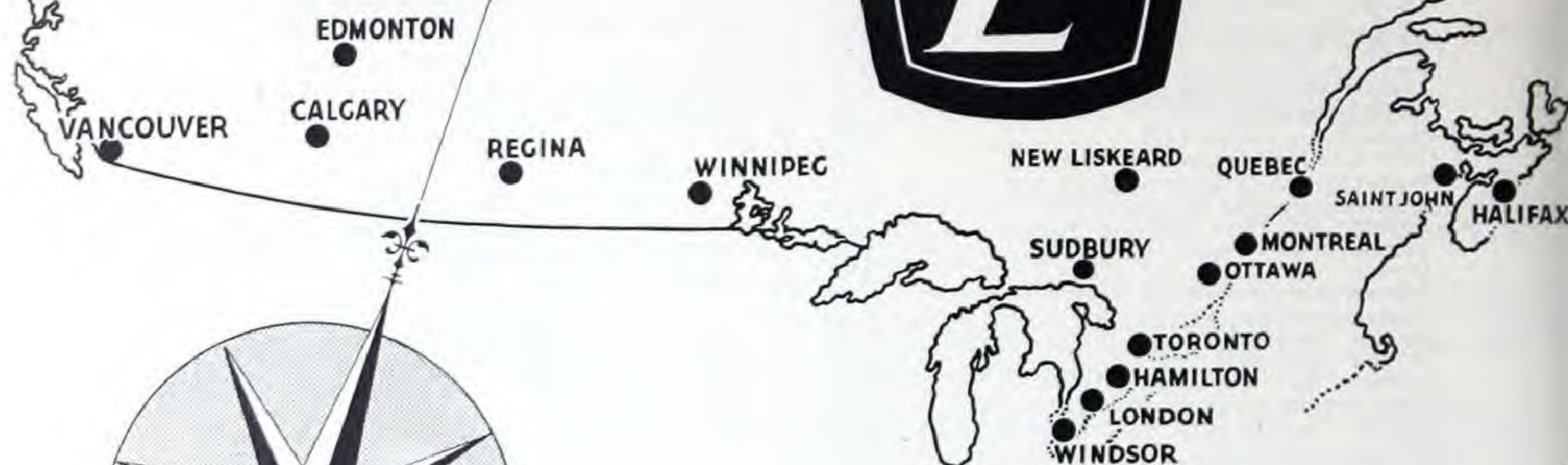
Resistivity at 68° F. = 50 ohms per Cir. Mil-Foot.

Resistivity at 20° C. = 8.30 microhms per Cm. Cube.

Specific Gravity = 8.86 Pounds per Cu. In. = 0.320

Prices on application.

A National Electrical Service



Serving all Canada

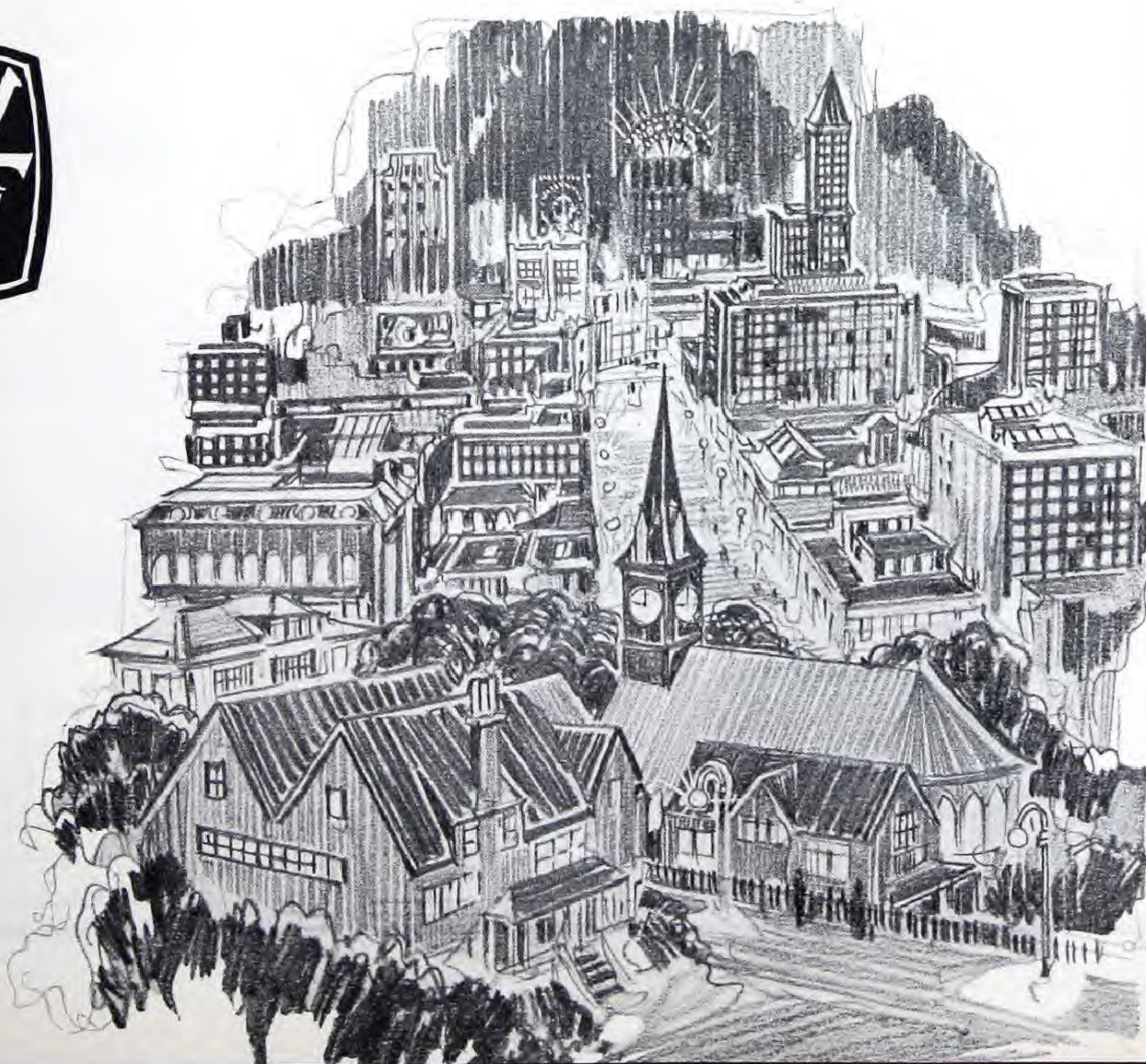
You are never far from a Northern Electric distributing house, each one of which is stocked and staffed to render a complete electrical service for public utility, industrial, amusement, municipal and home requirements. This national electrical service has been built up over the years through a wealth of manufacturing and research experience. Let it simplify your electrical problems and point the way to real economies.

for
**ILLUMINATION
EQUIPMENT
INDEX**

See Back of
this Page

*See alphabetical index for
page numbers of listings
at back of book.*

Whatever your problem may be in Residential, Commercial, Industrial, Church, School or even Street Lighting, you will find in this catalogue a representative selection of the best and latest in lighting equipment to choose from. » Experienced Lighting Specialists are located at our many distributing centres, alert to assist you with your lighting problems. We want you to take full advantage of their services.



**ILLUMINATION
EQUIPMENT**

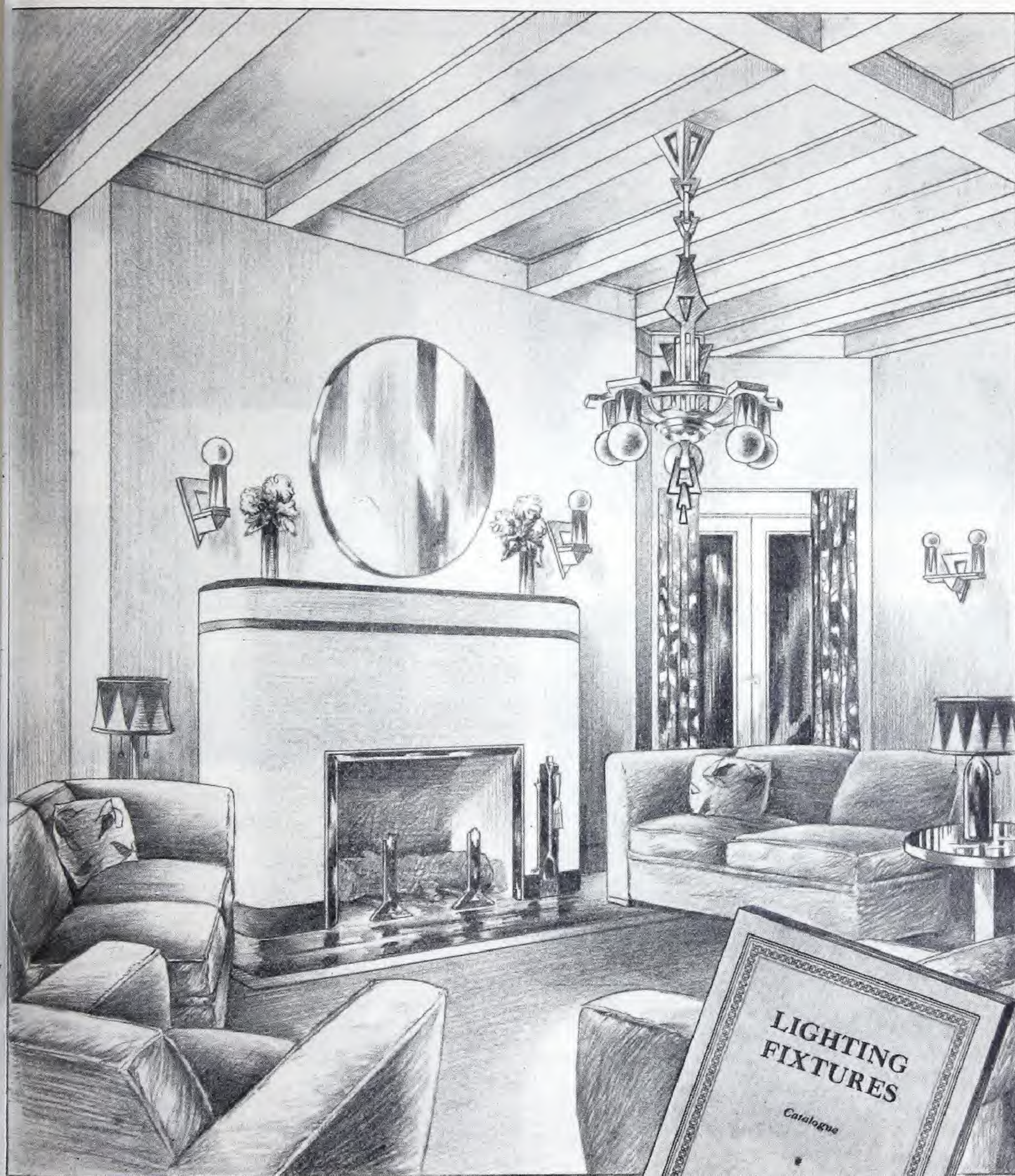
ILLUMINATION EQUIPMENT



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Vaporproof Reflectors

RESIDENTIAL LIGHTING FIXTURES



Since Residential Lighting Fixtures, like the clothes we wear, are subject to seasonal and yearly changes in styles, we are not, therefore, listing them in this catalogue in detail. Whenever you are in the market for Residential Lighting Fixtures, write to our nearest branch for a copy of our very latest Residential Lighting Fixture catalogue. A copy will then be mailed you promptly.

MODERN DECORATIVE LUMINAIRES

for
BEDROOM—SUN PARLOR—BATHROOM—DINETTE



No. 491/D.6
Length Overall 10"
Extension 5"
(Furnished with Pin Switch)



No. 494/D.6
Diameter of Glass Disc 7½"



No. 496/D.6
Diameter of Glass Disc 14"

Note: Ceiling Holders shown on No. 496/D.6. is for illustration purposes only and will not be furnished.

List No.	Description	List Price
491/D.6—Wired Complete		\$11.25
494/D.6—Wired Complete		10.00
496/D.6—Glassware Only—With Chromium Banding on Disc		7.05
496/D.6—Glassware Only—Without Chromium Banding on Disc		6.50

Glassware is furnished with standard 4" fitter and can be attached to any 4" holder.

Note: No. 491 and No. 494 are furnished wired complete and finished in "Chromalume" finish.

(Chromalume is a highly polished cast Aluminum, and looks like Chrome).

LE MODE LUMINAIRE

for
SUN PARLOR—BREAKFAST ROOM—BEDROOM
AND DINETTE



No. 82/D. 3
[2 Lights]



No. 80/D. 4
[3 Lights]

No. 80 is furnished with a metal reflector, which eliminates the unpleasant halo of light around the edge of the ceiling band.

Finish of Fixtures:

CHROMIUM ANTIQUE IVORY.

Choice of Glassware: D. 3, D. 4.

List No.	Dimensions		List Prices	
	Dia.	Length	Chromium	Ivor
82/D. 3	15"	x 8"	\$19.25	\$14.00
82/D. 4	15"	x 8"	18.75	13.50
80/D. 3	15"	x 3"	14.25	10.50
80/D. 4	15"	x 3"	13.75	10.00

When ordering, please mention:

- (1) Number of Fixture.
- (2) Finish of Fixture.
- (3) Number of Decorated Glass

All fixtures are furnished wired complete and packed on to a carton.

BEDROOM UNITS AND SHADES

MADE OF "IVORY" GLASS



No. 7541B



No. 7531B



No. 7507B

List No.	Std. Pkg.	Dimensions			Std. Pkg. Wgt.	List Price Each
		Width	Length	F'ter		
7541B....	4	9"	x 5 1/4"	x 4"	14 lbs.	\$5.00
7507B....	12	7"	x 4 1/2"	x 2 1/4"	17 lbs.	4.00
7531B....	12	5"	x 4 1/2"	x 4"	18 lbs.	3.75

Tinting

A brown tint is blended onto the "IVORY" glass and faint touches of Pastelle color are applied to the raised floral designs.



No. 199T



No. 197T

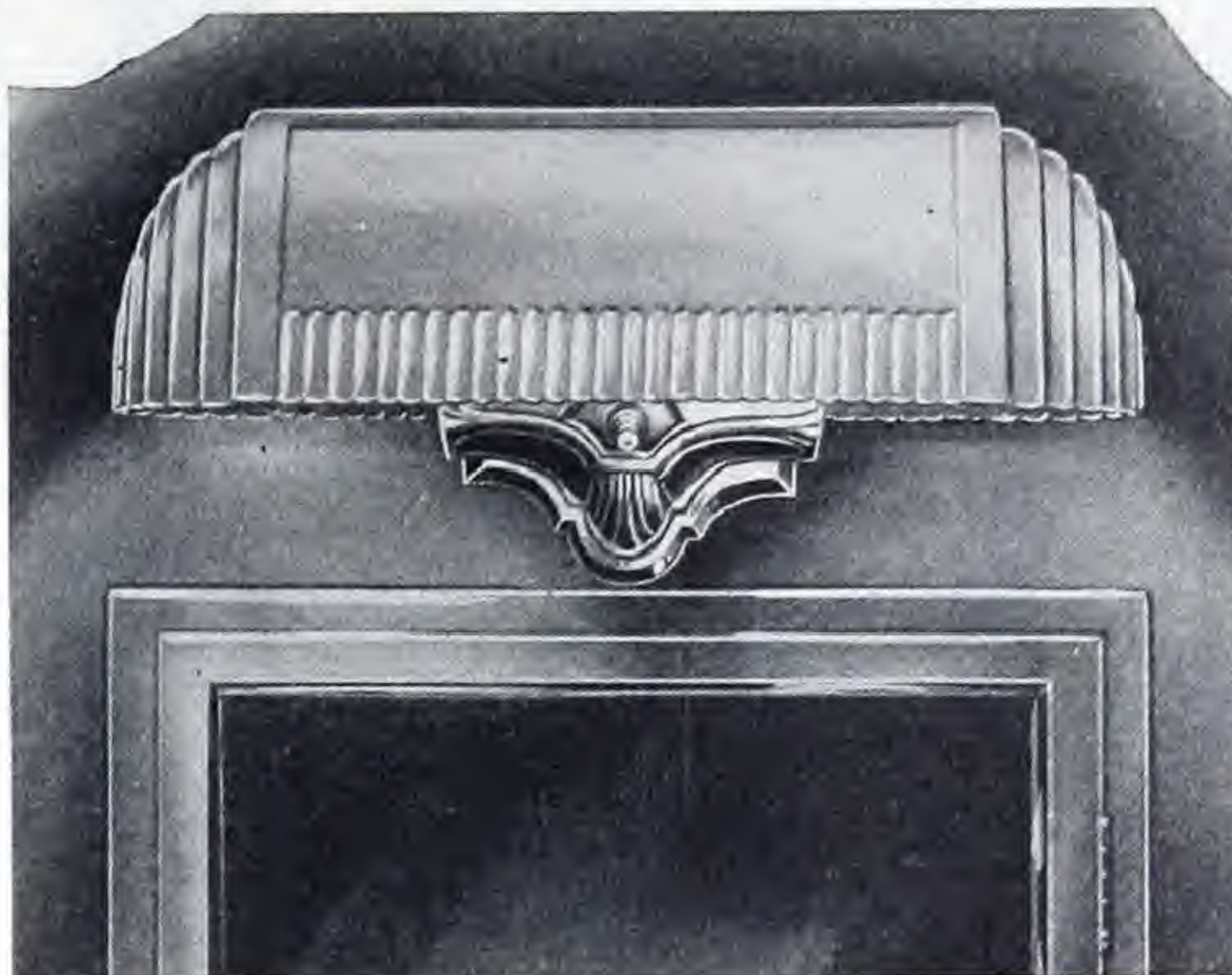
List No.	Glass	Std. Pkg.	Dimensions (Inches)			Std. Pkg. Wgt. Lbs.	List Price Each
			W'th	L'th	F'ter		
199T	"Ivory" Tinted.	12	9x7	x4		30	\$5.00
197T	"Ivory" Tinted.	12	7x6 1/4	x2 1/4		21	2.50

BATHROOM AND KITCHEN

CHROMIUM PLATED WALL BRACKETS

Wall Brackets of distinction, for Medicine Cabinets and over Kitchen Sinks.

Highly polished CHROMIUM with genuine "VELVA" glassware.

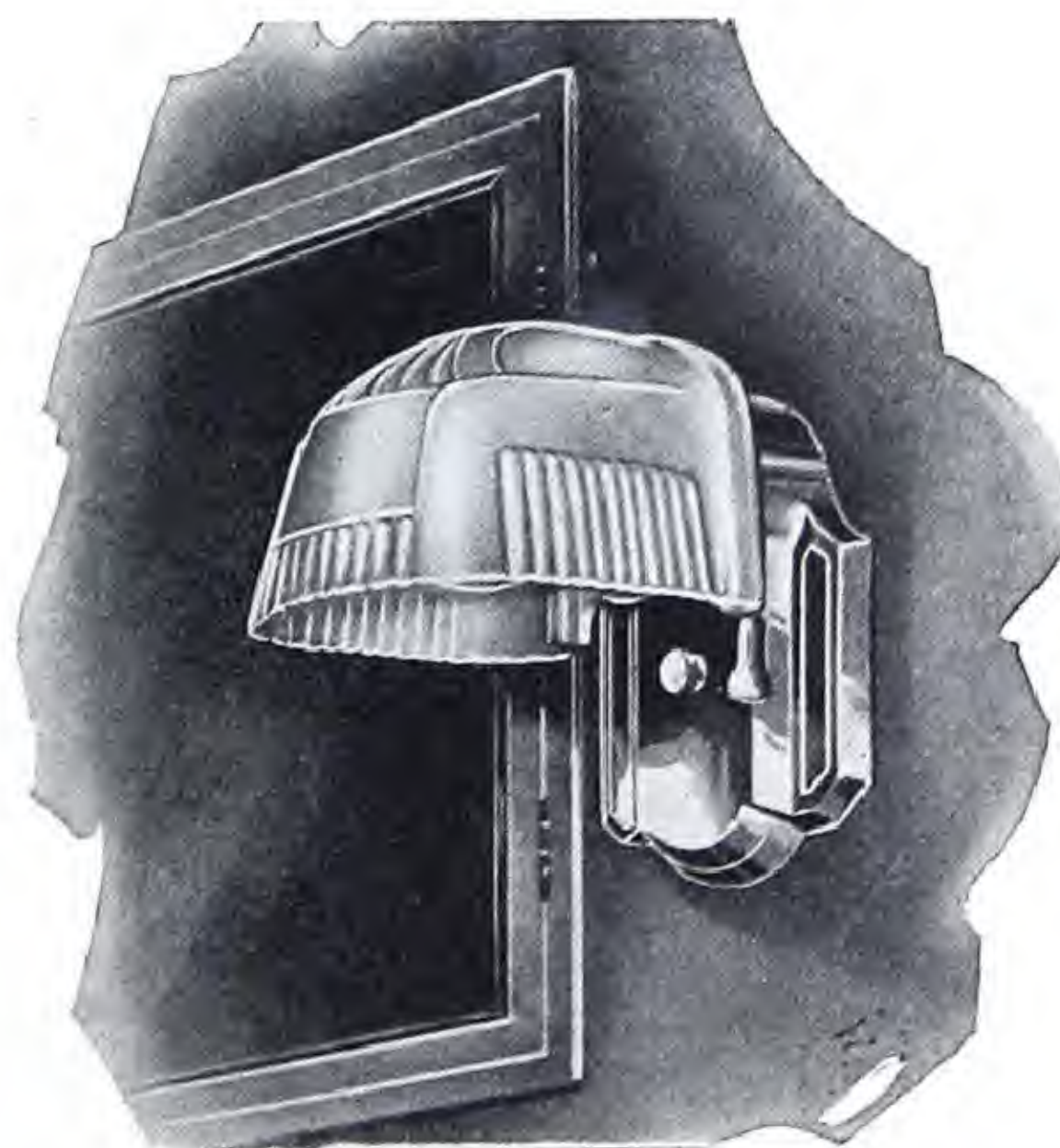


B. 143 [2 Lights]

Length of Bracket Back.....	5 1/4 inches
Width of Glass Shade.....	12 3/4 inches
Extension from Wall.....	6 1/4 inches

[With Canopy Switch].

List Price.....	\$13.75
-----------------	---------



B. 142 [1 light]

Length of Bracket Back.....	5 3/4 inches
Width of Bracket Back.....	4 1/4 inches
Extension from Wall.....	6 3/4 inches

[Pull Chain].

List Price.....	\$6.50
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When ordering, please specify fixture number.

All Brackets are furnished wired with approved wiring materials, and packed complete with glassware in individual cartons.

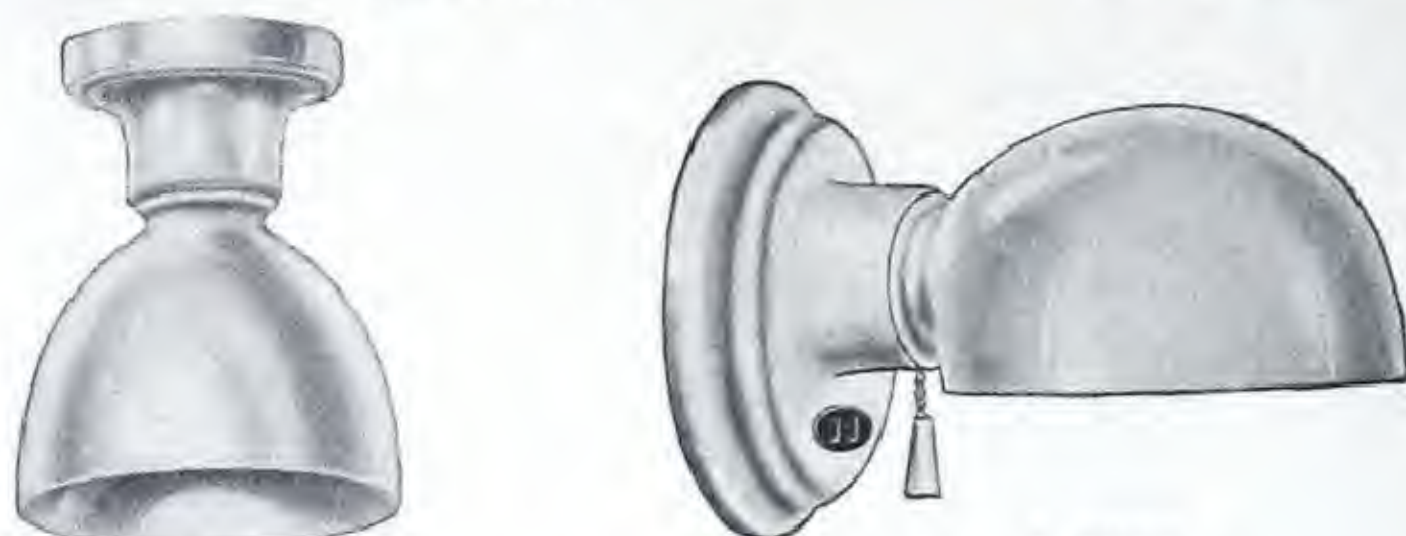
GUTH PORCELAIN ENAMEL AGLITE UNITS

For bathrooms, toilets and hospitals



No. A-1077

No. A-1066



No. A-1064

No. A-1075

Nos. A-1076 and A-1077

With Adjustable Shade Canopy, 4½ in. Diameter. Extends 8¼ in. Overall Opal Glass No. G3144.

List No.	Socket	List Price
A1076	Keyless	\$3.25
A1077	Chain Pull	3.75

White or Ivory Fluted Shades can be furnished at 30c list additional.

Nos. A-1066 and A-1077

Canopy, 4½ in. Diameter.

List No.	Socket	List Price
A1066	Keyless	\$1.60
A1067	Chain Pull	2.10

Can also be furnished in Black.

Nos. A-1064 and A-1065

Length, 7½ in. overall. Canopy, 4½ in. Diameter. Opal Glass 6¼ x 2¼ in. No. G1382.

List No.	Socket	List Price
A1064	Keyless	\$3.00
A1065	Chain Pull	3.50

White or Ivory Fluted Shades can be furnished at \$1.35 list additional.

Nos. A-1072 to A-1075

With Adjustable Shade. Canopy, 6 x 4¾ in. Extends 8½ in. overall. Opal Glass No. G3144.

List No.	Equipment	List Price
A1072	Keyless, without Plug	\$3.40
A1073	Chain Pull, without Plug	3.90
A1074	Keyless, with Plug	4.00
A1075	Chain Pull, with Plug	4.50

White or Ivory Fluted Shades can be furnished at 50c list additional.



No. A-3349

Nos. A-3346 to A-3349

Canopy, 6 x 4¾ in.

Extends 3½ in. overall

List No.	Equipment	List Price
A3346	Keyless, without Plug	\$3.00
A3347	Turn Switch, without Plug	3.60
A3348	Keyless, with Plug	3.40
A3349	Turn Switch, with Plug	4.00

GUTH PORCELAIN ENAMEL PENDANTS

For

Laboratories, Laundries, Hospitals, etc.



No. S-74350

No. A-3349

No. S-74350

Porcelain enameled steel pendants, with screwless internal safety holder—30" long overall—additional length—24" sections or less, 0.50 list—with chromium coupling.

List Price

4" Medium socket	\$11.65
6" Medium socket	12.10
6" Mogul socket	13.25

GUTH PORCELAIN ENAMEL FLANGES



No. K-1166

Guth one-piece flange is made of rust-resisting Armco iron. Aglites of polished cold-rolled steel, with permanent Lumo-Vitro Enamel finish.

The Guth flange is installed with the greatest ease and rapidity. The self-adjusting patented spring glass holder obviates rattling or breakage; instantly engages or releases glassware, no bothersome set screws. They are dust proof and have a perfectly smooth glossy porcelain finish that is easily cleaned.

All flanges regardless of exterior color have white enameled surface inside glass, which assures maximum light output. The enamel surface outside assures highest efficiency.

Guth flange is non-vibrating—self-adjusting—dust proof. No visible screws. Knockouts for switches. Approved by fire underwriters.

Ideal for use in schools, offices, stores, public buildings, hospitals, etc.

List No.	Lights	Socket	Diam.	Fitter	List Price
K1164	1	Medium	7½"	4"	\$2.65
K1166	1	Medium	10 "	6"	3.10
K1167	1	Mogul	10 "	6"	3.75
*K3395	2	Medium	10 "	6"	5.10

Standard finishes—White, ivory, antique bronze and black.

Polished chromium—Made of brass, 4" fitter \$1.75 list additional—6" fitter \$2.40 list additional.

One complete unit packed in separate carton.

*One socket positioned for night light.

GUTH SUPER ILLUMINATORS

Luminous Bowl Indirect Lighting

The satin finish glass bowl illuminates the inside of the reflector, without glare — and adds to the beauty of the individual units and to the complete installation.



No. R-4910



No. R-4355

Guth Super Illuminators not only reflect the maximum amount of light for wattage used—but they also properly distribute the light over a wide area through the use of wide angle reflectors. They produce efficient, uniform lighting intensities, eliminating glare from the light source, also shadows and undesirable reflection.

They fit into standard outlets without the necessity of special wiring. Easy to install—the swivel joint stem assures true hanging regardless of position of fixture stud or outlet. Canopy slips over swivel thus simplifying installation. Easy to service—for cleaning or relamping, simply unhook one of the three supports which attach the reflector to the socket cover.

List No.	Watts	Base	Diam.	Lgth.	List Price
R4910	100	Medium	12"	26"	\$18.50
R4912	150-200	Medium	14"	30"	20.00

Brass and aluminum.

Finish—No. F781—Pewter and Old Gold. Decalcomania medallions on outside of reflector. Inside reflector, white oxide.

R4355	150-200	Medium	14"	30"	\$17.00
R4357	300-500	Mogul	18"	36"	24.80
R4359	750-1500	Mogul	22"	42"	31.50

Built of Brass and Aluminum.

Finish—Chromium, and satin and polished aluminum. Inside reflector, white oxide.

Finishes other than specified above, 20% list, additional. 100 Watt lamp requires socket extension.

Canopy Pull Switch \$1.00 list additional, (knockout in canopy).

6-inch lengthening MP-2018...60c list. 12 inch lengthening MP-2019...85c list.

Luminous Glass Bowl available tinted, as ordered—Amber, Blue, Pink or Green—without extra charge.

3-Light Lamp Equipment—Mogul 3-Light Socket \$1.40 list, additional. 3-Light Canopy Pull Switch \$2.10 list, additional.

Packed in individual cartons.

GUTH SUPER ILLUMINATORS



No. R4671

List No.	Watts	Base	Dia.	Lgth.	List Price
R4671	150- 200 Watts	Medium	14"	30"	\$24.20
R4672	300- 500 Watts	Mogul	18"	36"	31.50
R4673	750-1500 Watts	Mogul	22"	42"	41.50

Built of brass and aluminum.

Finish—Chromium, and satin and polished aluminum. Inside reflector, white oxide.



No. R4474

INDIRECT LIGHT WALL BRACKETS

(For one 150-200 Watt Lamp)

Built of aluminum and brass.

Finish—No. F785, satin and polished cadmium. Inside reflector, white oxide.

Luminous bowl—Satin finished crystal glass (white or tinted amber, blue, pink or green at no extra charge.) Switch in canopy.

Size—Extends 12½" from wall—Height 11½".

Reflector—12" diameter.

List No.	Description	List Price
R4474	As illustrated.....	\$28.50
R4477	With ornaments to match No. R4671.....	33.95

NOVEL LIGHTING UNITS

for
BEER GARDENS—TAVERNS—TAP ROOMS

The fixtures and keg-supporting brackets, which are made of cast aluminum are true reproductions of real wood carving and the antique wood finish applied is so realistic as to challenge detection.



No. 8135 (5 Lights)

Overall Length.....42 inches
Spread.....20 inches

List Price Each wired complete \$24.00

List No.	Finish	Glasses Only		Dimensions		Fitter
		Diameter		Length		
2700	Oak Color	10"	x	12"	x	6"
2700	"Hyperion" White	10"	x	12"	x	6"
2710	Oak Color	10"	x	10"	x	6"
2710	"Hyperion" White	10"	x	10"	x	6"
2706	Oak Color	5"	x	6"	x	3 1/4"
2706	"Hyperion" White	5"	x	6"	x	3 1/4"

List No.	Standard Carton	Weight Standard Carton	List Price
2700	1	6 lbs.....	\$10.00
2700	1	6 lbs.....	7.00
2710	1	5 1/2 lbs.....	7.50
2710	1	5 1/2 lbs.....	4.50
2706	12	20 lbs.....	3.75
2706	12	20 lbs.....	2.50



No. 8101 (1 Light Bracket)

Length.....8 1/2 inches
Extension.....7 1/2 inches

(With Canopy Switch)

List Price Each wired complete.. \$10.00

Units can be furnished in Oak Color
or "Hyperion" White.

Specify color desired.

Glass kegs furnished are regular No. 2706:

Diameter.....5 inches
Length.....6 inches
Fitter.....3 3/4 inches



No. 2700

With Clear Crystal Bottom and Metal
Connecting Ring

MODERNE LOUVRE LUMINAIRE

with
"HYPERION" GLASSWARE



No. 714—L3309
No. 716—L3312
No. 716—L3314
No. 716—L3316

Fixtures are furnished wired complete with No. 16 Heat Resisting Wire, and with Porcelain Medium Base Sockets. Add 0.45 List for Mogul Sockets.

Fixtures are furnished only in Chromal finish, a two-tone combination of Polished Chrome on the louvres and Satin finished Aluminum on the pendants.

List No.	List Price Fixture Complete	List Price Glass-ware and Louvres only	Dimensions of Glassware only Diam. Lgth. Fitter	Overall Length of Fixture Complete Ins.
714—L3309	\$15.00	...	9" x 9 ⁷ / ₈ " x 4"	36
716—L3312	17.25	...	12" x 11 ¹ / ₄ " x 6"	39
716—L3314	18.75	...	14" x 11 ³ / ₈ " x 6"	39
716—L3316	22.00	...	16" x 11 ¹ / ₂ " x 6"	39
L3309	...	\$6.50	9" x 9 ⁷ / ₈ " x 4"	...
L3312	...	8.50	12" x 11 ¹ / ₄ " x 6"	...
L3314	...	10.00	14" x 11 ³ / ₈ " x 6"	...
L3316	...	13.25	16" x 11 ¹ / ₂ " x 6"	...

For longer overall lengths, add 75c list per foot or fraction of a foot.

MODERNE LOUVRE LUMINAIRE

and
"HYPERION" GLASSWARE



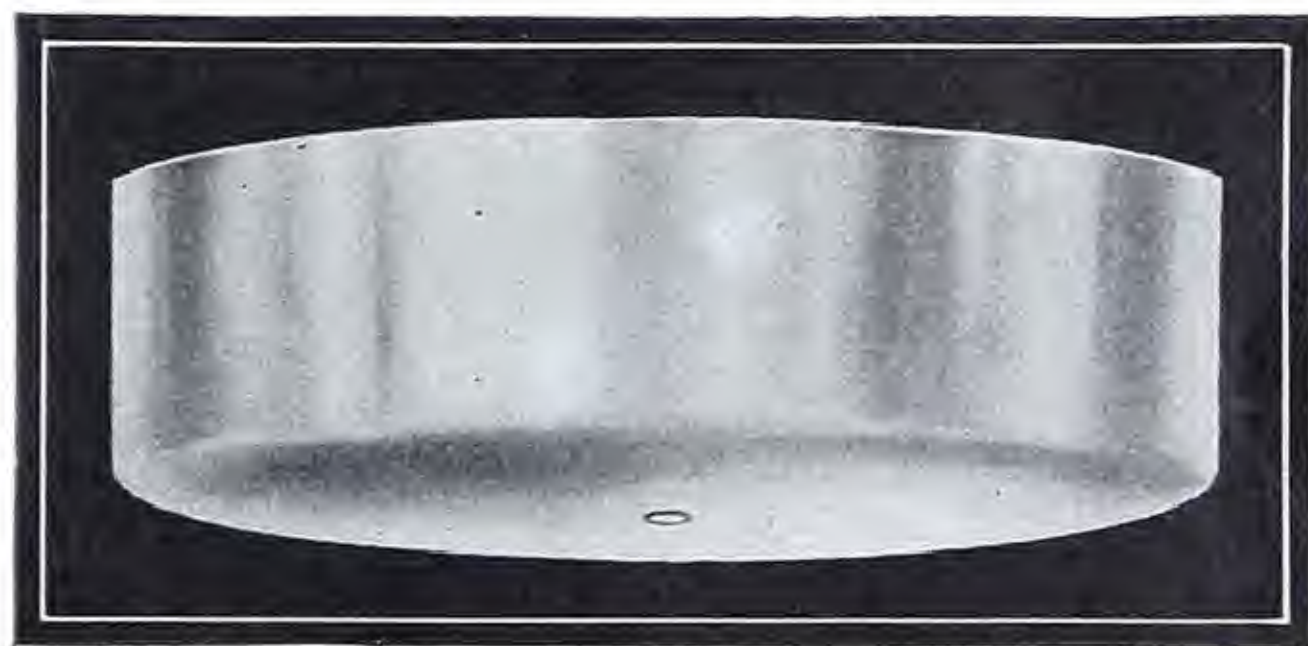
No. 708—L3510
No. 710—L3512
No. 712—L3514

Fixtures are furnished wired complete with metal reflectors, which do not permit the light to form halos on the ceiling.

Fixtures are furnished only in Chromal finish, a two-tone combination of Polished Chrome on the Louvres and Satin finished Aluminum on the Ceiling Bands.



No. 3510 to No. 3514



* No. 3510¹/₂ to No. 3514¹/₂

List No.	List Price Fixture Complete	List Price Glass-ware and Louvres only	List Price Glass-ware only	Dimensions of Glassware Diam. Depth Fitter	No. of lgts.
708—L3510	\$12.50	...	...	10" x 3 ⁷ / ₈ " x 8"	2
710—L3512	15.75	...	...	12" x 4 ³ / ₈ " x 10"	2
712—L3514	20.00	...	...	14" x 4 ⁷ / ₈ " x 12"	3
L3510	...	\$7.50	...	10" x 3 ⁷ / ₈ " x 8"	...
L3512	...	9.50	...	12" x 4 ³ / ₈ " x 10"	...
L3514	...	11.25	...	14" x 4 ⁷ / ₈ " x 12"	...
3510	...	...	\$3.75	10" x 3 ⁷ / ₈ " x 8"	...
3512	...	...	5.75	12" x 4 ³ / ₈ " x 10"	...
3514	...	...	7.30	14" x 4 ⁷ / ₈ " x 12"	...
3510 ¹ / ₂	...	...	4.15	10" x 3 ¹ / ₄ " x *	...
3512 ¹ / ₂	...	...	6.40	12" x 3 ³ / ₄ " x *	...
3514 ¹ / ₂	...	...	7.95	14" x 4 ¹ / ₄ " x *	...

*No Fitter but with Hole in Bottom.

MODERNE LOUVRE UNITS

"Hyperion" Glassware combined with CHROME finished Metal Louvres



No. L601
No. L602
No. L603
No. L604

Note: Standard No. 716 Pendants can be furnished for these Louvre Units.

List No.	List Price Glassware and Louvre	Dimensions of Glassware	Fitter
L601	6.50 List	10" x 6 $\frac{3}{4}$ " x 4"	
L602	8.50 List	12" x 7 $\frac{3}{8}$ " x 6"	
L603	10.00 List	14" x 8" x 6"	
L604	13.25 List	16" x 8 $\frac{3}{4}$ " x 6"	

THE "EXCELITE" WALL BRACKET

METAL WORK FINISHED IN DULL CHROME



Specifications: Wired complete with socket and No. 18 stranded copper Heat Resisting wire, approved by the National Board of Fire Underwriters.

Will take any size Inside Frosted Lamp up to 150 watts.

Length 11 $\frac{1}{2}$ inches, width 10 $\frac{3}{4}$ inches.

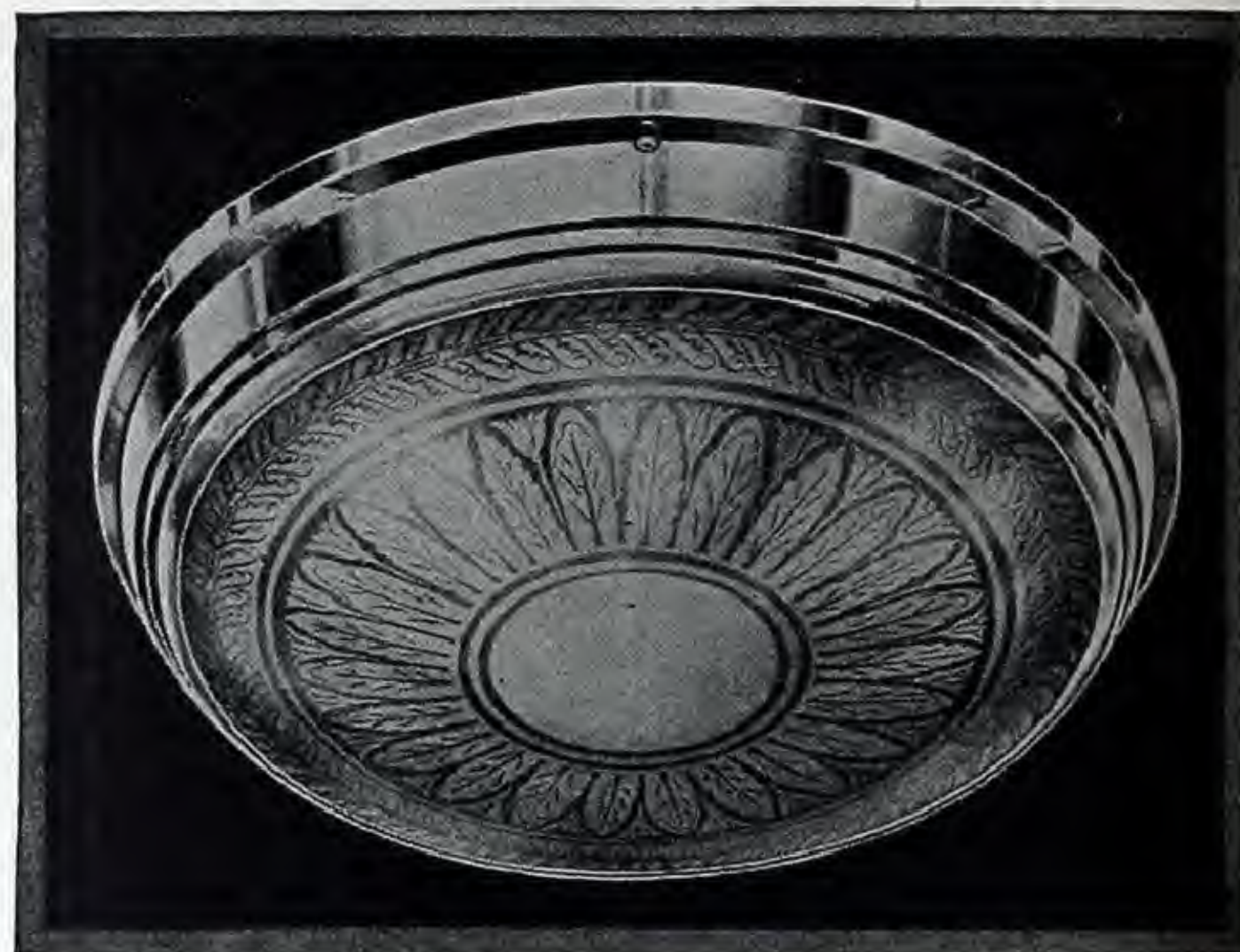
Packed One to a Standard Carton. Weight, 4 lbs.

List No.	Finish of Glass	List Price Each
1611	Plain White	\$11.25
1611 E.	White Etched	16.25
1611 Y.	White "Nukraft," Decorated	13.75
1611 B.	Ivory "Nukraft," Decorated	14.75
1611 W. N.	White "Nukraft," Plain	12.25
1611 I. N.	Ivory "Nukraft," Plain	13.25

Note:—With Pin Switch Control—45c List extra.

Please mention number and specify Finish of Glass desired.

COMMERCIAL LIGHTING FIXTURES WITH CRYSTAL ETCHED GLASSWARE



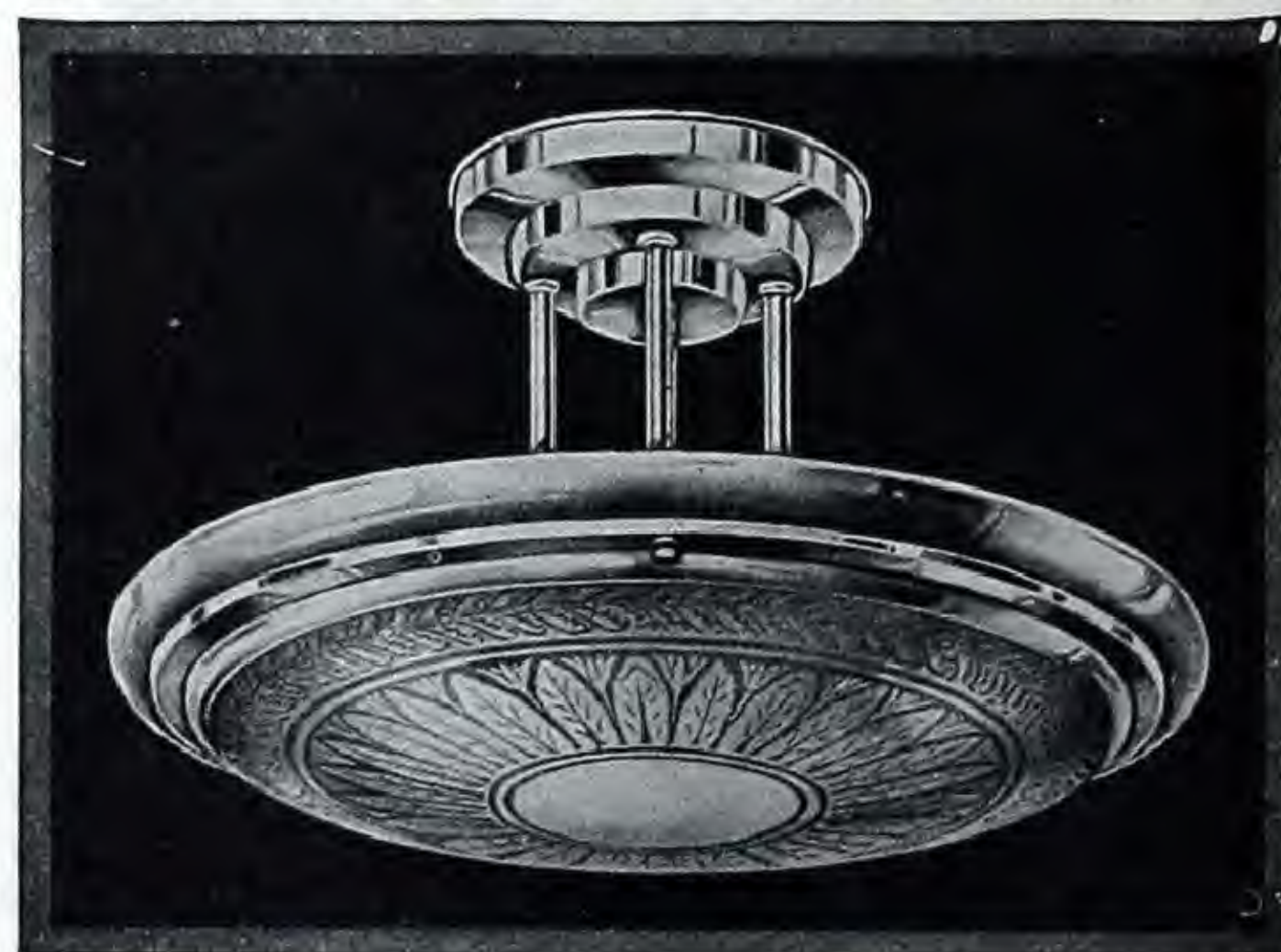
No. 80/D. E. (3 Lights)

Diameter.....15 inches Length.....3 inches
List Price Each—Chromium \$14.50—Cadmium \$14.00
Metal reflector inside stops any light from showing on the ceiling, around the edge of the metal band.



No. 81/D. E. (2 Lights)

Diameter.....15 inches Length.....6 inches
List Price Each—Chromium \$15.50—Cadmium \$14.75



No. 82/D. E. (2 Lights)

Diameter.....15 inches Length.....8 inches
List Price Each—Chromium \$19.50—Cadmium \$18.50

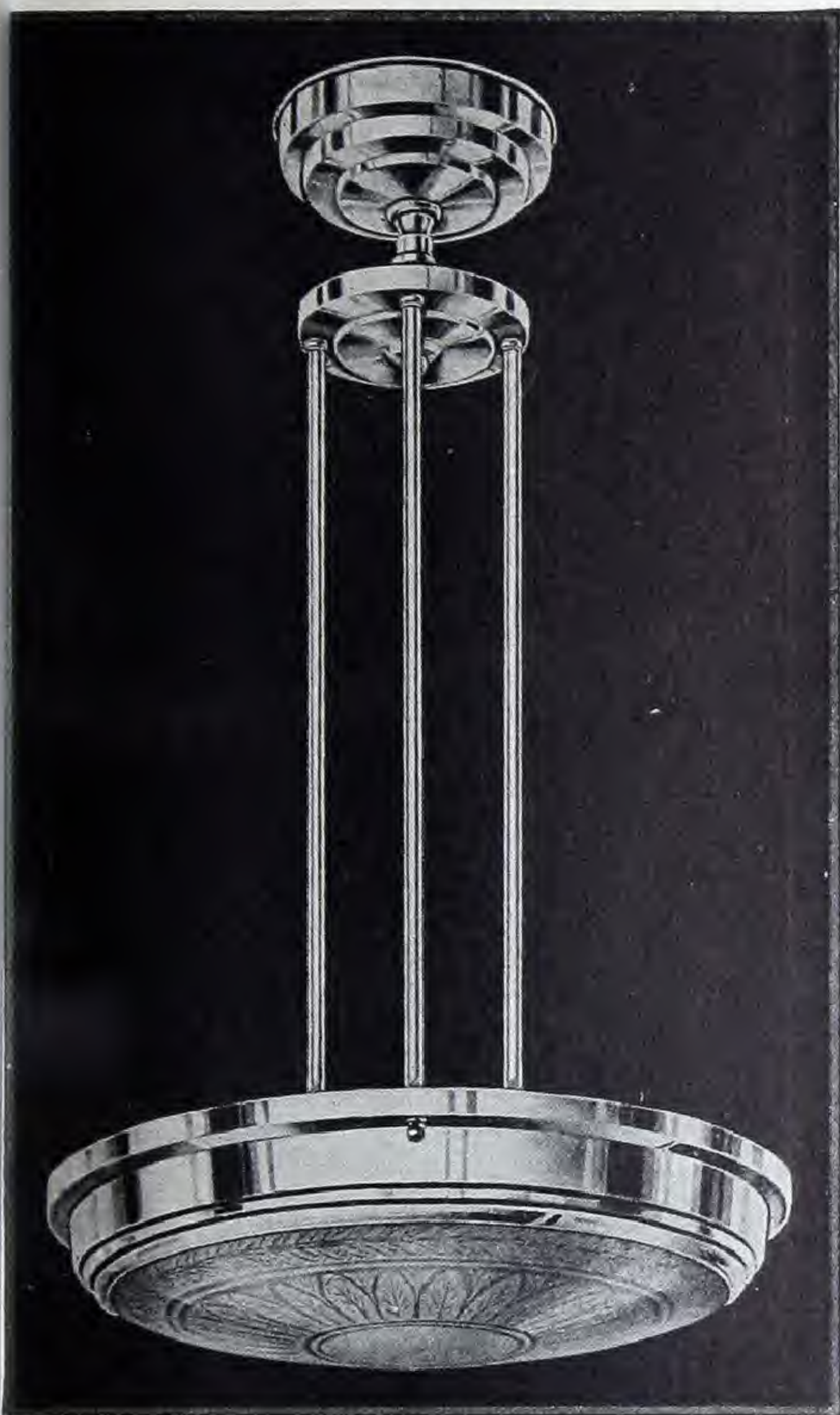
All fixtures are furnished wired complete with approved wiring material.

All bands are provided with hinges for easy relamping and cleaning.

When ordering please mention the fixture number complete. Fixture can also be furnished with plain white "Hyperion Glass" (not etched).

COMMERCIAL LIGHTING FIXTURES

with
CRYSTAL ETCHED GLASSWARE



No. 84/D. E. [4 Lights]

Diameter.....15 inches Length.....30 inches

List Price, each, Chromium \$30.00; Cadmium \$27.50

If lengths of over 30 inches are required No. 84 will be furnished with chain between the canopy and break, at an extra cost of 75c list per foot for CHROME and 50c list per foot for CADMIUM.

All fixtures are furnished wired complete with approved ring material.

All bands are provided with hinges for easy relamping and cleaning.

When ordering, please mention the fixture number complete.

Fixture can also be furnished with plain White "Hyperion Glass" (Not Etched).

GLASS LOUVRE UNITS

*"CHIP CRYSTAL" FINISH

*"Chip Crystal" is a beautiful, decorative Crystal Glass with a chip design, which is everlasting.

No. 726/5315—Overall length—17 inches—same as No. 716/5315 only it is supplied as close-up ceiling fixture with short stem.



No. 716/5315—Overall length—40 inches

Pendants will be furnished 28 inches from top of canopy to bottom of holder, and wired with medium base sockets.

If longer lengths are desired, add \$1.25 list per foot or fraction of a foot.

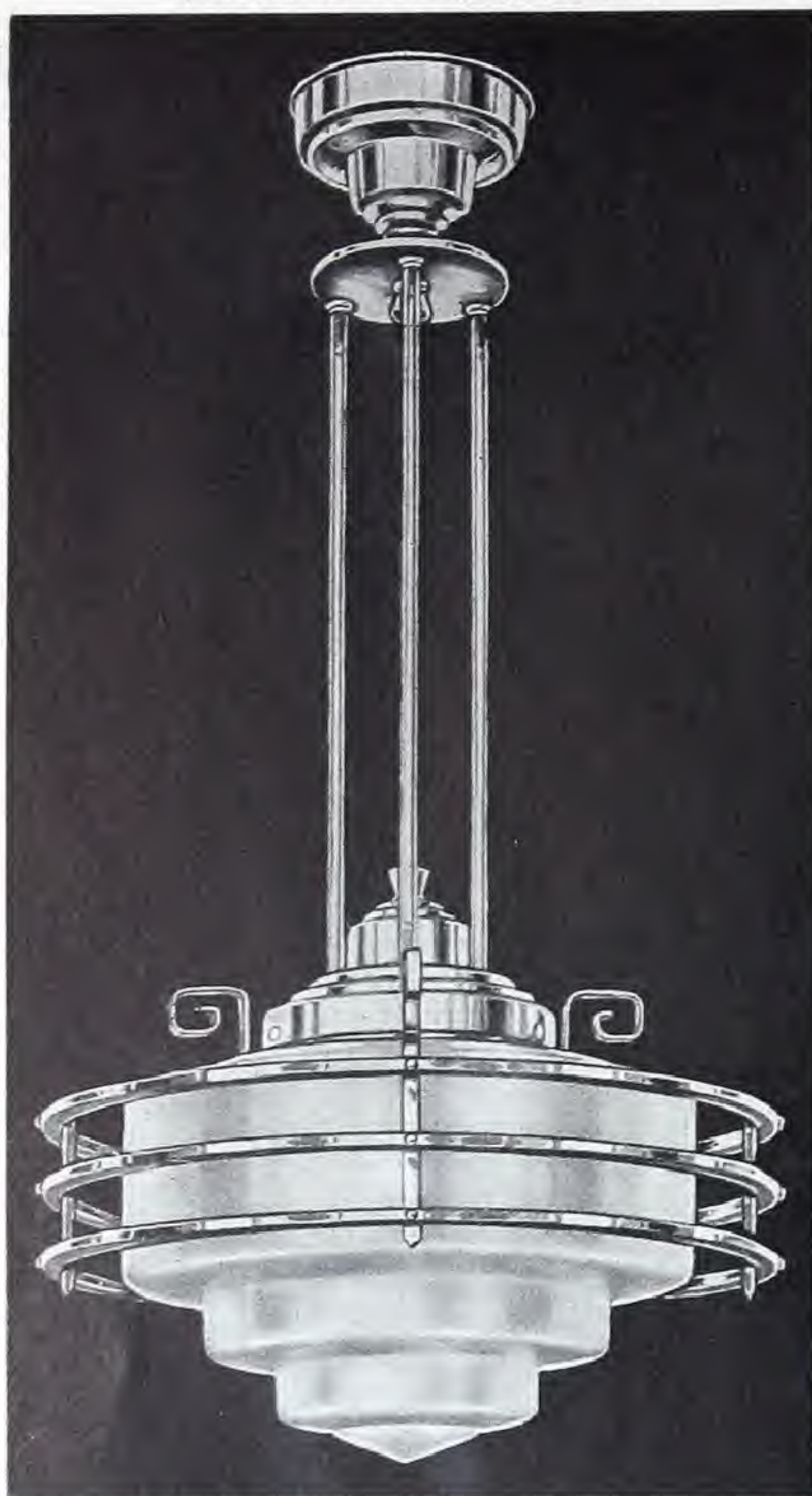
Metal Bands on Glass Discs are furnished in Polished Chrome.

Fixture Finished in Brushed Aluminum.

List No.	Finish of Glassware	Dimensions of Glassware		Wattage	List Price
		incl. Discs	Length Dia.		
716/5315	"Chip Crystal"	12"	14"	100-200W-Frosted	\$25.00
726/5315	"Chip Crystal"	12"	14"	100-200W-Frosted	23.25

MODERNE LOUVRE LUMINAIRE

("Astralite" is Daylight Glass)



No. 736—L1712

"ASTRALITE" GLASSWARE

Suspension type fixtures No. 716 and No. 736 will be furnished 28 inches long—from top of canopy to bottom of holder. (Quotations will be given for special lengths other than this.)

All fixtures will be furnished with Medium Base Porcelain Sockets and No. 16 Heat Resisting Wire.

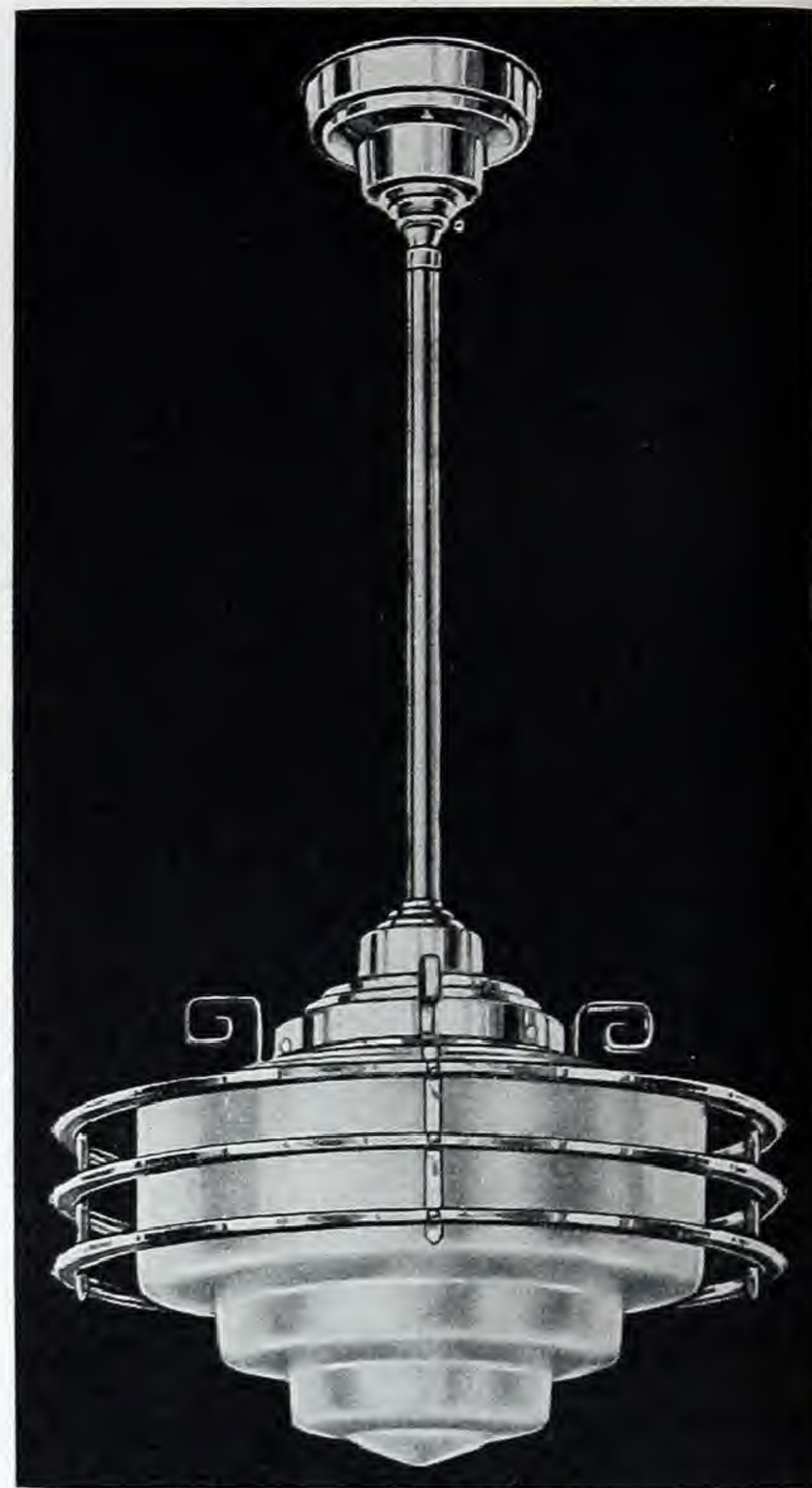
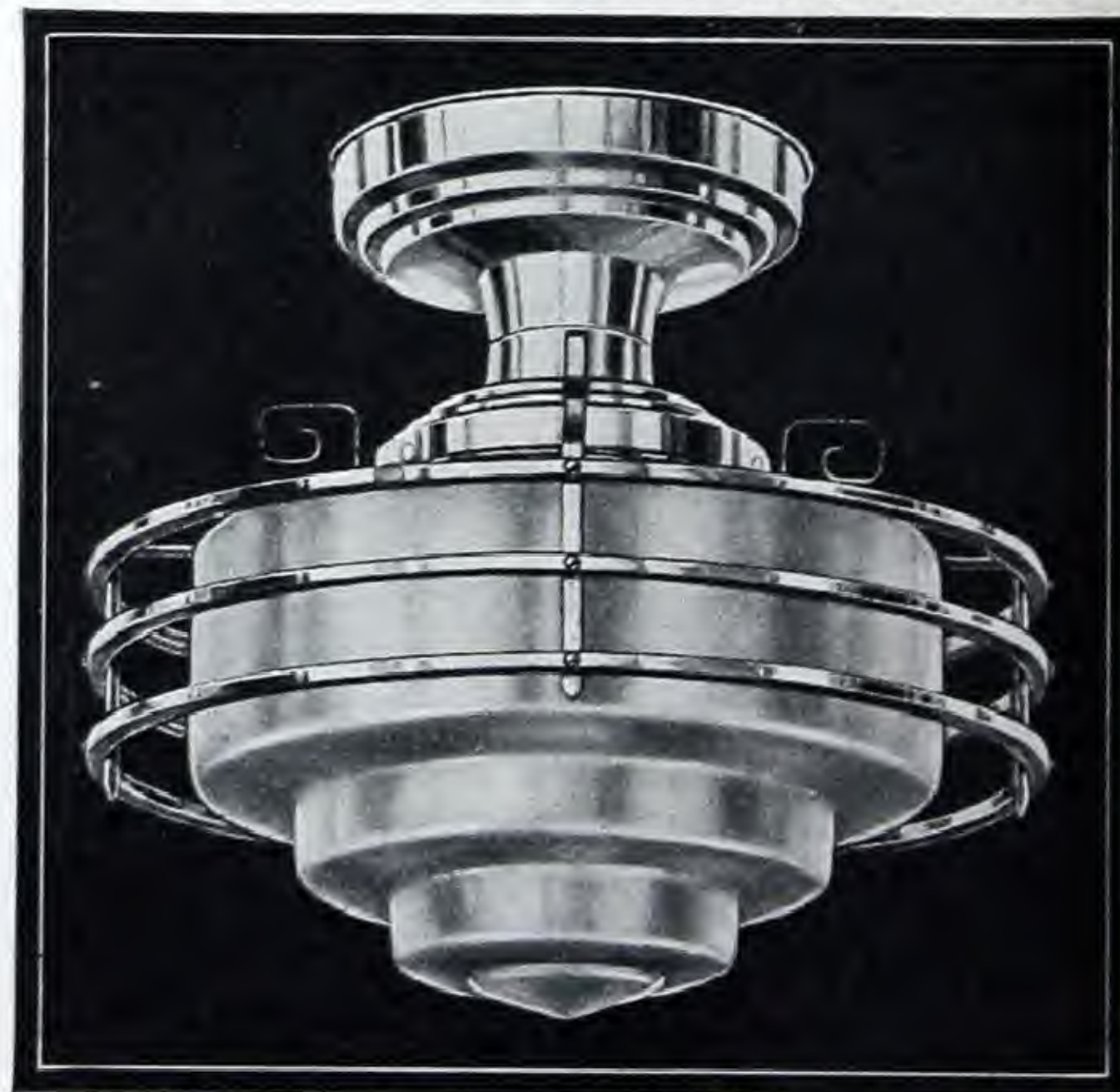
All metal parts are finished in Chromal. (Chromal is a Brushed Aluminum finish on the pendant and polished Chrome on the Louvres.)

No. 701—L1708
(With Canopy Switch)

List No. Complete	List No. Glassware with Lou- vres only	Dimensions of Glassware Only Diam. Lgth. Fitter	List Price Com- plete	List Price Glass only
716/L1712	L1712	12" x 8½" x 6"	\$23.50	\$6.35
726/L1712	L1712	12" x 8½" x 6"	22.45	6.35
736/L1712	L1712	12" x 8½" x 6"	28.25	6.35
716/L1714	L1714	14" x 9¼" x 6"	26.25	8.00
726/L1714	L1714	14" x 9¼" x 6"	25.20	8.00
736/L1714	L1714	14" x 9¼" x 6"	31.00	8.00
701/L1708	L1708	8" x 6¼" x 4"	20.25	2.00

MODERNE LOUVRE LUMINAIRE

"ASTRALITE" GLASS

No. 716—L1712 List Price Each Complete \$23.50
No. 716—L1714 List Price Each Complete \$26.25

No. 726—L1712 List Price Each Complete \$22.45

No. 726—L1714 List Price Each Complete \$25.70

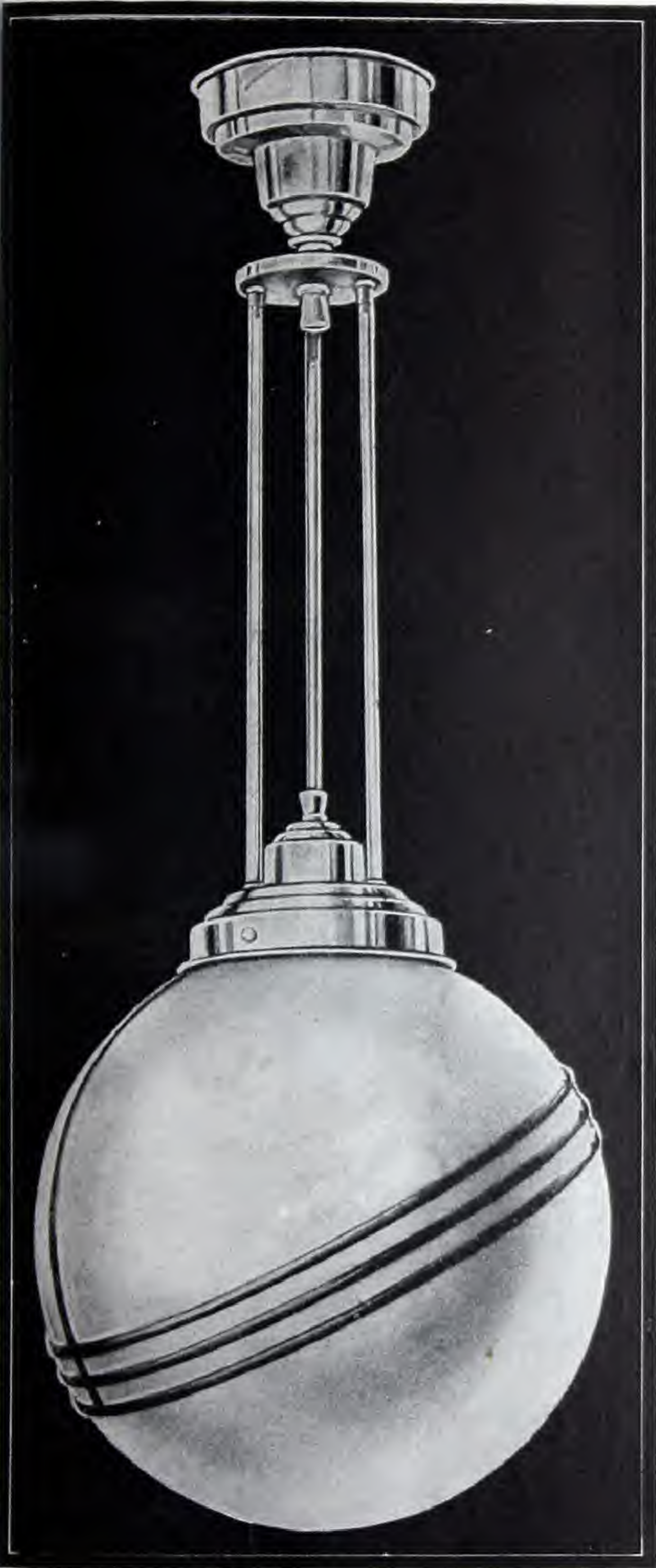
All fixtures are furnished with Porcelain Medium Base Sockets and No. 16 Heat Resisting Wire, approved by the Board of Fire Underwriters.

Metal Parts are finished in Chromal. (CHROMAL is a Brushed Aluminum finish on the pendant and Polished Chrome on the Louvres.)

MODERNE LOUVRE LUMINAIRE

"HYPERION" AND "ASTRALITE" GLASSWARE

Louvres are Blown In Glass Balls, and Finished in Black or Platinum



No. 736—B 814



No. 726—B 814

Metal parts are furnished in "BRUSHED ALUMINUM" finish.

Suspension type fixtures No. 736, will be furnished 28 inches long—from top of canopy to bottom of holder.

(Quotations will be given for special lengths).

All fixtures will be furnished with Medium Base Porcelain Sockets and No. 16 Heat Resisting Wire.

Patents pending on Louvre Balls



No. 701—B 806
(With Canopy Switch)

List No.	Complete
726—B 814	.....
736—B 814	.....
701—B 806	.....
B814	14" x 14" x 6"
B806	6" x 6" x 3 1/4" and 4"

List Price Hyperion Black Lined	List Price Astralite Black Lined	List Price Hyperion Platinum Lined	List Price Astralite Platinum Lined
\$19.90	\$21.10	\$22.35	\$23.80
25.70	26.90	28.15	29.60
13.50	13.80	14.05	14.45
12.20	13.40	14.65	16.10
2.75	3.05	3.30	3.70

(B 806 packed 27 to carton)

When ordering B806 Glass only, please mention size of Fitter—3 1/4" or 4".

THE "EXCELITE UNIT"

Semi-indirect lighting has long been recognized as the ideal form of artificial illumination for school, office and accounting rooms, stores, hospitals and all places where good illumination without eye strain is essential.

Heretofore, the low efficiency of units of this type, together with the high initial and constant maintenance cost, have made the expense of this form of lighting almost prohibitive.

Realizing the field for a unit combining efficiency with distinctive appearance and low cost, we have developed the EXCELITE which has completely fulfilled the purpose for which it was designed.

In presenting the EXCELITE, we offer a unit of true semi-indirect type with the remarkable efficiency of 82%, a light output equal to that of the best direct lighting units.

Illuminating engineers are agreed that excess light delivered in the zone between 60° and 90° is most harmful because it enters the eye at the critical angles which cause eye strain. The distribution chart of the EXCELITE unit shows a very considerable reduction of candlepower in this zone thus insuring an absolutely glareless luminaire.

A further examination of the distribution, will show that 61% of the light output of the bare lamp is directed in the zone between 90° and 180° with only 21% being directed in the zone between zero and 90°. This means that 75% of the light output of the unit itself is directed above and 25% below the horizontal plane passing through the lamp filament—a truly extraordinary performance in that it conforms exactly with the best principle of semi-indirect lighting as prescribed by the foremost illuminating engineers.

The candlepower per square inch test indicates the maximum brightness of the bowl to be 1.9 candlepower and the average to be 1.14 candlepower. This overcomes any possibility of excessive globe brightness with its attendant eye strain.

A study of the distribution curve shows that the maximum candlepower is obtained between the angles of 105° and 180° which assures that the greatest possible amount of useful light will be reflected back to the working plane, evenly distributed over an extremely wide area.

Actual working tests made in a room with eleven foot average conditioned ceiling, with 200 watt frosted inside lamps in units spaced on nine foot centres, gave an average of eleven foot candles throughout the room on the working plane.

Too much attention cannot be called to the luminous socket cover which is an exclusive patented feature of EXCELITE. By the use of this device, the light output of the unit has not only been increased, but, due to the design of this member, the energy formerly dissipated in heat is diffused in light.

The specially designed fixture is of stem pendant type with patented swivel joint at canopy and is dignified and attractive in appearance. The parts are chrome plated brass and highly polished aluminum.

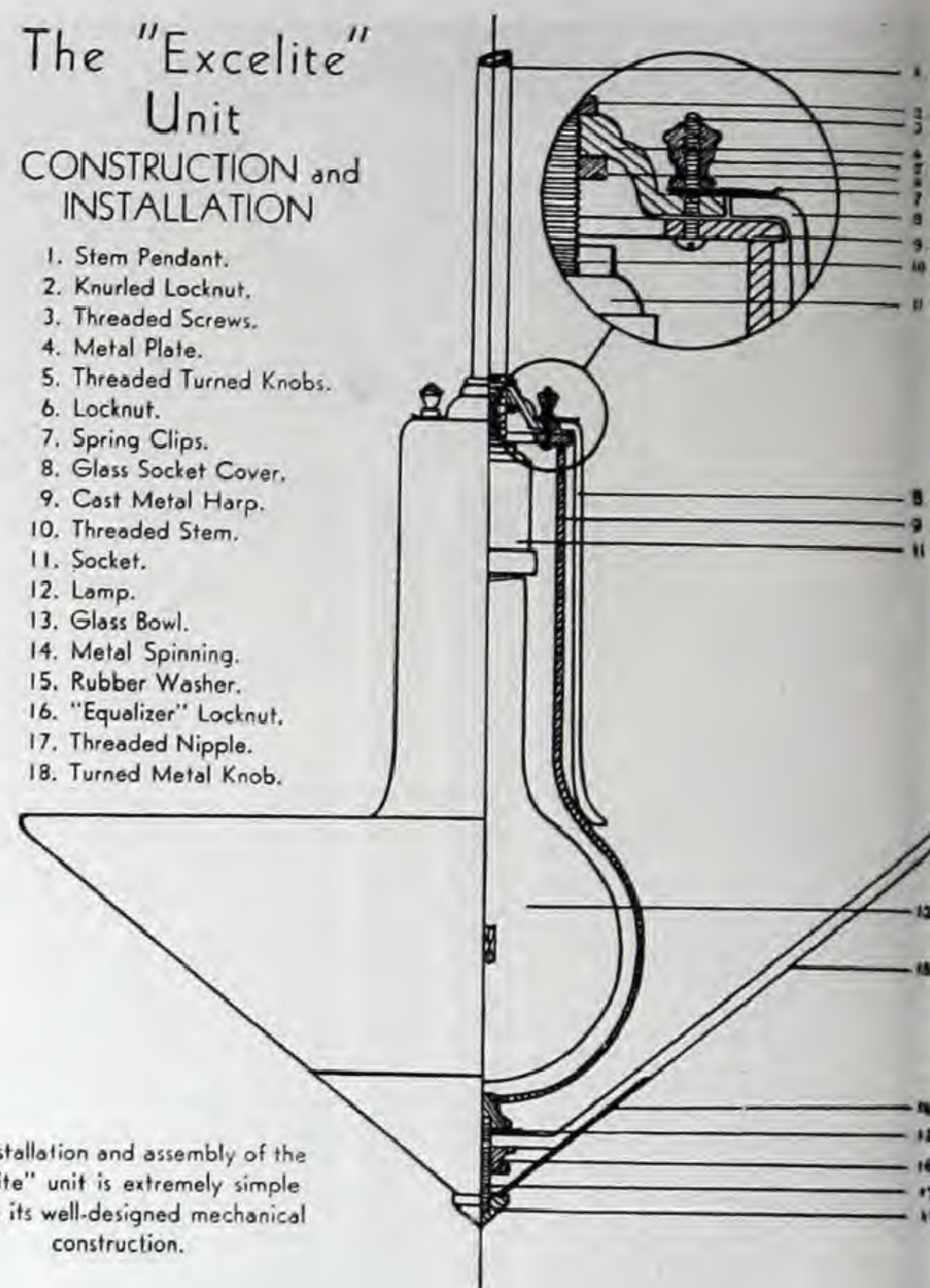
Provision for the easy installation, relamping and cleaning of the EXCELITE unit has been properly provided for by the simplicity of the mechanical construction, an indispensable feature of well-designed lighting equipment. The glass socket cover has only to be raised a few inches for easy access to the lamp or the inner surface of the bowl.

THE "EXCELITE" UNIT

The "Excelite" Unit

CONSTRUCTION and INSTALLATION

1. Stem Pendant.
2. Knurled Locknut.
3. Threaded Screws.
4. Metal Plate.
5. Threaded Turned Knobs.
6. Locknut.
7. Spring Clips.
8. Glass Socket Cover.
9. Cast Metal Harp.
10. Threaded Stem.
11. Socket.
12. Lamp.
13. Glass Bowl.
14. Metal Spinning.
15. Rubber Washer.
16. "Equalizer" Locknut.
17. Threaded Nipple.
18. Turned Metal Knob.



The installation and assembly of the "Excelite" unit is extremely simple due to its well-designed mechanical construction.

Construction and Installation

(a) Attach the Stem Pendant (1) to the ceiling outlet in the regular way.

(b) Slip the Glass Socket Cover (8) onto the Cast Metal Harp (9) which should then be secured to the Metal Plate (4) by means of the two Threaded Turned Knobs (5).

(c) Turn the two Spring Clips (7), firmly securing the Glass Socket Cover (8) to prevent vibration.

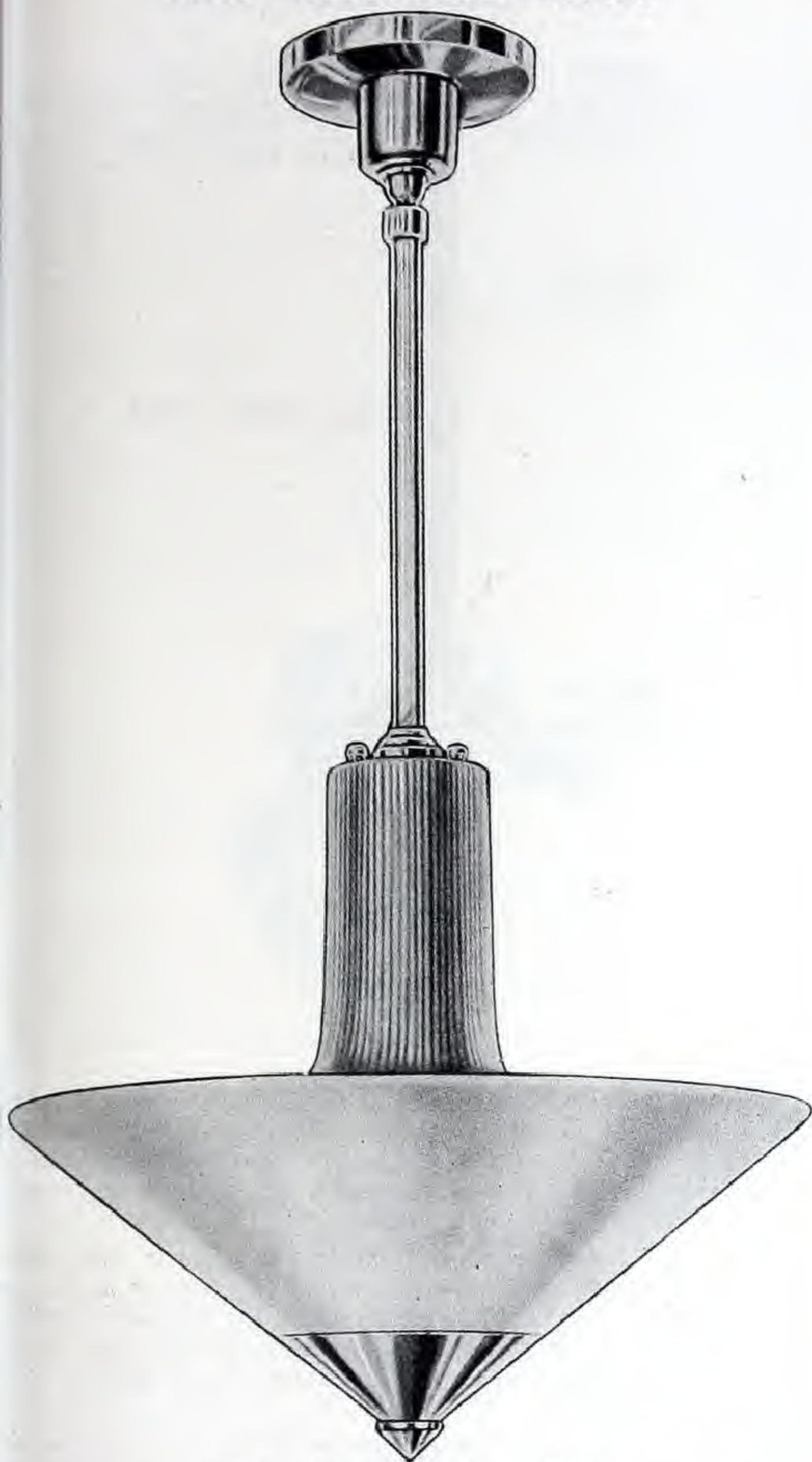
(d) Insert (if at hand) the Lamp (12) into the Socket (11).

(e) Place the Rubber Washer (15) into the Glass Bowl (13) and attach same to the Harp (9) by means of the "Equalizer" Locknut (16) threaded onto the Nipple (17).

(f) Secure the Metal Spinning (14) to the Glass Bowl (13) by means of the Turned Metal Knob (18).

To relamp: Turn both Spring Clips (7) inward and raise Glass Socket Cover (8).

THE "EXCELITE" UNIT



THE "EXCELITE" UNIT

One characteristic of the Excelite Unit is the striking and unusual beauty of its lines. We do not believe there was ever such a combination of efficiency with attractiveness present in the same Luminaire, and we are certain that a casual inspection will convince anyone.

For anyone who is seeking a unit which will make an immediate and forceful appeal to the consumer; which will inspire the latter with a desire to have it installed in his own home or office building, we are certain there has been no luminaire developed in the last ten years more appropriate to this purpose than the Excelite.

The Luminous socket cover described elsewhere is undoubtedly a particularly attractive and striking feature. It gives the unit unusual character and distinction. In a word the Excelite belongs to that class of developments which almost compel people to own it because of its striking appropriateness, its unusual beauty and its efficiency.

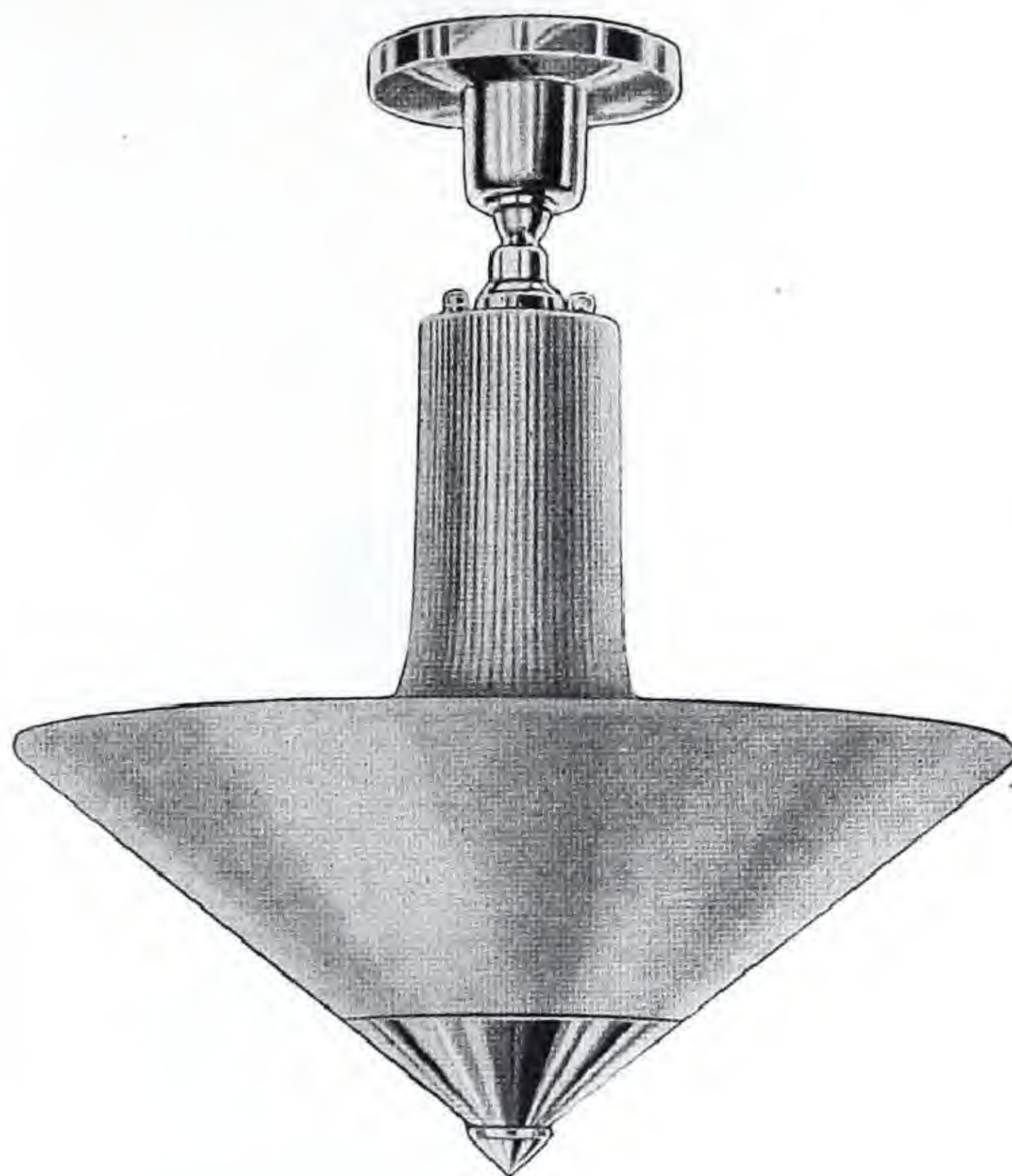
The Excelite has the following features of superiority:

1. Distinctive appearance, being conservatively modern in design.
2. Low maintenance cost due to the ease in cleaning and relamping.
3. Properly designed diffusing glass bowl is doubly supported from the bottom thereby insuring safety from breaking that is not possible when drilled with holes in the sides for suspending from chains.
4. Lightly polished glass diffusing bowl of special density perfected for high reflection and low absorption.
5. Exclusive patented luminous socket cover.
6. Extremely low surface brightness which eliminates glare.
7. High percentage of total light output converted into useful light.

THE "EXCELITE" UNIT

CEILING TYPES

Plain White—Decorated Nukraft and Etched Glassware with Dull Chrome Finished Fixture.



The "Excelite" as a ceiling type unit for low ceilings. The plain white decorated Nukraft and Etched glass bowls can be furnished with this type ceiling luminaire.

"Excelites" are furnished wired complete with porcelain sockets and No. 16 stranded copper heat resisting wire, approved by the National Board of Fire Underwriters.

(Please mention number and specify glass desired).

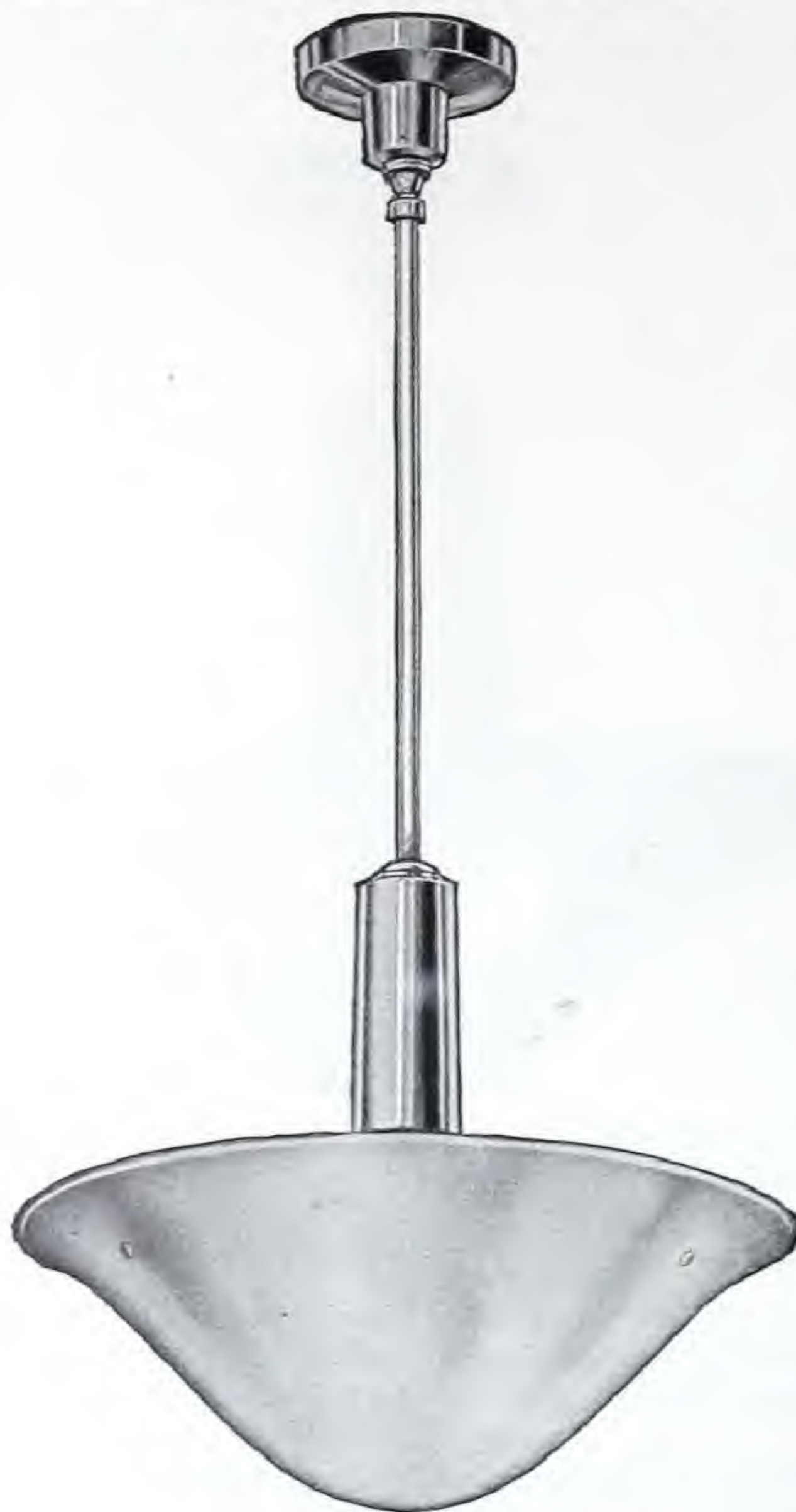
Lumin. No.	Finish of Glass Bowl	Dia. of Bowl	Over- all L'gth	Wgt. of all Std. Car. Lbs.	Lamp Size Watt	List Price Each
1626	Plain White.....	16"	17"	11	200	\$25.00
1630	Plain White.....	20"	21"	15	300-500	41.50
1626E	White Etched.....	16"	17"	11	200	32.50
1630E	White Etched.....	20"	21"	15	300-500	50.00
1626Y	White Nukraft Dec..	16"	17"	11	200	28.75
1630Y	White Nukraft Dec..	20"	21"	15	300-500	46.00
1626B	Ivory Nukraft Dec..	16"	17"	11	200	30.00
1630B	Ivory Nukraft Dec..	20"	21"	15	300-500	47.50

Note. It is essential that inside frosted lamps be used to avoid unsightly ceiling striations, which are produced by clear crystal lamps.

Packed one in a carton.

"SUPERBA"**SEMI-INDIRECT LUMINAIRE**

A semi-indirect luminaire for schools, offices, accounting rooms, stores, hospitals and all places where good and adequate illumination, without eye strain, is essential.



No. 4616

Superior Features

1. Distinctive appearance.
2. High percentage of light output.
3. Lightly polished glass diffusing bowl of special density, perfected for high reflection and low absorption.
4. Low surface brightness—eliminating glare.
5. Low maintenance cost.

Specifications

Over all length, 30 inches. Diameter of bowl, 16 inches. Wired complete with porcelain Edison base socket and No. 16 heat resisting wire.

For use with 150-200 watt inside frosted lamps. 300-500 watt can also be used if wished with Mogul Socket.

$\frac{3}{4}$ " diameter stem can be furnished instead of $\frac{1}{2}$ " as shown, at no extra cost. (Kindly mention same when ordering).

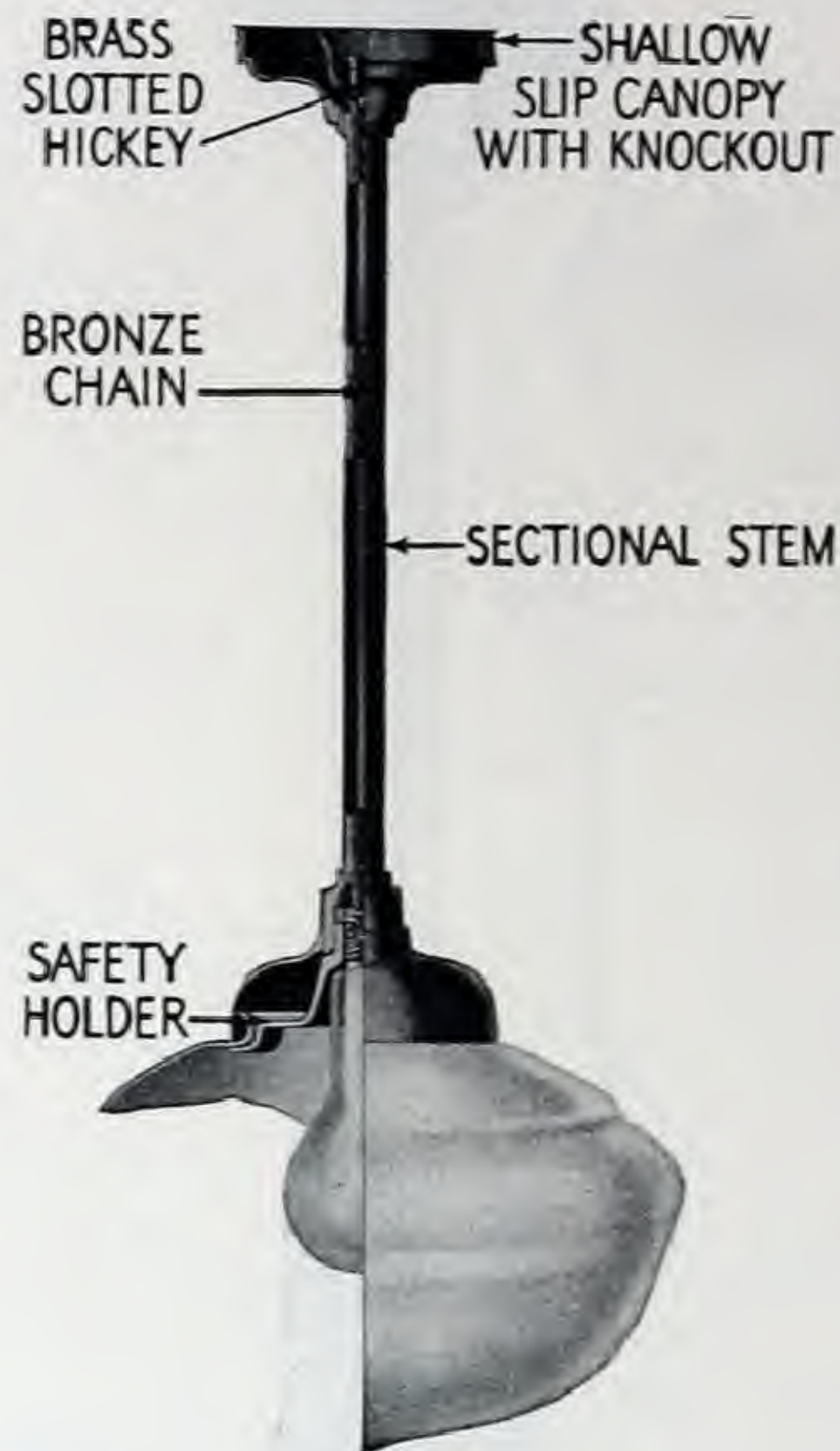
Can be furnished with special 3 light socket and switch to take the new 3 light lamps.

Prices furnished on request.

The fixture, which is finished in "Dull Chrome," is of the stem pendant type with swivel joint at canopy and is dignified and attractive in appearance.

The glass bowl is suspended by three very small link chains and it is only necessary to unhook one or two of these chains for relamping or cleaning.

There will be an additional charge of \$1.50 list per foot, or fraction of a foot, for fixtures more than 30 inches over all.

SHELCREST FIXTURES

Shelcrest Fixtures are a distinct advance in design, material and appearance from competitive commercial fixtures now available. They have many unique features—simple fool-proof holder, sectional stem, swivel joint, shallow slip canopy and maximum insulating qualities.

The globe holder is safe, simple to operate and makes globe installation or removal easy. The canopy is the popular shallow slip type, held in place by a round bushing which gives the free-swinging effect of a ball and socket joint. The ceiling type has a canopy and socket cover molded in one piece.

Shelcrest fixtures are supplied wired with No. 14 stranded asbestos-covered wire, marked for polarity. They are furnished in hanging and ceiling types, accommodating all lamps up to and including 300 watts. When used with "99," "66," "33" or "88" plain or decorated globes, Shelcrests are suitable for the finest of commercial interiors.

Material—Shelcrest fixtures are made of genuine moulded Bakelite, which is frequently used in manufacturing objects of art. The fixtures thus have all of the charm, and warmth of color, as well as the long-wearing qualities and accuracy of molding which is associated with this product.

Packing and Assembly—Shelcrest fixtures are made up of interchangeable parts, all of which accurately fit each other without the use of metal screws and clamps, thus facilitating shipping in a knock-down form and permitting ready assembly without the usual inconvenience of missing parts.

Finish—The standard finish of Shelcrest fixtures is Japanese Bronze. The color permeates the entire material and surface scratches, common to fixtures with any other finish, will not show on Shelcrests. The finish will not tarnish or fade.

Insulating Qualities—While all electrical fixtures are required to meet certain insulation requirements the Shelcrest because of its bakelite construction, offers additional insulating properties not found in metal fixtures.

Installation—By actual demonstration the Shelcrest fixture has proved to be the easiest type to install. A patented hickey used with the pendant type can be attached to the stud of an outlet box regardless of its depth or alignment. Through this hickey, is passed a bronze chain of a type that can be taken up or let down with ease, requiring no additional fittings. The canopy, which is slip type, drops the full length of the stem, permitting maximum working convenience.

SHELCREST FIXTURES

Specifications for Shelcrest Fixtures

Shelcrest Fixtures are made of genuine Bakelite—holders are jawless safety saddle type—they fit securely under inside of glass. Special brass slotted hickey adaptable to various outlet box conditions. Extra strong bronze chain carries the weight of the unit. Shallow slip canopy with knockout for easy switch. Canopy held in place by spherical-shaped hickey threaded to top section of stem, forms ball joint. Stem in three sections, each $\frac{3}{4}$ " diameter 6" long, held on perfect alignment, permits lengthening or shortening. Socket held rigidly in place. Ceiling and suspension types are similar. Slip canopy and socket cover are moulded in one piece and mounting is accomplished by slotted strap. Finish is permanent, smooth, and Japanese bronze in color. Shelcrest Fixtures are numbered and interchangeable. Fixtures are supplied wired with asbestos-covered stranded wire, ground leg white, live leg brown. All fixtures packed in individual cartons 8 x 6, clearly labelled.

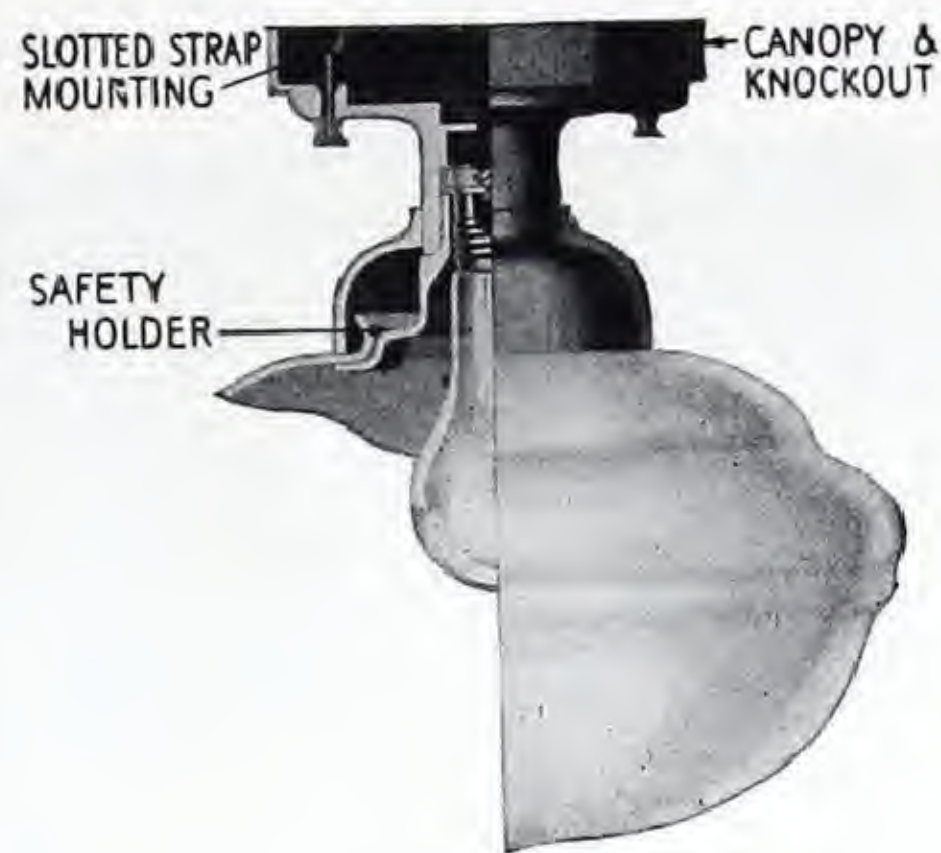


M6H-3320

Hanging Type

Suspension type Shelcrests are really chain suspension fixtures encased in a genuine Bakelite stem. The extra strong bronze supporting chain attaches to a brass slotted hickey adaptable to all outlet conditions. The shallow canopy with knockout, the adjustable hickey, the sectional stem, and bronze chain are all features. The globe holder is safe, simple to operate and makes for low cost in maintenance. It is saddle shaped and accurately seats the globe from the inside and under the neck. To remove the globe for cleaning or lamp changing, lift cover and tilt to a 30° angle and slip off the globe.

SHELCREST FIXTURES



M6C-6620

Ceiling Type

Shelcrest Ceiling Fixtures have a canopy and socket cover moulded in one piece. The globe holder is a rigid saddle, shaped to accurately seat the globe from the inside and under the neck. To remove globe, simply tilt to a 30° angle and slip off the holder. Slotted strap mounting and shallow canopy with knockout are convenience features.

FIXTURES WITHOUT GLASS

List No.	Type	Socket Used	Overall	Std. Pkg.	App. Ship.	Unit Wgt.	List Price each
M4C	Ceiling	Medium	4½"	12	1¾ lbs.		\$4.80
M6C	Ceiling	Medium	5"	12	2 lbs.		6.40
M4H	Hanging	Medium	23"	12	2 lbs.		6.40
M6H	Hanging	Medium	24"	12	2¼ lbs.		7.40
M7H	Hanging	Mogul	24"	12	2½ lbs.		9.20
M6H	Hanging	Medium	24"	12	2½ lbs.		8.86
M C	Recept.	Medium	3½"	12	1 lb.		2.50

Finish: High Polish Japanese Bronze.—Cost of other finishes on application.

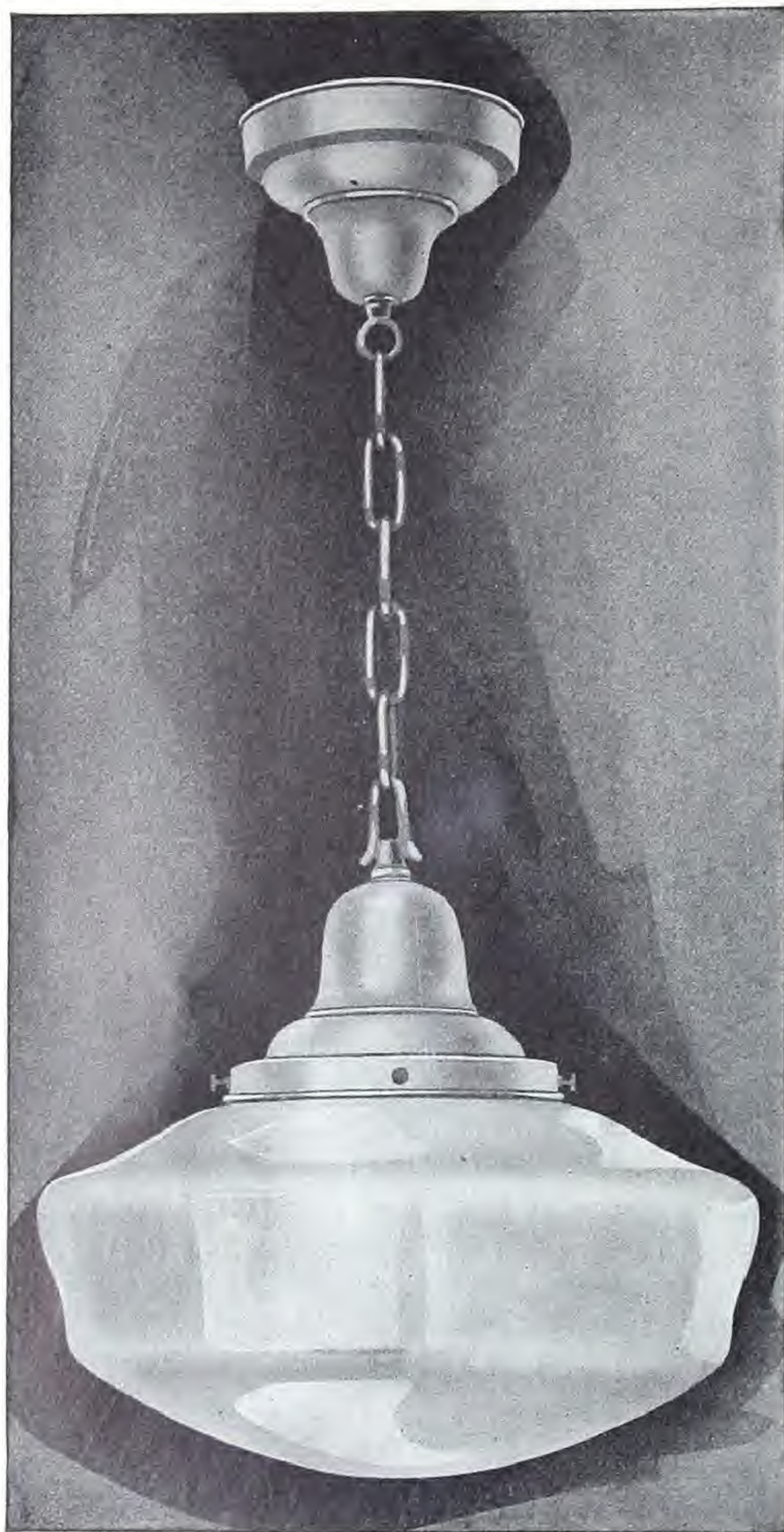
Wire: Wire attached; one white, one black.

Extra Length: 70 cents per six inch section.

COMMERCIAL UNITS

made of
"HYPERION" GLASS

The Glassware of Highly Efficient Lighting Qualities



The Hanger shown is for illustration purposes only
and will not be furnished

List No.	Dimensions (Inches)	Std. Pkg.	Std. Pkg. Wgt. Lbs.	Suggested Wattage	List Price Each
606	8½ x 6 x 4	12	18	75	\$1.50
606½	9 x 6½ x 4	12	23	75-100	1.75
607	10 x 6½ x 4	4	11	100	2.75
608	12 x 6½ x 4-6	4	15	100-150	4.70
609	14 x 7½ x 6	2	10	150-200	6.00
610	16 x 8¾ x 6	2	14	200-300	7.20
611	18 x 9 x 6-8	1	10	300-500	13.75
611½	20 x 10 x 8	1	15	300-500	24.75

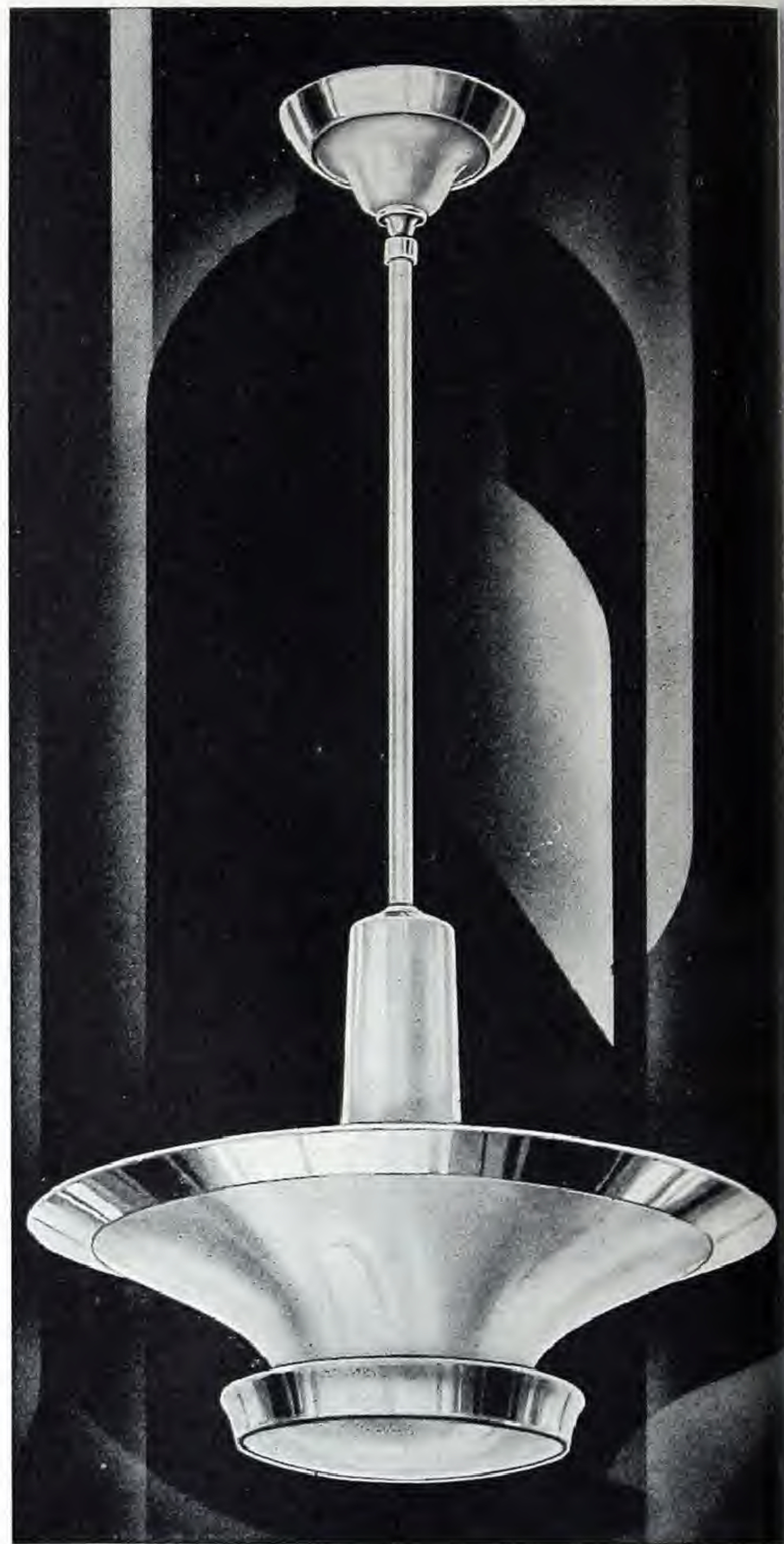
If No. 608 is ordered please specify whether 4" or 6" fitter is desired.

If No. 611 is ordered please specify whether 6" or 8" fitter is desired.

THE "ULTRA-LITE"

An Indirect Lighting Unit that diffuses the light, which is redirected from the ceiling to the working plane below.

Beautiful in Appearance—Efficient in Illumination.



"Ultra-Lites" are furnished wired complete with slow burning wire, and approved wiring devices.

Special white porcelain effect enamel is applied to the inside of the reflector.

The Grey outer finish is applied the same way.

Overall lengths, other than shown, are not recommended as they reduce the illumination efficiency.

If utmost efficiency is secondary to effect, fixtures can be furnished in extra lengths at an added cost of \$1.25 list per foot or fraction of a foot.

Can be furnished wired with 2 Circuit Socket and 3 Circuit Switch for Trilite Lamp—Prices given on request.

List No.	List Price	Re-lector Dia.	Finish	Overall Length	Wired	Sug- gested Wattage
016-R	\$13.05	16"	Chromalume	35"	Medium Base	150-200
020-R	16.20	20"	and Grey	36"	Mogul Base	300-500
016-R	11.55	16"	Grey	35"	Medium Base	150-200
020-R	14.40	20"	only	36"	Mogul Base	300-500

COMMERCIAL LIGHTING FIXTURES

with
"HYPERION" GLASSWARE



No. 816/B. 26

Length of Pendant to bottom of stem is 24 inches.

Pendants are furnished in either CHROME or CADMIUM finishes, wired complete with medium base sockets.

If longer lengths are desired, add \$1.50 list per foot or fraction of a foot for CHROME and \$1.25 list per foot for CADMIUM.

List No.	Diameter of Glassware	Recommended Wattage	List Chromium	Price Cadmium
6/B. 26	16 inches	200-500	\$20.00	\$19.00
6/B. 24	14 inches	150-300	17.50	16.50
6/B. 22	12 inches	100-200	14.50	13.50

When ordering, please mention fixture number, size of glassware and finish of Pendant desired.

COMMERCIAL LIGHTING FIXTURES

with
"HYPERION" GLASSWARE



No. 817/1551 1/2

Length overall—33 inches

Pendants are semi-rigid, with swivel arrangement inside canopy.

Fixtures are installed by crossbar in canopy.

Deep flanged canopy provided, so that levolver or other similar switches may be installed.

Pendants are furnished in CHROME, BRONZE or CADMIUM finishes, wired complete for 3 lights.

If longer lengths are desired, add \$1.50 list per foot or fraction of a foot for CHROME and \$1.25 per foot for CADMIUM or BRONZE.

List No.	Dimensions of Glassware Dia.	Depth	Recommended Wattage	List Prices Chromium	Cadmium	Bronze
817/1551 1/2	16"	x 6 1/2"	225-450	\$20.00	\$17.50	\$17.50
817/1551 1/2	14"	x 5 "	120-225	18.50	16.00	16.00

When ordering, please give the Size of Glassware and Finish of Pendant.

COMMERCIAL UNITS

made of
HYPERION GLASS

The Glassware of Highly Efficient Lighting Qualities



The Hanger shown is for illustration purposes only and will not be furnished.

List No.	Dimensions			Std. Pkg.	Wgt. Pkg.	Suggested Wattage	List Price
	Width	Length	Fitter				
400	8" x	9" x	4"	12	20lbs.	100-150	\$1.75
401	10" x	12" x	6"	1	4lbs.	150-200	4.70
402	12" x	14" x	6"	1	8lbs.	200-300	6.00

Will be furnished without holes unless specified.

COMMERCIAL UNITS

made of
"HYPERION" GLASS

The Glassware of Highly Efficient Lighting Qualities



The Hanger shown is for illustration purposes only and will not be furnished

List No.	Dimensions (Inches)			Std. Pkg.	Wgt. Lbs.	Suggested Wattage	List Price Each
	Wid.	L'th	F'ter				
612	8½x	7	x 4	12	18	75	\$1.50
612½	9	x 7¼x	4	12	23	75-100	1.75
613	10	x 6½x	4	4	11	100	2.75
614	12	x 7½x	4-6	4	15	100-150	4.70
615	14	x 8¾x	6	2	10	150-200	6.00
616	16	x 9½x	6	2	14	200-300	7.20

If No. 614 is ordered please specify whether 4" or 6" fitter is desired.

COMMERCIAL UNITS

made of
HYTERION GLASS

The Guarantors of Highly Efficient Lighting Qualities



The Hanger shown is for illustration purposes only, and will not be furnished.

List No.	Dimensions (Inches)			Std. Plug	Std. Watt.	Suggested Wattage	List Price
	Width	Length	Filter				
701	8 1/4"	8"	4"	10	18 W.	75	\$1.70
702	9"	8 1/4"	4"	10	22 W.	75-100	1.75
703	10"	8 1/4"	4"	4	11 W.	100	2.75
704	12"	8 1/4"	4" x 0"	4	12 W.	100-150	4.75
705	14"	7 1/4"	0"	2	11 W.	100-200	6.95
706	16"	8 1/4"	0"	2	12 W.	200-300	7.00

If No. 706 is ordered please specify whether 4" or 0" filter is desired.

COMMERCIAL UNITS

made of
"HYTERION" GLASS

The Guarantors of Highly Efficient Lighting Qualities



The Hanger shown is for illustration purposes only, and will not be furnished.

List No.	Dimensions (Inches)			Std. Plug	Std. Watt.	Suggested Wattage	List Price
	Width	Length	Filter				
701	8 1/4"	8"	4"	10	20	75	\$1.80
702	9"	8 1/4"	4"	10	22	75-100	1.75
703	10"	8 1/4"	4"	4	11	100	2.75
704	12"	8 1/4"	4" x 0"	2	8	100-150	4.75
705	14"	7 1/4"	0"	2	10	100-200	6.95
706	16"	8 1/4"	0"	1	8	200-300	7.00
707	18"	12"	4" x 0"	1	10	300-500	15.75

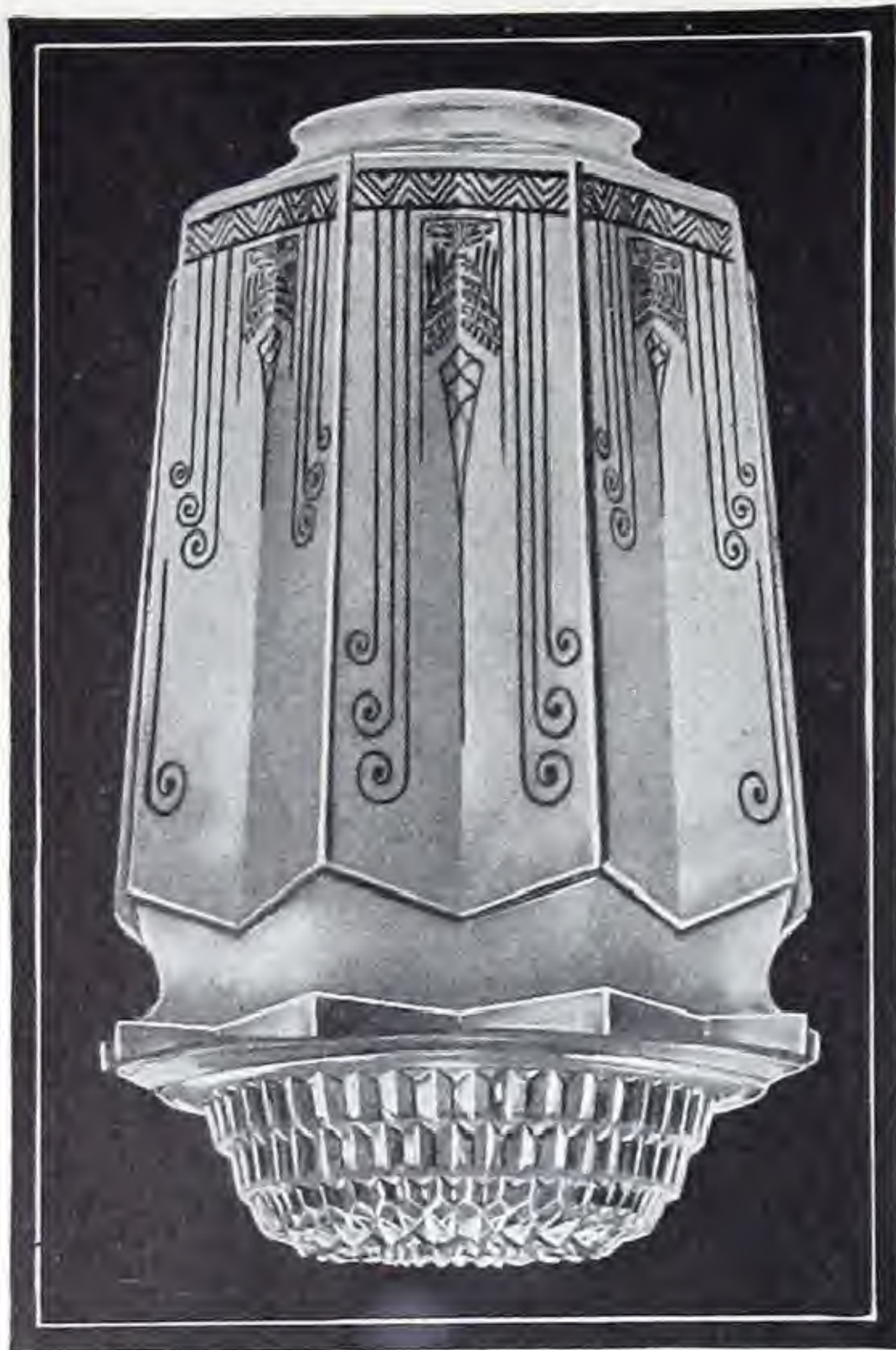
If No. 704 is ordered please specify whether 4" or 0" filter is desired.

If No. 707 is ordered please specify whether 0" or 4" filter is desired.

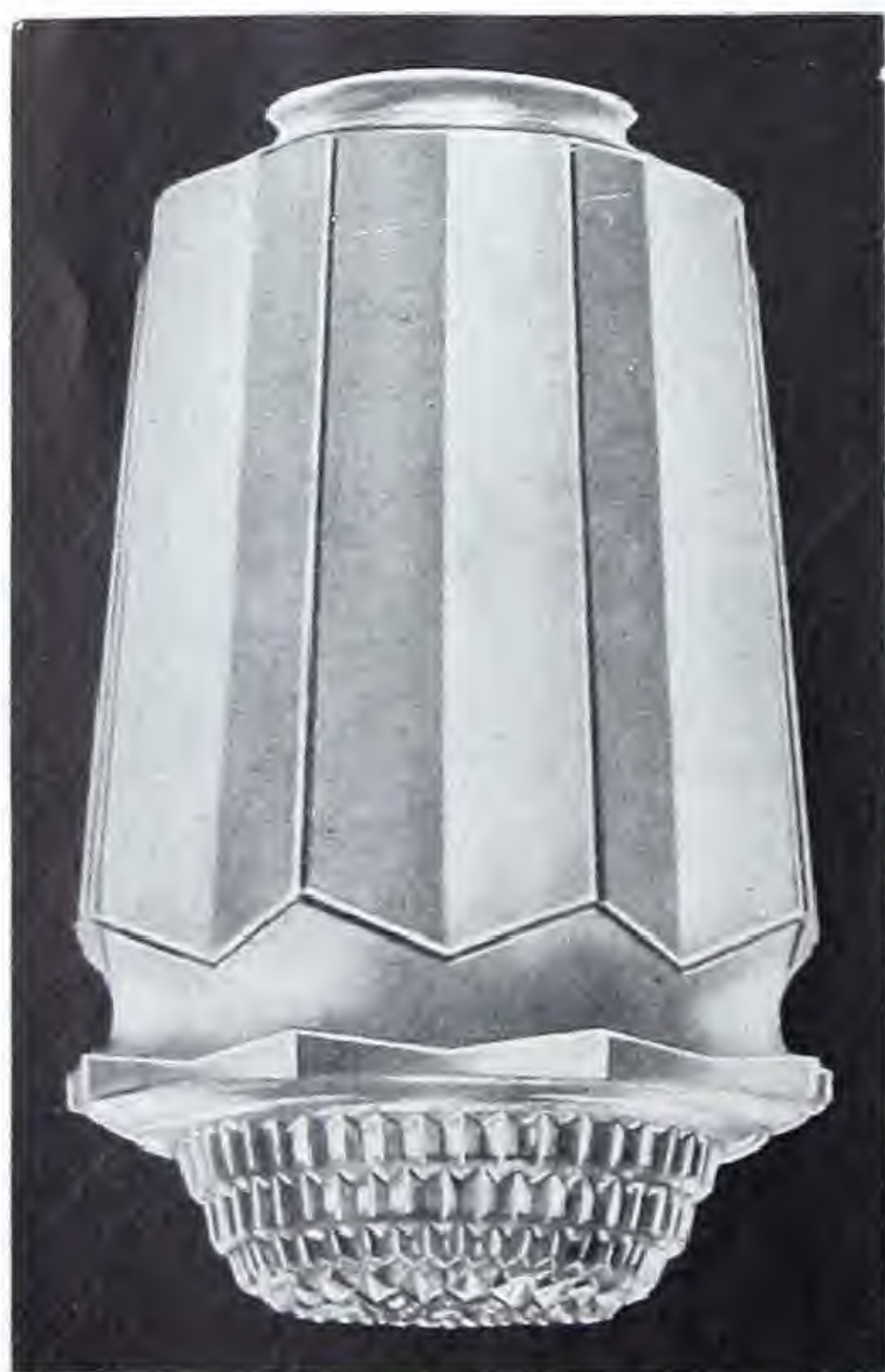
"STELLAR" CRYSTAL BOTTOM UNITS

MADE OF "HYPERION" GLASS

(Complete with Crystal Cut Bowl)



No. 6165E



No. 6165

List No.	Std. Pkg.	Dimensions			Std. Pkg. Wgt.	List Price Each
		Width	Length	F'ter		
6165.....	1	11"	x 17"	x 6"	13 lbs.	\$13.75
6165E....	1	11"	x 17"	x 6"	13 lbs.	17.25

CRYSTAL BOTTOM UNITS

HYPERION GLASS



No. 2400

List No.	Dimensions			Standard Carton	Weight	List Price
	Diam.	Length	Fitter			
2400	9"	x 12"	x 4" and 6"	1	6 lbs.	\$5.00



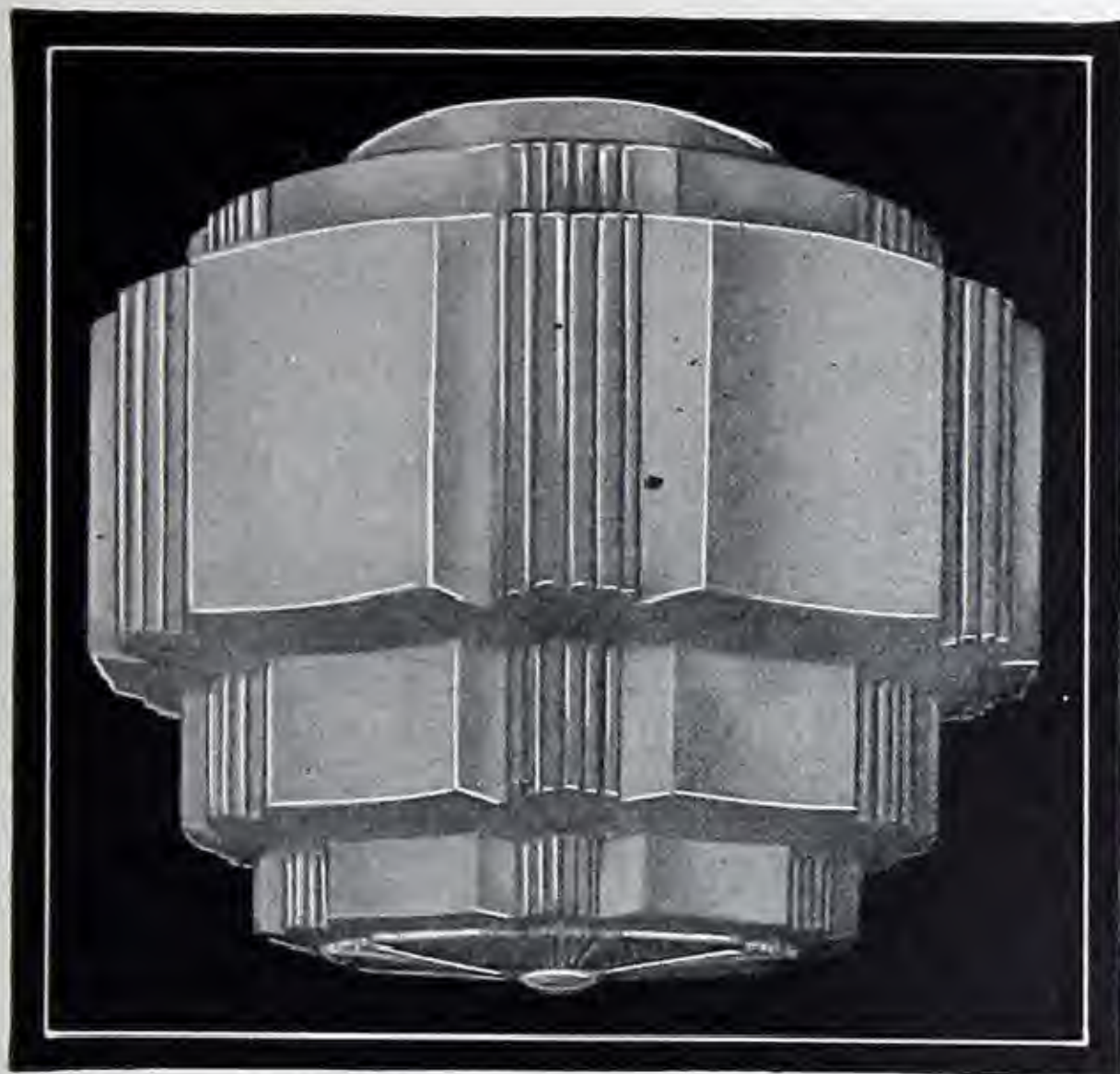
No. 2300

List No.	Dimensions			Standard Carton	Weight	List Price
	Diam.	Length	Fitter			
2300	9"	x 12"	x 4" and 6"	1	6 lbs.	\$5.00

Specify the size of Fitter required (4" or 6").

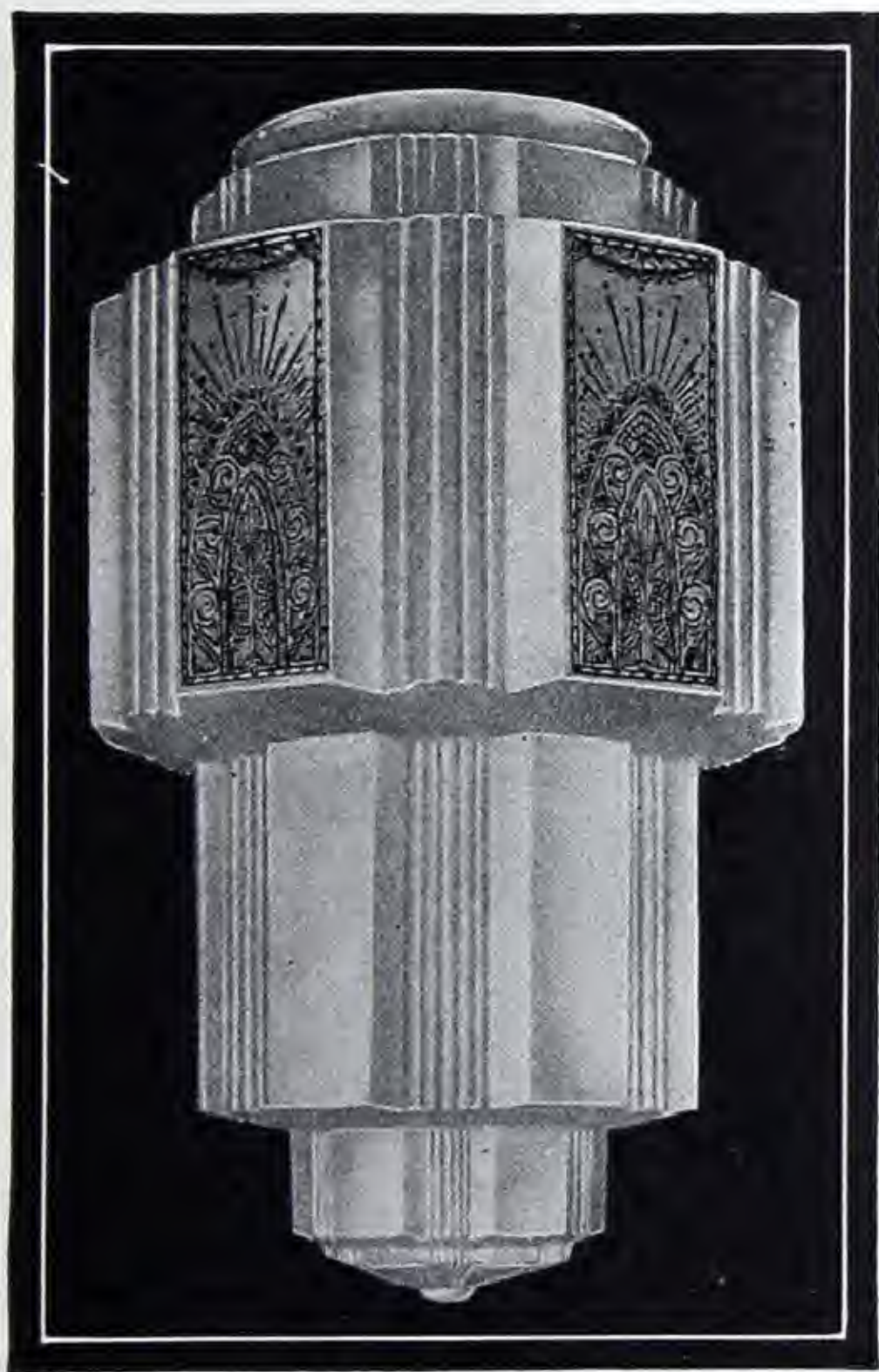
"PREMIER" UNITS

MADE OF "HYPERION" GLASS



No. 2259

No. 2260



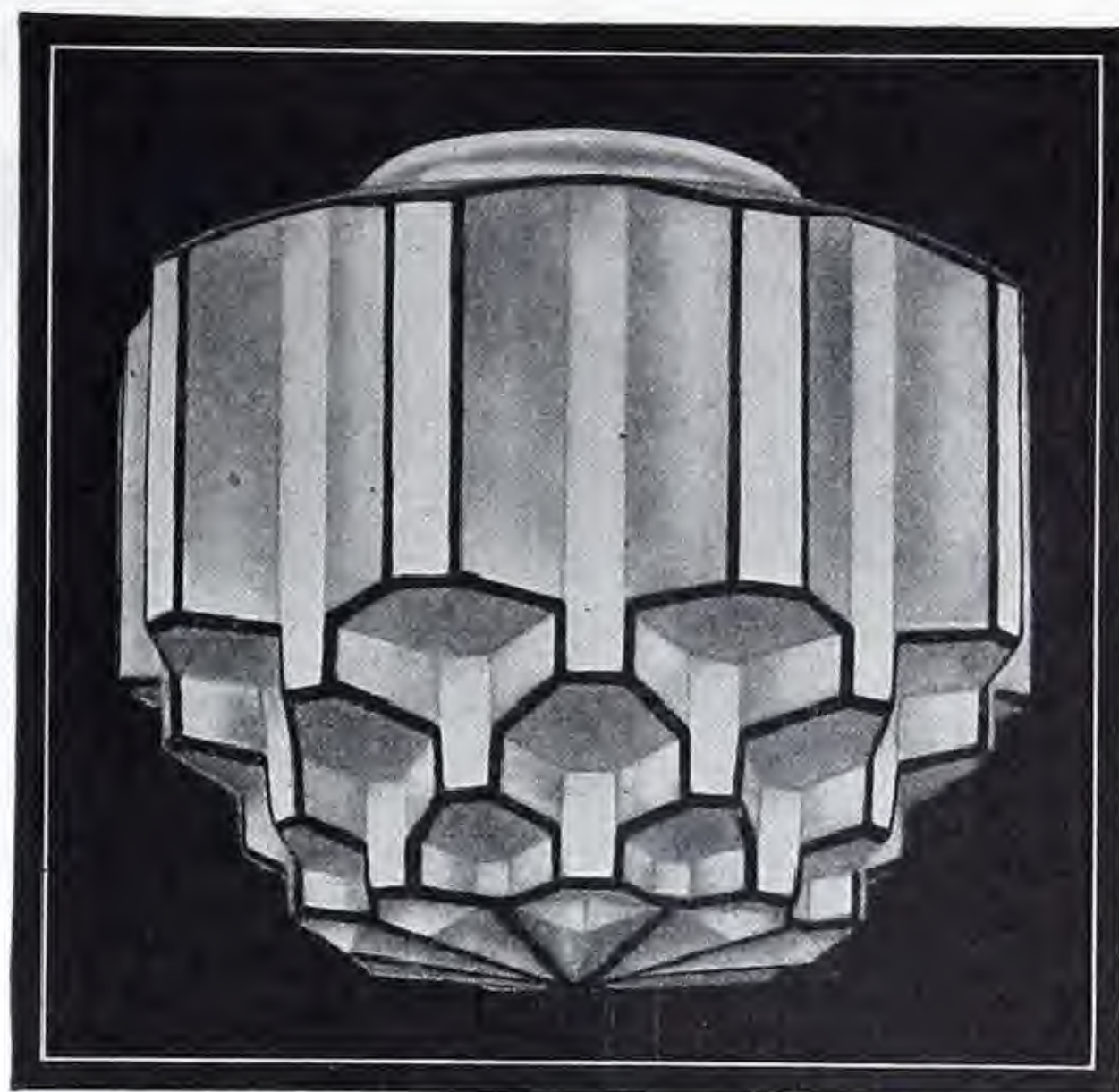
No. 2257E

No. 2258E

List No.	Standard Pkg.	Width	Length	Fitter	Weight Standard Pkg.	List Price
259	8	9"	7 1/2"	4"	22 lbs.	\$2.50
260	1	12 3/8"	10 1/2"	6"	10 lbs.	6.35
257	12	5 1/2"	9"	4"	26 lbs.	2.50
258	1	10"	16 3/8"	6"	12 lbs.	9.35
257E	12	5 1/2"	9"	4"	26 lbs.	4.00
258E	1	10"	16 3/8"	6"	12 lbs.	13.20
259E	8	9"	7 1/2"	4"	22 lbs.	4.00
260E	1	12 3/8"	10 1/2"	6"	10 lbs.	7.40

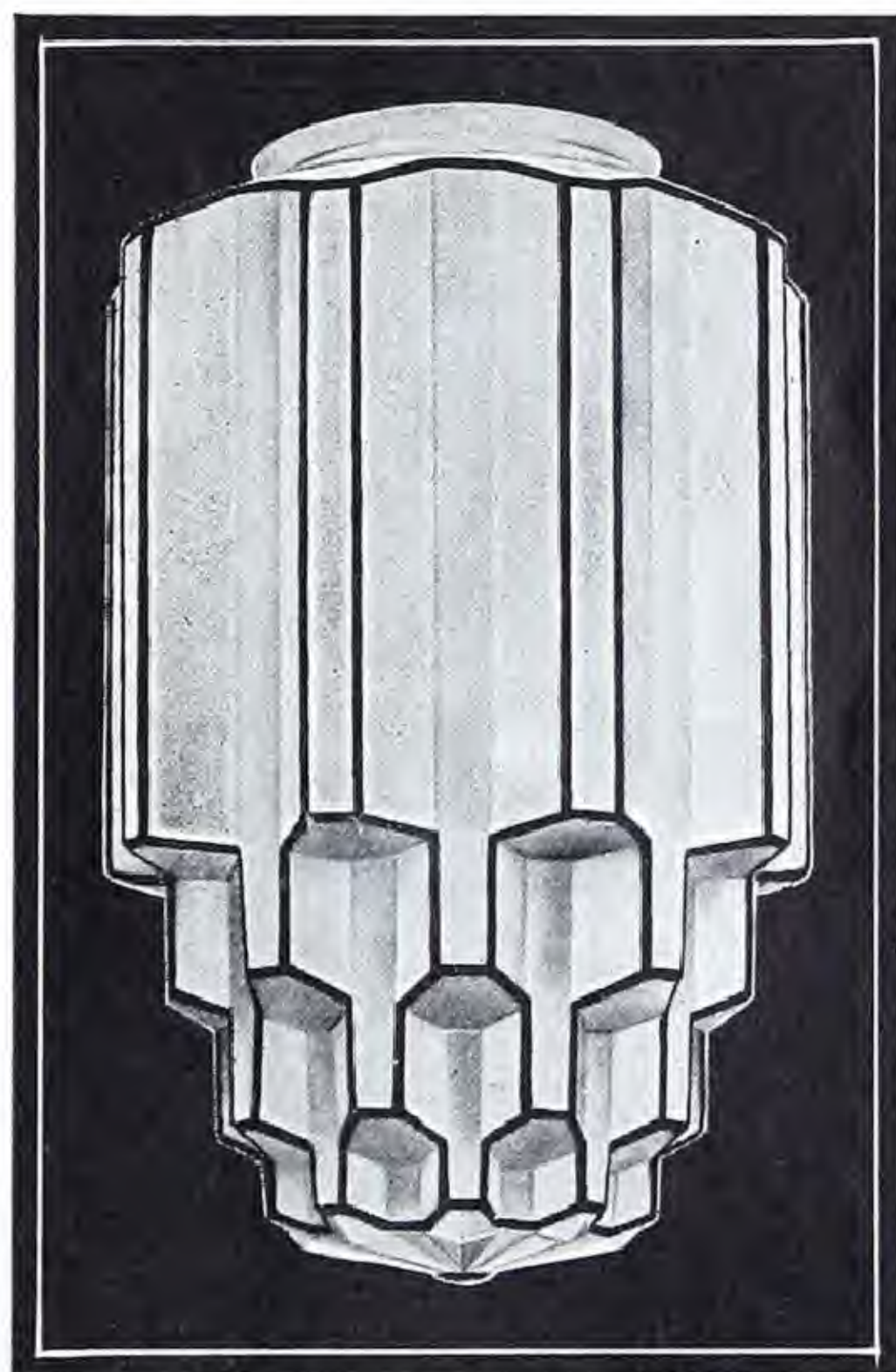
MODERNE LIGHTING UNITS

MADE OF "HYPERION" GLASS



No. 1460D—12 1/2" x 10 3/4" x 6" Fitter

No. 1459D—9" x 7" x 4" Fitter



No. 1458D—10 1/4" x 16 1/4" x 6" Fitter

No. 1457D—6" x 9" x 4" Fitter

No. 1461D—12 1/2" x 20" x 6" or 8" Fitter

Modernistic Glassware

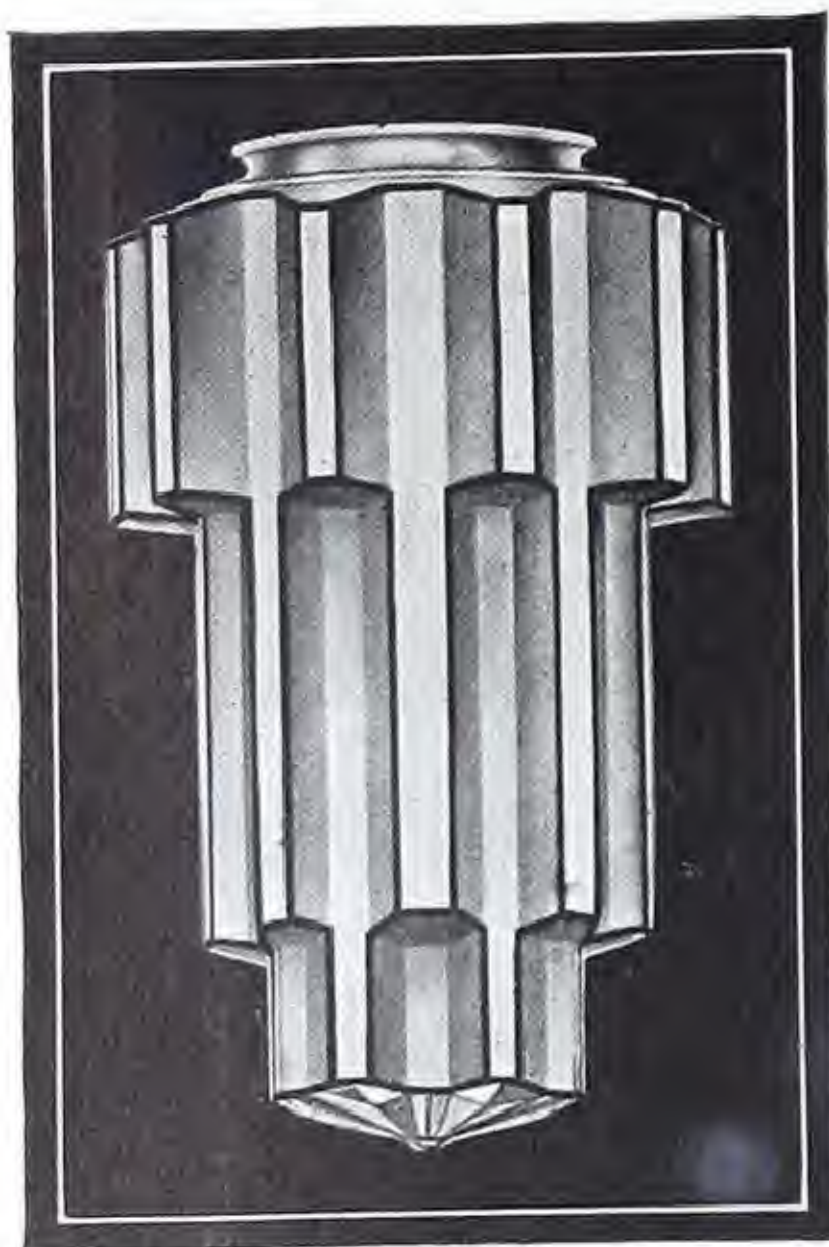
List No.	Standard Pkg.	Width	Length	Fitter	Finish	List Price
1457	12	6" x 9"	x 4"		Plain	\$2.50
1457D	12	6" x 9"	x 4"		Blk. Line	4.00
1458	1	10 1/4" x 16 1/4"	x 6"		Plain	6.00
1458D	1	10 1/4" x 16 1/4"	x 6"		Blk. Line	13.20
1459	8	9" x 7 1/2"	x 4"		Plain	2.50
1459D	8	9" x 7 1/2"	x 4"		Blk. Line	4.00
1460	1	12 1/2" x 10 3/4"	x 6"		Plain	6.35
1460D	1	12 1/2" x 10 3/4"	x 6"		Blk. Line	7.40
1461	1	12 1/2" x 20"	x 6" or 8"		Plain	27.50
1461D	1	12 1/2" x 20"	x 6" or 8"		Blk. Line	35.75

THE "ARISTOCRAT" UNIT

MADE OF "HYPERION" GLASS

DECORATED

BLACK LINED

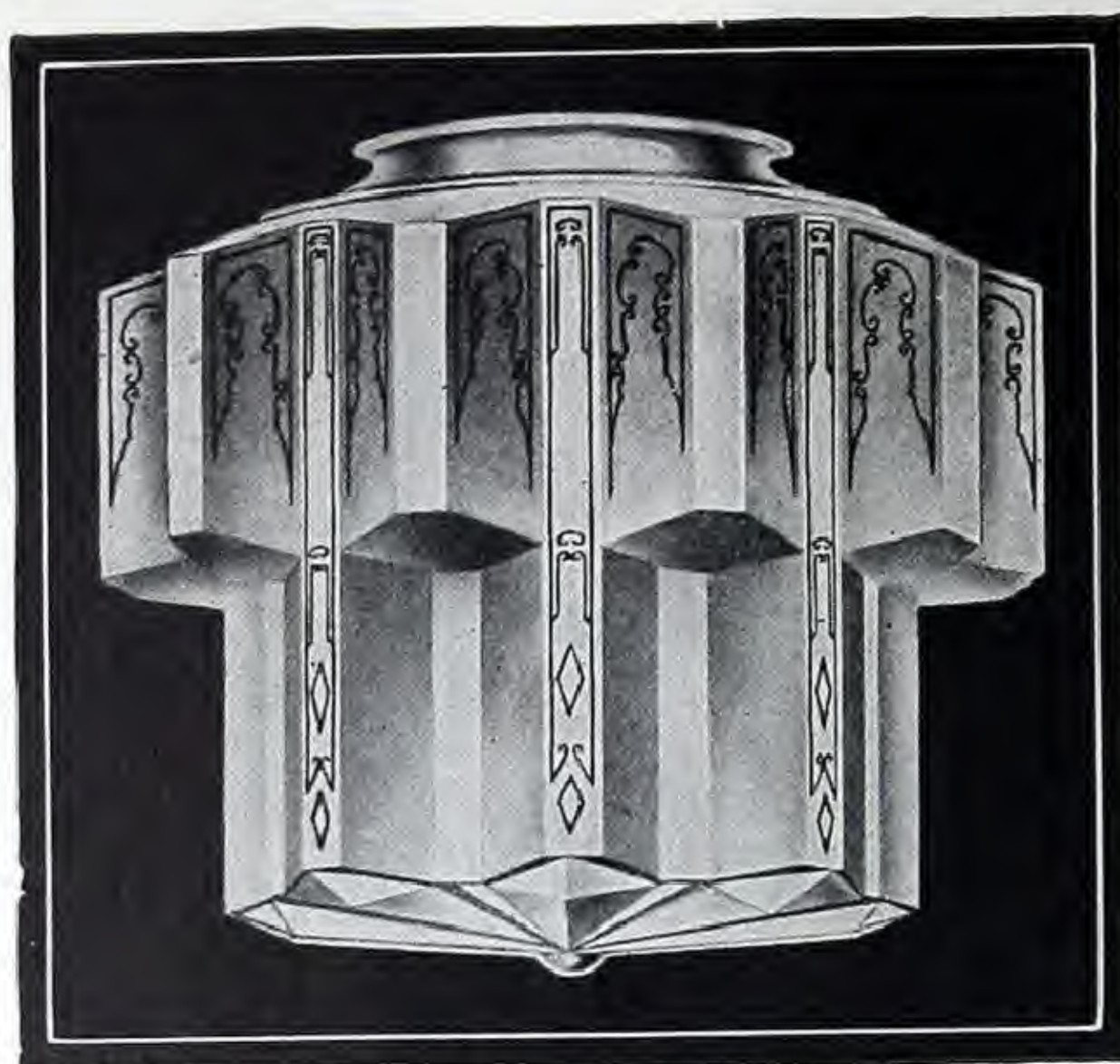


No. 1258D—10¼" x 16½" x 6" Fitter
 No. 1257D—6" x 9" x 4" Fitter
 No. 1261D—12½" x 20" x 6" or 8" Fitter

BLACK LINED

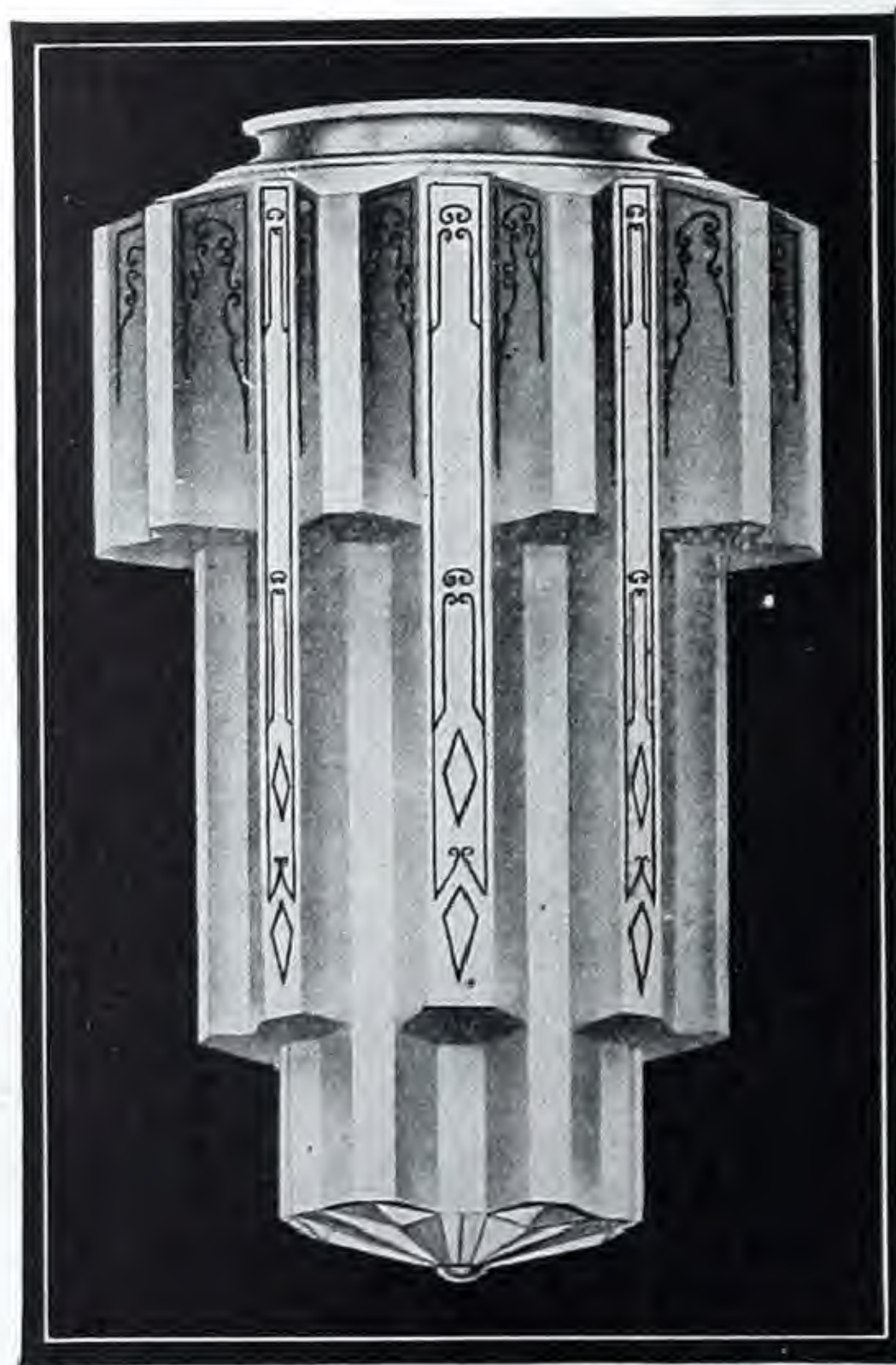


No. 1260D—12½" x 10¾" x 6" Fitter
 No. 1259D—9" x 7½" x 4" Fitter



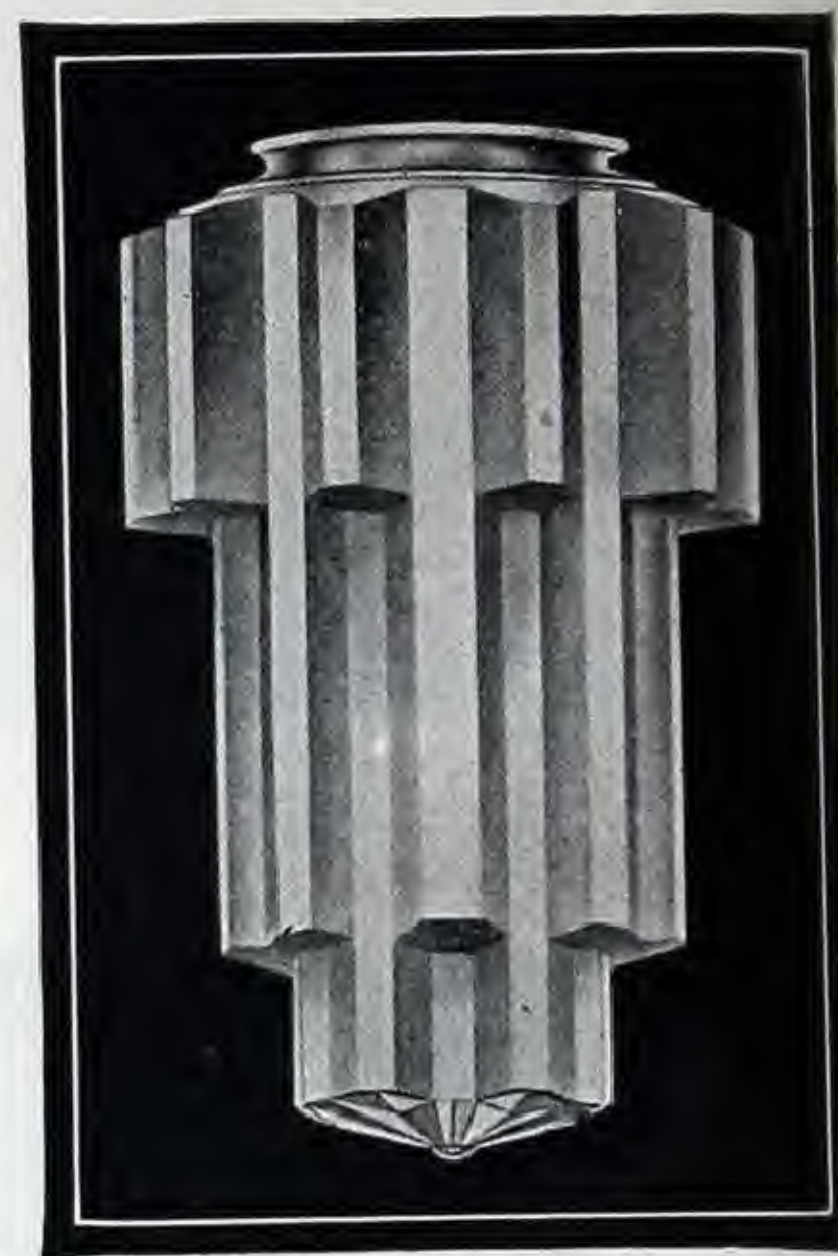
No. 1260E—12½" x 10¾" x 6" Fitter
 No. 1259E—9" x 7½" x 4" Fitter

DECORATED



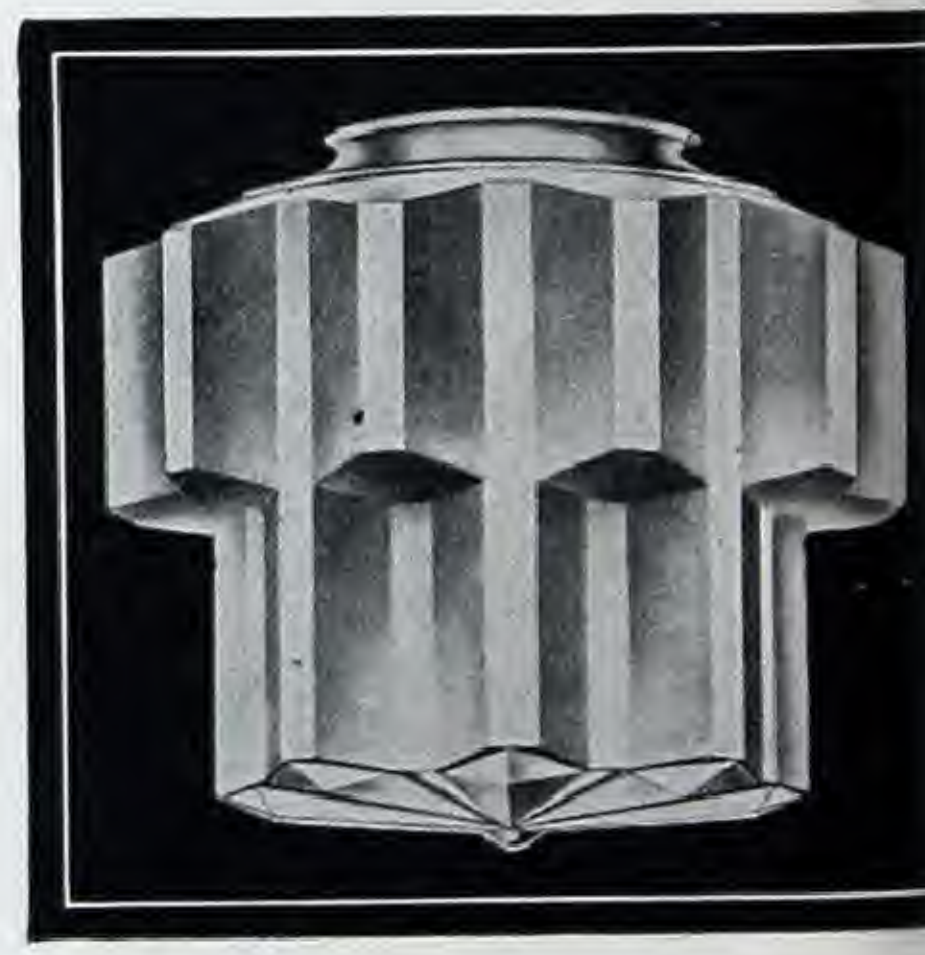
No. 1258E—10¼" x 16½" x 6" Fitter
 No. 1257E—6" x 9" x 4" Fitter
 No. 1261E—12½" x 20" x 6" or 8" Fitter

PLAIN WHITE



No. 1258—10¼" x 16½" x 6" Fitter
 No. 1257—6" x 9" x 4" Fitter
 No. 1261—12½" x 20" x 6" or 8" Fitter

PLAIN WHITE



No. 1260—12½" x 10¾" x 6" Fitter
 No. 1259—9" x 7½" x 4" Fitter

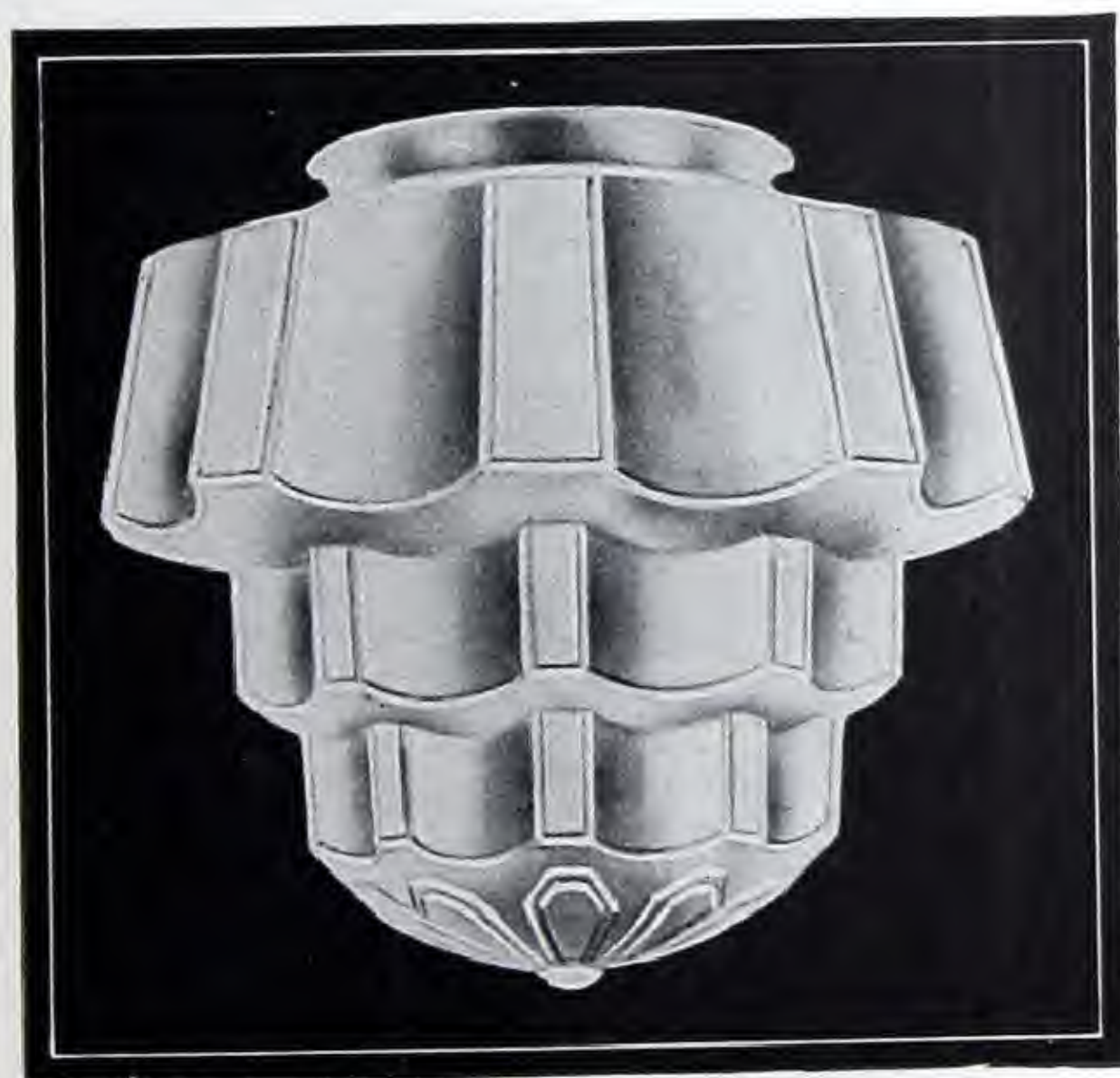
List No. Plain White	List Price	List No. Decorated	List Price	List No. Black Lined	List Price	Standard Package	Weight Stand. Package
1257	\$ 2.50	1257-E	\$ 4.00	1257-D	\$ 4.00	12	26 lbs.
1258	9.35	1258-E	13.20	1258-D	13.20	1	12 lbs.
1259	2.50	1259-E	4.00	1259-D	4.00	8	22 lbs.
1260	6.35	1260-E	7.40	1260-D	7.40	1	10 lbs.
1261	27.50	1261-E	35.75	1261-D	35.75	1	17 lbs.

MAJESTIC UNITS

MADE OF "HYPERION" GLASS



No. 1958
No. 1957

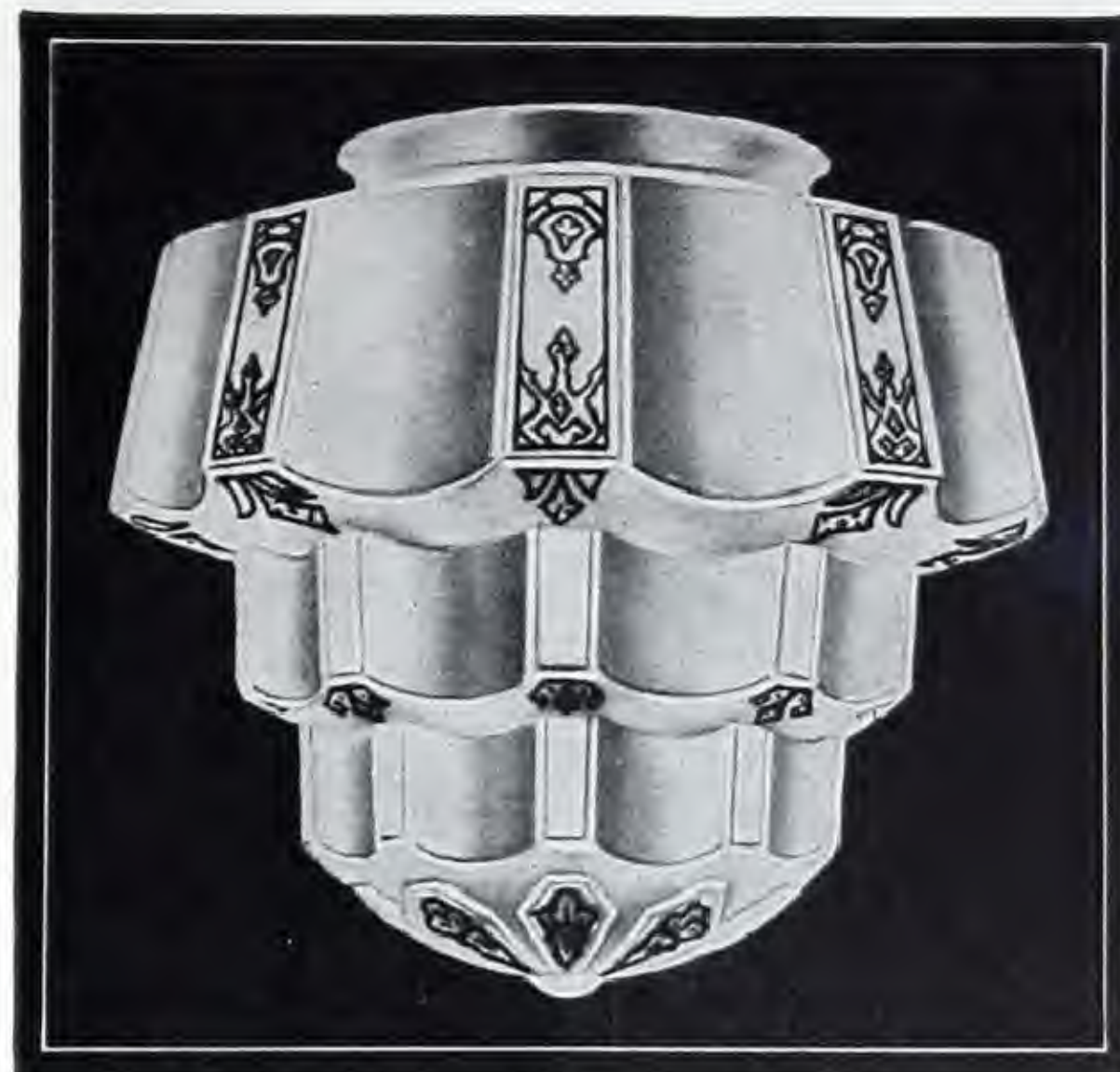


No. 1960
No. 1959

List No.	Std. Pkg.	Dimensions			Std. Pkg. Wgt.	List Price Each
		Width	Length	F'ter		
1957.....	12	6"	x 9"	x 4"	26 lbs.	\$2.50
1958.....	1	16 1/4"	x 11 1/4"	x 6"	12 lbs.	9.35
1959.....	8	9"	x 7 1/2"	x 4"	22 lbs.	2.50
1960.....	1	12 1/2"	x 10 1/2"	x 6"	10 lbs.	6.35

"MAJESTIC" UNITS

MADE OF "HYPERION" GLASS



No. 1960E
No. 1959E



No. 1958E
No. 1957E

List No.	Std. Pkg.	Dimensions			Std. Pkg. Wgt.	List Price Each
		Width	Length	F'ter		
1960E....	1	12 1/2"	x 10 1/2"	x 6"	10 lbs.	\$7.40
1959E....	8	9"	x 7 1/2"	x 4"	22 lbs.	4.00
1958E....	1	16 1/4"	x 11 1/4"	x 6"	12 lbs.	13.20
1957E....	12	6"	x 9"	x 4"	26 lbs.	4.00

"PROGRESS" UNITS
IN "HYPERION" AND "ASTRALITE" GLASS
**"Astralite"* is Daylight glass.



No. L2816

No. L2818

The metal louvers, illustrated above, are made of solid brass throughout, and are substantially constructed from heavy square brass stock, so as to retain their shape and firmness at all times. They are furnished in a high grade Chromium finish and are completely assembled for shipment.



No. 2816

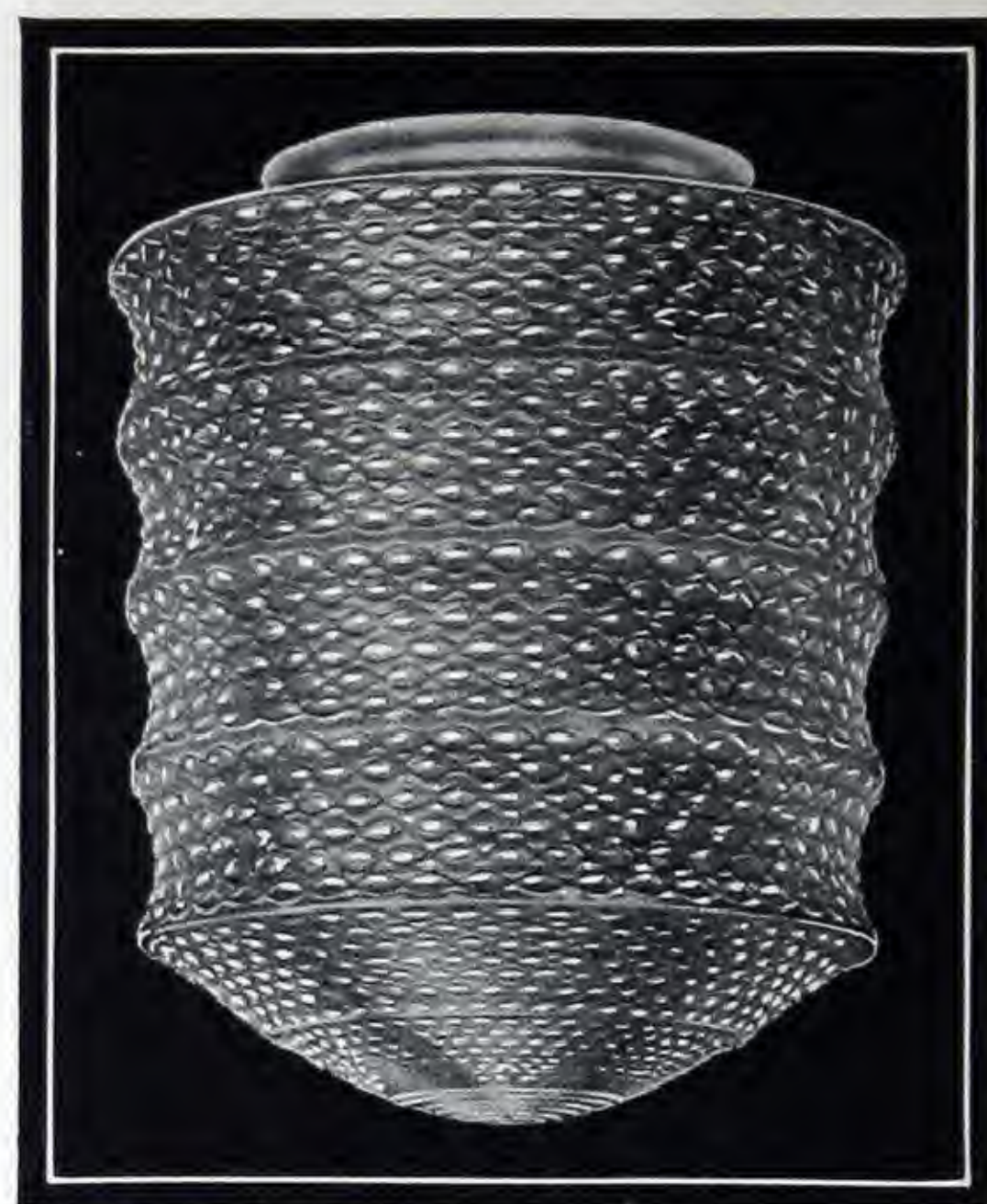
No. 2818

When ordering, please mention the number and whether "Hyperion" or "Astralite" daylight glass is desired.

List No.	Glass Dimensions			Standard Pkg.	Weight		List Price
	Length	Width	Fitter		Std. Pkg.		
2816	16"	x 10 $\frac{3}{4}$ "	x 6"	1	8 lbs.		\$10.30
2818	18"	x 10 $\frac{3}{4}$ "	x 6"	1	9 lbs.		16.65
L2816	16"	x 10 $\frac{3}{4}$ "	x 6"	1	12 $\frac{1}{2}$ lbs.		22.80
L2818	18"	x 10 $\frac{3}{4}$ "	x 6"	1	13 $\frac{1}{2}$ lbs.		29.15

CUT DIAMOND DESIGN UNITS
in
"ALABASTER" GLASS

The scintillating and sparkling effect, produced by the Diamond Cut design, is both unique and attractive and the "Alabaster" glass materially softens any glare, making it restful to the eyes, yet efficient in illumination.



No. 510

One piece "Alabaster" Unit.



No. 509

With 8" Cut Crystal Glass Bottom Dish and Chrome Connecting Ring.

List No.	Dimensions			Standard Carton	Weight	List Price
	Diam.	Length	Fitter			
510	9 $\frac{1}{2}$ "	x 11 $\frac{1}{4}$ "	x 6"	1	7 lbs.	\$6.50
509	9 $\frac{1}{2}$ "	x 12 $\frac{1}{2}$ "	x 6"	1	8 lbs.	8.10

When ordering, please mention the Unit number.

VELVA PRESSED REFLECTORS



No. 3007

List No.	Glass	Std. Pkg. (per bbl.)	Dim. of Glass (Inches)			Std. Pkg. Wgt.	List Price Each
			W'th	L'th	F'ter		
007.....	Velva	72	7 1/8"	3 7/8"	2 1/4"	146	\$1.35
008.....	Velva	48	8 1/8"	4"	2 1/4"	122	1.85
009.....	Velva	24	10"	4 3/4"	2 1/4"	110	2.50

BOWLS AND DISHES



No. 260—Hyperion
Furnished with Bottom Hole



No. 1551—Bowl
Hyperion and C. R. I. Glass



No. 1558—Dish—Deep Type
Hyperion and C.R.I. Glass

List No.	Std. Pkg.	Dimensions of Glass			Std. Pkg. Wgt.	List Price Each
		Width	Length	F'ter		
1558.....	24	8"	x 4"	x 8"	38 lbs.	\$2.50
1558.....	6	10"	x 5"	x 10"	15 lbs.	3.75
1558.....	5	12"	x 6"	x 12"	22 lbs.	5.75
1558.....	4	14"	x 7"	x 14"	24 lbs.	7.70
1551.....	6	10"	x 5 1/8"	x 8"	25 lbs.	3.75
1551.....	4	12"	x 5 3/8"	x 10"	22 lbs.	5.75
1551.....	5	14"	x 5 1/2"	x 12"	30 lbs.	7.70
260.....	4	10"	x 9"	x 6"	16 lbs.	2.75

NOVA BLOWN REFLECTORS

and

SILVERED REFLECTORS

(Genuine Silver Plated Glass)

Mirrored surface is guaranteed against peeling or deterioration.



Nova

No. 7000
No. 7001
No. 7002
No. 7003



Nova

No. 7006
No. 7007
No. 7008
No. 7009

PLAIN "NOVA" REFLECTORS

List No.	Glass	Std. Pkg.	Dimensions			Wgt. Std. Pkg. lbs.	List Price
			Width	Length	Fitter		
7000	Nova	36	5 1/8"	x 4"	x 2 1/4"	32	\$1.25
7001	Nova	30	5 3/4"	x 4 5/8"	x 2 1/4"	34	1.35
7002	Nova	24	7 3/4"	x 4 3/4"	x 2 1/4"	32	2.00
7003	Nova	12	8 1/2"	x 6"	x 2 1/4"	32	2.55
7006	Nova	36	7"	x 3 1/8"	x 2 1/4"	76	1.35
7007	Nova	24	8"	x 3 5/8"	x 2 1/4"	34	1.85
7008	Nova	24	9"	x 4 1/8"	x 2 1/4"	30	2.15
7009	Nova	12	11"	x 5"	x 2 1/4"	40	2.80

SILVERED GLASS REFLECTORS

List No.	Glass	Std. Pkg.	Dimensions			Wgt. Std. Pkg. lbs.	List Price
			Width	Length	Fitter		
7000 S	Silvered	36	5 1/8"	x 4"	x 2 1/4"	32	\$3.25
7001 S	Silvered	30	5 3/4"	x 4 5/8"	x 2 1/4"	34	3.40
7002 S	Silvered	24	7 3/4"	x 4 3/4"	x 2 1/4"	32	4.25
7003 S	Silvered	12	8 1/2"	x 6"	x 2 1/4"	32	5.25
7006 S	Silvered	36	7"	x 3 1/8"	x 2 1/4"	76	3.40
7007 S	Silvered	24	8"	x 3 5/8"	x 2 1/4"	34	3.80
7008 S	Silvered	24	9"	x 4 1/8"	x 2 1/4"	30	4.55
7009 S	Silvered	12	11"	x 5"	x 2 1/4"	40	5.75

The outer surface of the Silvered Reflectors is finished in a satin silver color.

DUOLUX LIGHTING UNIT

MAXIMUM LIGHTING EFFICIENCY—MINIMUM
SURFACE BRIGHTNESS

"Duolux" is an all-white glass unit which, when illuminated, produces a beautiful mellow ivory tone—(eliminating glare and eye-strain)—while still retaining its interior whiteness, for maximum reflection to the ceiling.

"Duolux" is ideal for the illumination of hospitals, offices, showrooms, schools and all other places where adequate illumination, without eye-strain, is essential.



No. 2716

Overall length of fixture complete is 30 inches.
For longer overall lengths, add 90c list per foot or fraction of a foot.

Standard stem diameter is $\frac{1}{2}$ "—Stem $\frac{3}{4}$ " diameter can be supplied if desired.

No. 2716—With 16" diameter "Duolux" Bowl.
List Price..... \$13.50

Wired with porcelain Medium Base Socket for 150-200 watt lamp.

No. 2720—With 20" diameter "Duolux" Bowl.
List Price..... \$25.50

Wired with porcelain Mogul Base Socket for 300-500 watt lamp.

For fixtures wired to take the new 3-light Lamps.

Add \$3.00 list for the special 2-circuit socket and switch.

Add \$1.50 list for the 2-circuit socket only, when no switch is required.

Pendants are made of Brass and finished in "Dull Chrome."

GUTHFAN CONDITIONAIRES

Circulate Air a new and Better way

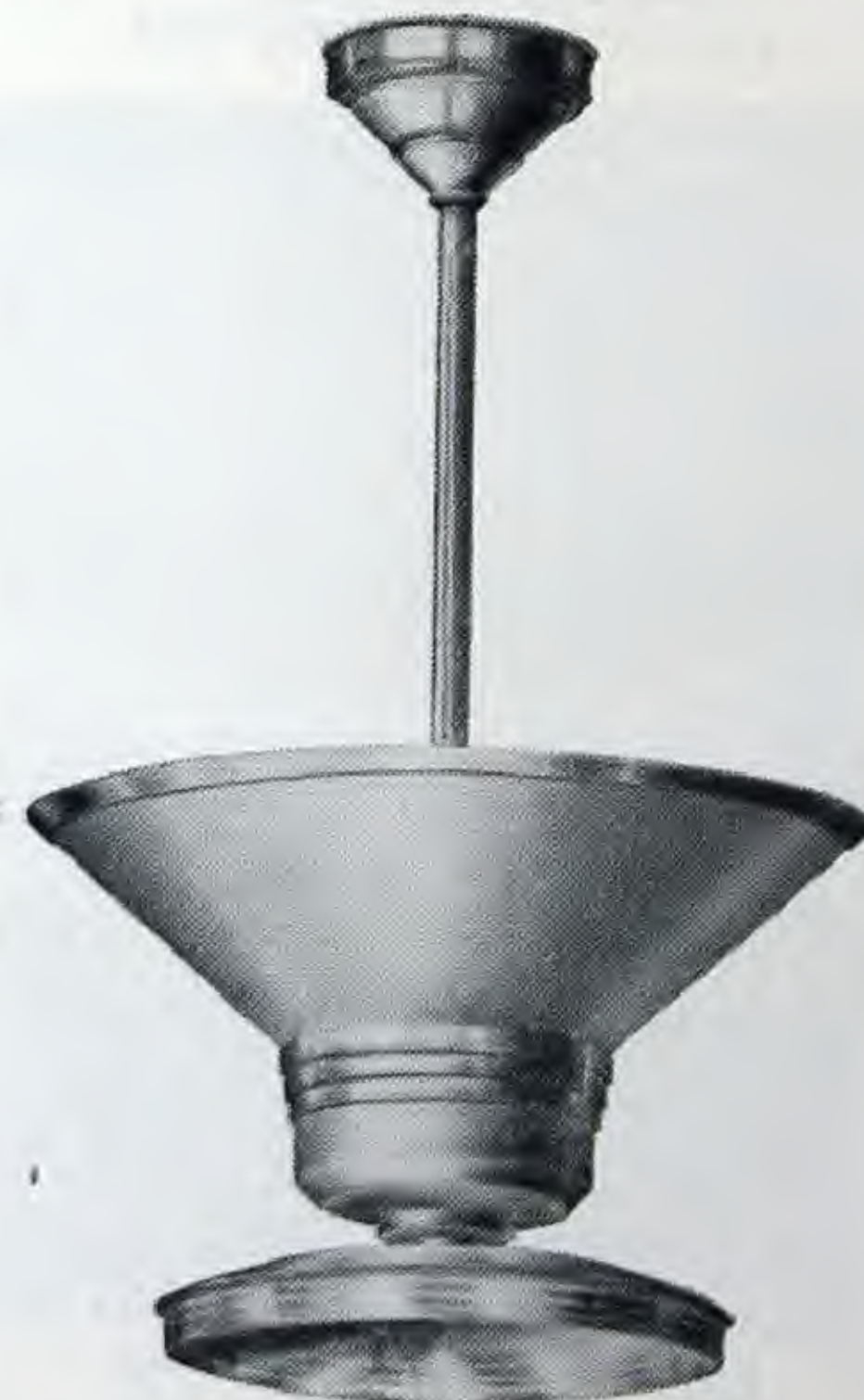
Cools you all over—without drafts or air blasts.™ Draws the cooler air up from beneath the fan and circulates it over a wide area. Circulates 5,134 cubic feet of air per minute. More efficient than 3 sixteen inch oscillating type fans.



No. R-4813 12" spread

This type GUTHFAN without lighting equipment. Two speed. Standard finish is English Brass. Can be furnished in Silvertone, (if specifically ordered) at no additional cost.

AC 110 Volt, 60 Cycle..... \$81.60
DC 110 Volt..... 98.00



No. 4808

3 Lights, 600 Watts Capacity, 20" Spread

A popular type of GUTHFAN with Guth Super Illuminator indirect lighting unit, particularly effective in rooms with light colored walls and ceilings. (Ceiling height should not be greater than fourteen feet for maximum lighting efficiency.) The wide angle indirect lighting reflector is finished in two-tone Aluminum, with satin and polished bands.

AC 110 Volt, 60 Cycle..... \$102.50
DC 110 Volt..... 119.00

GUTHFAN CONDITIONAIRES

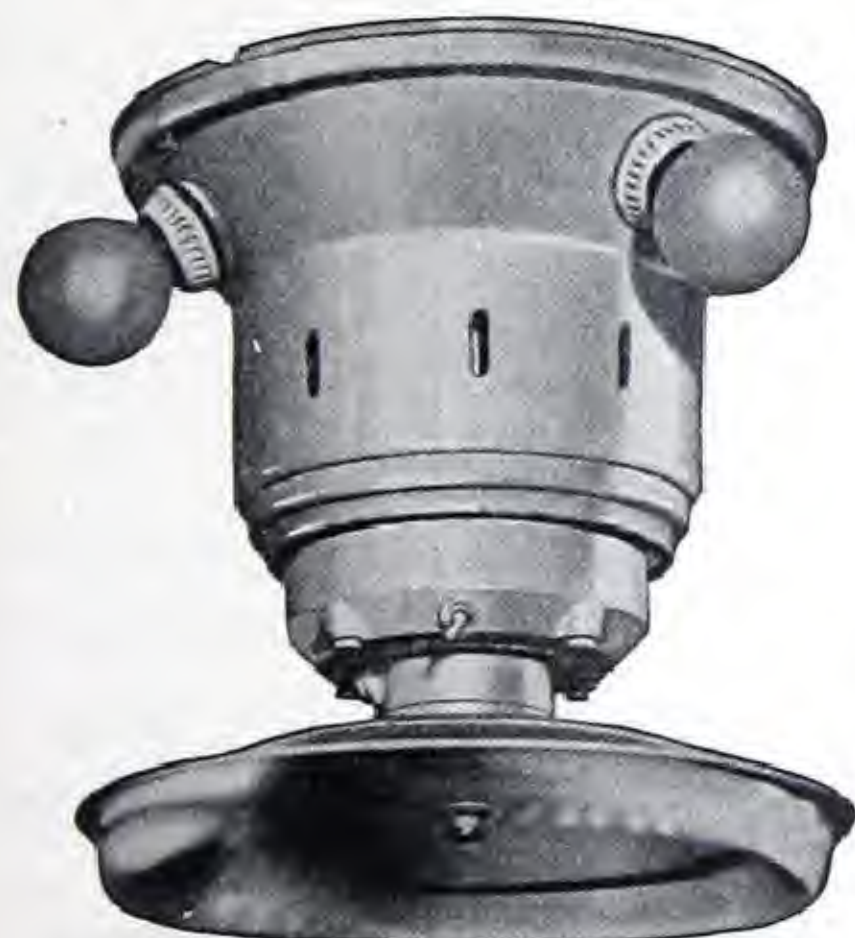


No. R4806

3 Lights 450 Watts Capacity 21" Spread

Another popular fixture with a neat cased alabaster glass bowl in petal form—attractive, yet simple, and suitable for offices, shops, hospitals or other general installations. Finished in English brass.

AC 110 Volt 60 Cycle.....\$110.00
DC 110 Volt.....126.00



No. R4815

3 Lights 11" Ceiling Plate Two Speed

Ideal for the low ceiling rooms. Attractively finished in Duco Ivory Enamel. May be had in other finishes at small additional cost. Also available without lights—R4815 N.L.

AC 110 Volts 60-Cycle.....\$ 90.50
DC 110 Volt.....107.00



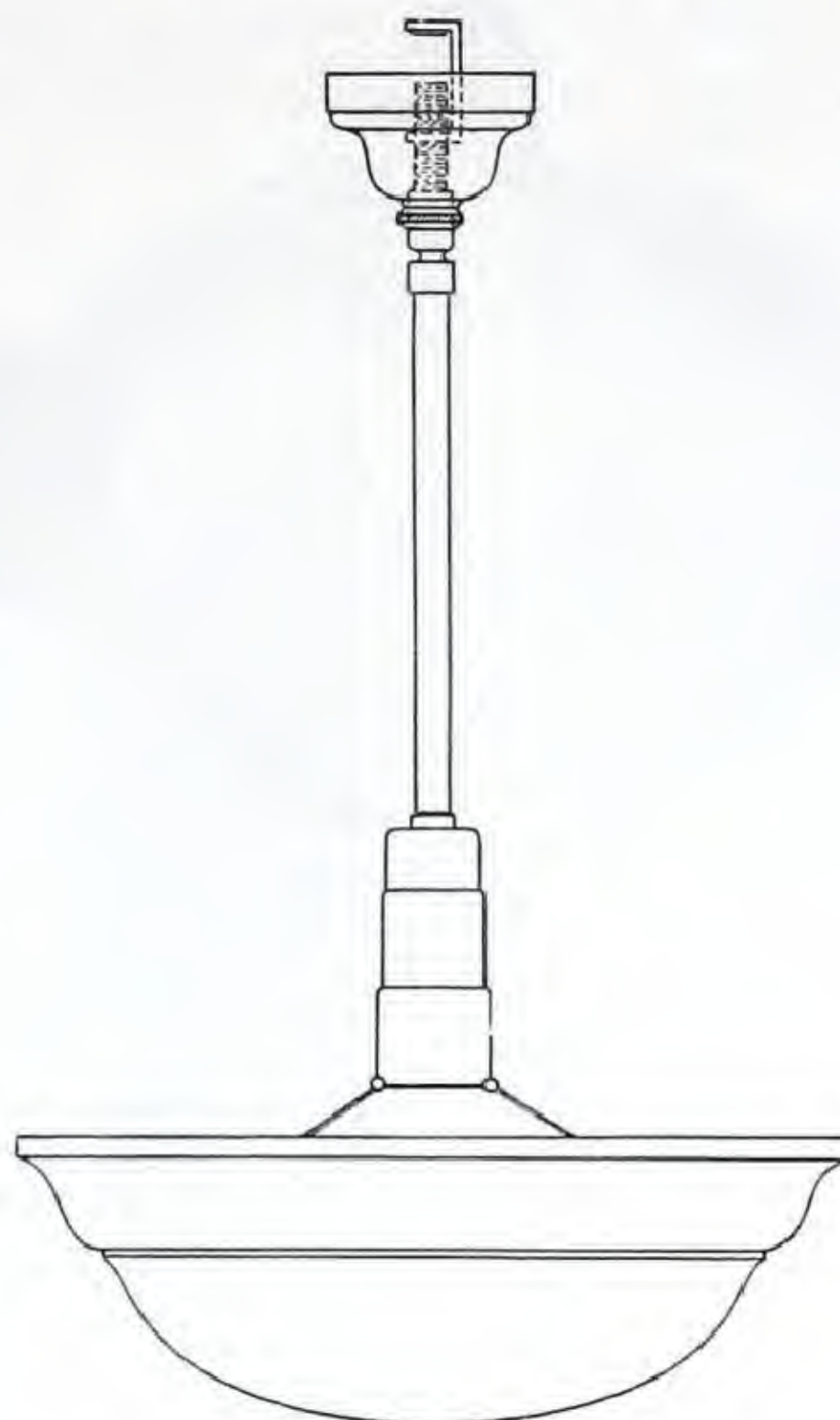
No. R4964

4 Lights

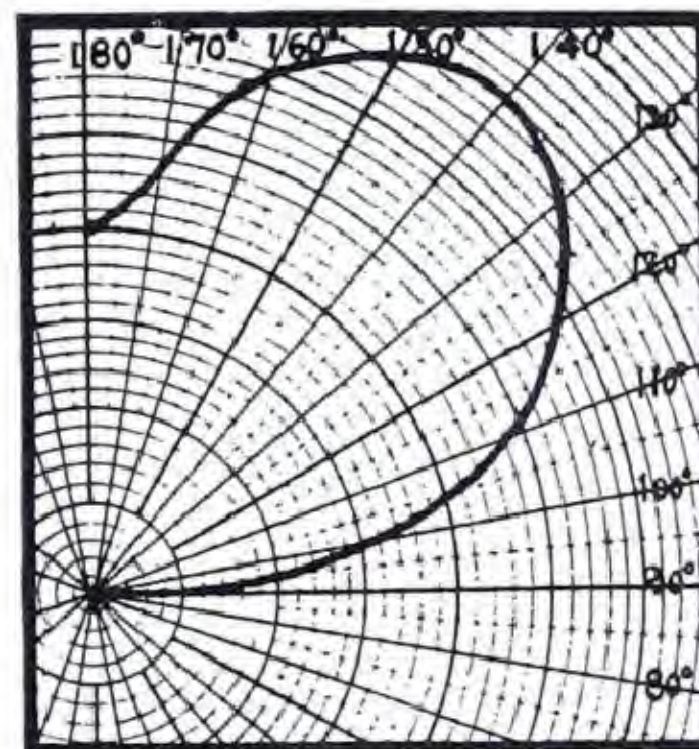
A very effective "elevator cab" model of unique design. Ceiling ring is cast iron with brass band. Finished to match surroundings. Has 4 lights and measures 19" over all. R4960 is without lights and measures 14" in diameter.

AC 110 Volt 60 Cycle.....\$129.00
DC 110 Volt.....145.50

GUTH PORCELAIN ENAMEL "INDIRECT-LITE"



No. R5354



Photometric Chart Showing Light Output of 82%

Suspension of Semi-rigid type finished Polished Chrome.

Suspension of Chain type finished Ivory Enamel.

Socket Cover for both porcelain enameled.

Reflector bowl finished Lumo-Vitro Enamel.

Ivory outside—White inside.

List Numbers		Wattage	Diam.	Lgth.	Socket	List Prices
Semi-rigid Stem	Chain Stem					
R-5354	R-3750	100-150	10"	30"	Med.	\$14.20
R-5355	R-3751	200	14"	30"	Med.	15.50
R-5357	R-3753	300-500	18"	36"	Mog.	19.40
R-5358	R-3754	750-1000	18"	36"	Mog.	19.40
R-5359	R-3755	750-1500	22"	42"	Mog.	28.70

Single pole canopy pull switch.....\$1.65 extra

Mogul socket for 3-wattage lamp.....1.65 "

Canopy pull switch for 3-wattage lamp.....2.50 "

Extra length for Chain stem, per foot......85 "

Lengthening for Semi-rigid stem { 6" MP-2018 .70 "
12" MP-2019 1.00 "

MURALIER COLOR CONTROL LIGHTING



Select the color filter you want . . . slip it into place . . . light Muralier and it is tinted on the surface of the fixture with the color you choose.

Muralier fixtures supply a projected light or illumination that is sparkling white plus the added feature of color control for decoration . . . changeable transmitted color that is confined within the area of the fixture. With Muralier it is no longer necessary to have always the same color effect in your fixture (when lighted) as when it was originally installed.



Muralier Chain Hanger.

With blue glass filter, there is added a richness to many schemes of interior decoration.

With red glass filter, Muralier enhances the beauty of many decorative plans.

With green glass filter, there is created an illusion that is ideal for many different purposes.

With amber glass filter, Muralier puts new vitality into lighting of any room.

MURALIER COLOR CONTROL LIGHTING



No. 8006—THE MURALIER WALL POCKET

This fixture attaches flush against the wall, and furnishes attractive supplementary lighting, matching the general lighting plan. Muralier color filters are obtainable with these wall pocket fixtures. The projected light is of course white.



Muralier Swivel Hanger.

1. The only lighting fixture with color control. When lighted, the fixture takes on the color of the glass filter, without affecting the whiteness of the illumination.

2. Changing the color of the fixture (when lighted) is as easy as changing a lamp bulb. The fixture can be red, amber, blue or green or other colors according to the color of filter inserted in the fixture.

3. It provides indirect lighting . . . the most evenly distributed and agreeable type of lighting.

4. Muralier makes available effective illumination, color harmony and unusual eye-appeal without the penalty of any premium.

MURALIER COLOR CONTROL LIGHTING

5. Muralier gives you colors that fit the mode of the day . . . color harmony for every occasion . . . easily changeable . . . decorative possibilities that are unique and fascinating.

6. The distinctive color effect of Muralier is unequalled by any other lighting fixture. The luminous colors give the effect of richly colored glass.

7. Color can be easily changed to match the decorative plan. It is no longer necessary to have the same color effect in your fixture as when it was originally installed.

8. Muralier radiates an everlasting spirit of newness and cheer.

List No.	Type	Length Overall	Diam. Bowl	Type Socket
8012	Suspension	36"	13½"	Medium
8015	Suspension	42"	15"	Mogul
8016	Suspension	42"	18"	Mogul
8024	Suspension	42"	24"	Mogul
8302	Ceiling	18"	13½"	Medium
8305	Ceiling	21½"	15"	Mogul
8308	Ceiling	24½"	18"	Mogul
8006	Wall Pocket	10"x5¾"	12"	Medium

List No.	Wattage	Standard Package	Wt. Lbs. Std. Pkg.	List Price
8012	100-150-200W	1	6	
8015	300W	1	8	
8016	500W	1	8	
8024	750-1000W	1	12	
8302	100-150-200W	1	5	
8305	300W	1	8	
8308	300-500W	1	8	
8006	75-100W	1	6	

Swivel hanger supplied at extra price.

Wall pocket is wired complete with switch.

When 100W or 150W lamp is used in Nos. 8012 or 8302, use socket extension.

Standard finish is silvertint.

Special finish: etched and polished gold.

MURALIER GLASS COLOR FILTERS

List No.	List No.	List No.	List No.	Dia. Bowl	Dia. Fitter	List Price
8508	8509	8510	8511	13½"	5"	
8512	8513	8514	8515	15"-18"	6¾"	
8522	8523	8524	8525	24"	8¼"	
8518	8519	8520	8521	Wall Pocket	5x2½"	

Standard package, 1. Weight, standard package, 1½ pounds.

REGENT LIGHTING UNITS

Semi-indirect

The Regent is a modern fixture that yields artistic and effective illumination . . . the standard of lighting necessary. The glass used in the lower section is Galax having an embossed design. It is of heavy density for maximum reflection and low visible brightness. The rich diffused flow of light serves to accentuate the lines of beauty in the fixture which adds a decorative charm to any interior.



Illustration shows Swivel Stem Suspension which can be supplied at extra cost.

List No.	Type	Length Overall	Diam. Bowl	Wattage	Wgt. of Std. Pkg.
1915	Chain Suspension	36"	15"	200-300W	8 lbs.
1918	Chain Suspension	36"	18"	300-500W	8 lbs.
1924	Chain Suspension	42"	24"	750-1000W	12 lbs.
1935	Ceiling	16"	15"	200-300W	7 lbs.
1938	Ceiling	17"	18"	300-500W	8 lbs.

Mogul socket is standard. Standard package is 1.

Prices on application.

Note—When a 200-watt lamp is used in the 15" size, use a socket reducer for correct focal position.

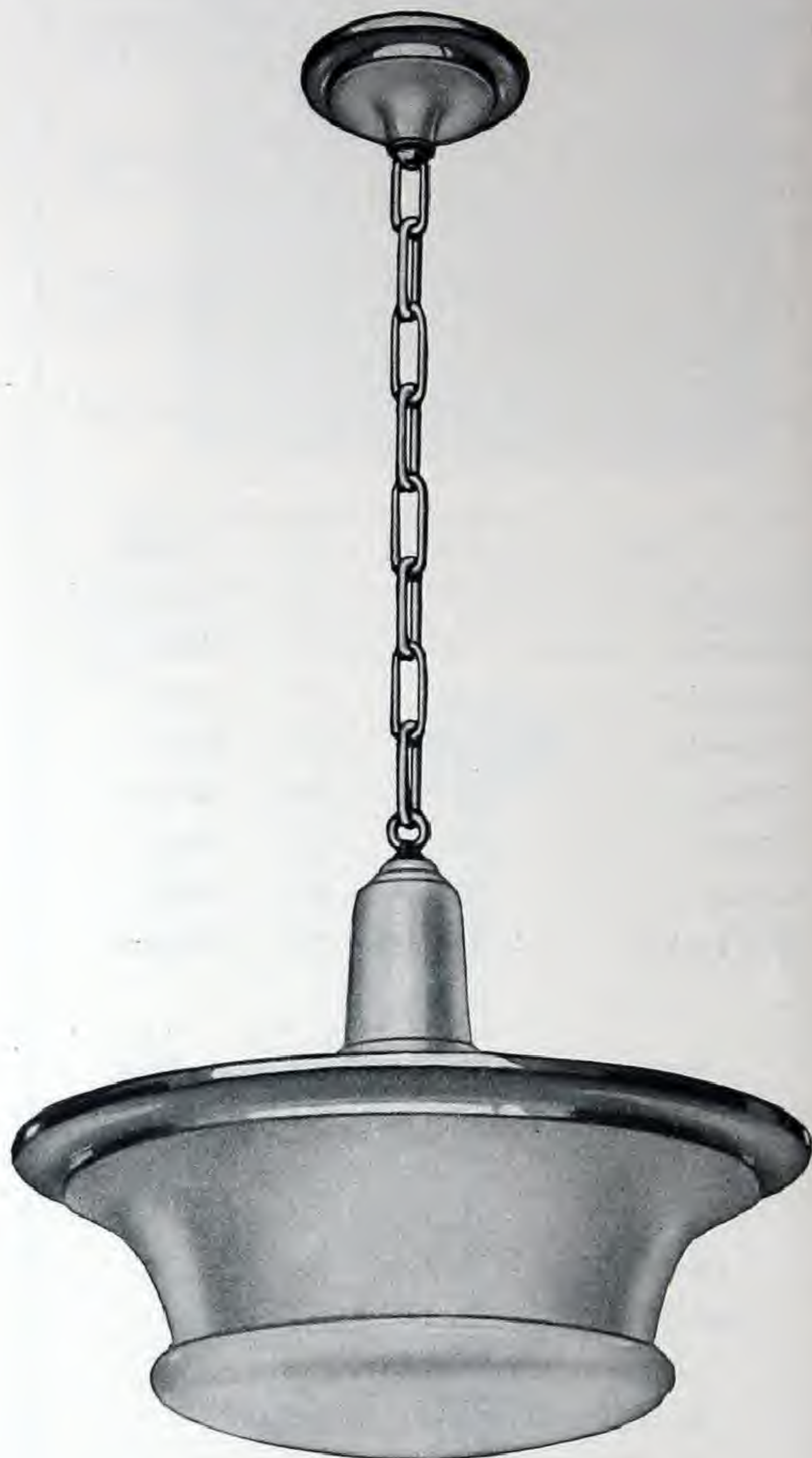
Standard finish for all above list numbers: Silvertint.

Special finishes: Etched and polished gold, royal bronze. Prices on request.

The bowl as well as the canopy and husk are made of aluminum.

Regent can be had wired for Dual Filament Bulbs. Prices on request.

AMOLIER LIGHTING UNITS



Amolier is an all-purpose unit with the meritable features of direct, indirect and semi-indirect lighting. The Galax dual-density enclosing globe of homogeneous structure affords maximum upward reflection of diffused light over a wide area and supports the etched aluminum deflector which screens the light source. The low density direct light through the bowl section also lights the face of the deflector with a soft luminous effect.

List No.	Type	Length Overall	Diam. Bowl	Type Socket	Glass Size	Wattage	Standard Package	Wgt. of Std. Pkg.	List Price Each
6240	Chain Suspension	36"	18"	Medium	12"x5"	200W	1	18 lbs.	
6241	Chain Suspension	40"	18"	Mogul	12"x6"	300W	1	23 lbs.	
6242	Chain Suspension	48"	22"	Mogul	14"x6"	500W	1	26 lbs.	
6243	Ceiling	18"	18"	Medium	12"x5"	200W	1	17 lbs.	
6244	Ceiling	18"	18"	Mogul	12"x6"	300W	1	20 lbs.	
6245	Ceiling	24"	22"	Mogul	14"x6"	500W	1	20 lbs.	

Standard finish for all above list numbers: Silvertint.

Special finishes: Etched and polished gold, royal bronze. Prices on request.

ECONOMY SAFETY HANGERS

SPECIFICATIONS

- Standard finish:

Plated statuary bronze.
- Overall lengths:

As shown in schedule.
- Wired pendants:

Standard equipment. Medium base porcelain socket and No. 18 asbestos-covered wire. Mogul socket and No. 14 asbestos-covered wire.
- Wired ceiling fixtures:

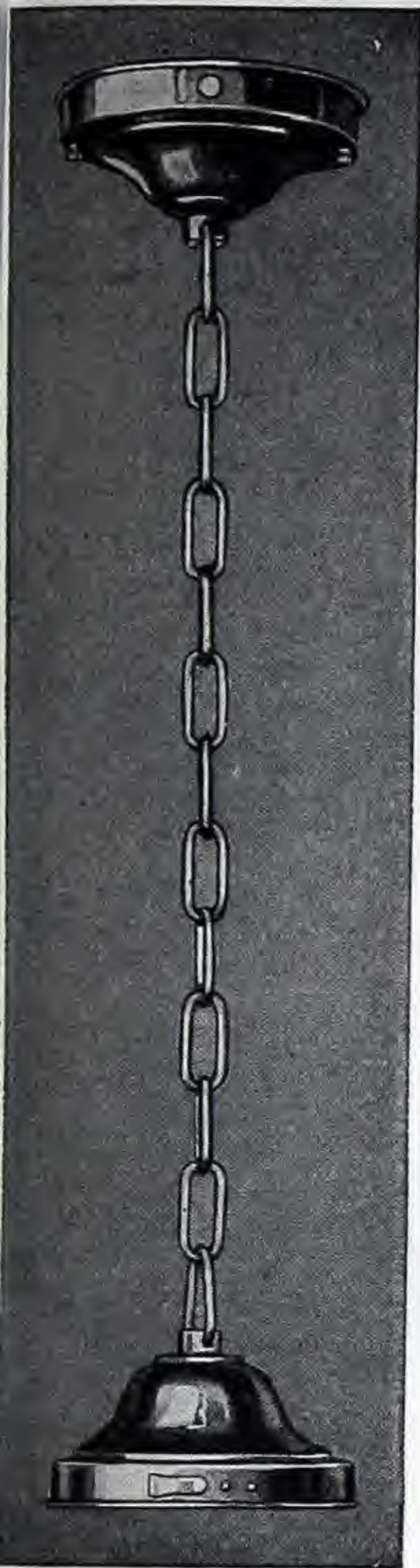
Two-piece sign receptacle with pigtails. Mogul socket and No. 14 asbestos-covered wire leads.
- Strap type canopies:

6 in. diameter, complete with strap, screws and knurled nuts.
- Slip type canopies:

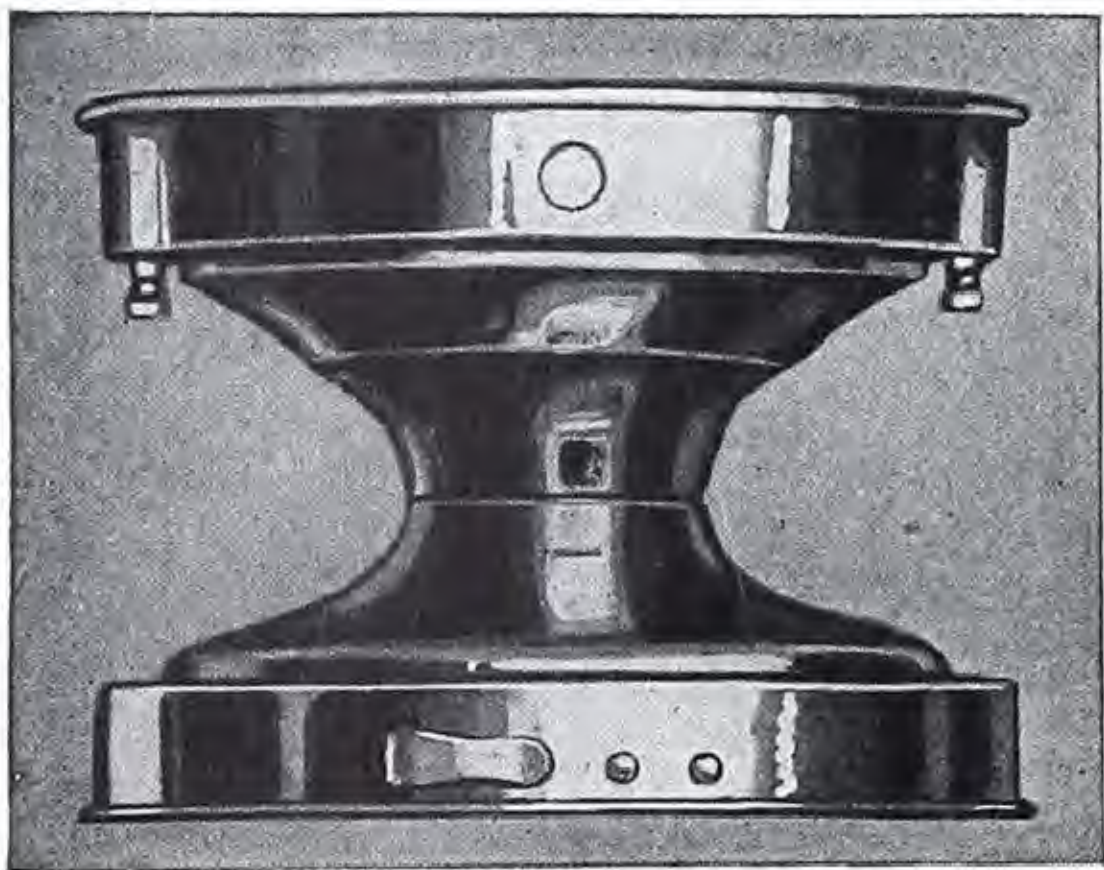
6 in. diameter.
- All canopies:

Have knockout for pull switch.
- Packing:

All fixtures packed one complete to a carton in standard package quantities as listed.



No. 1160
No. 1160M
No. 1140



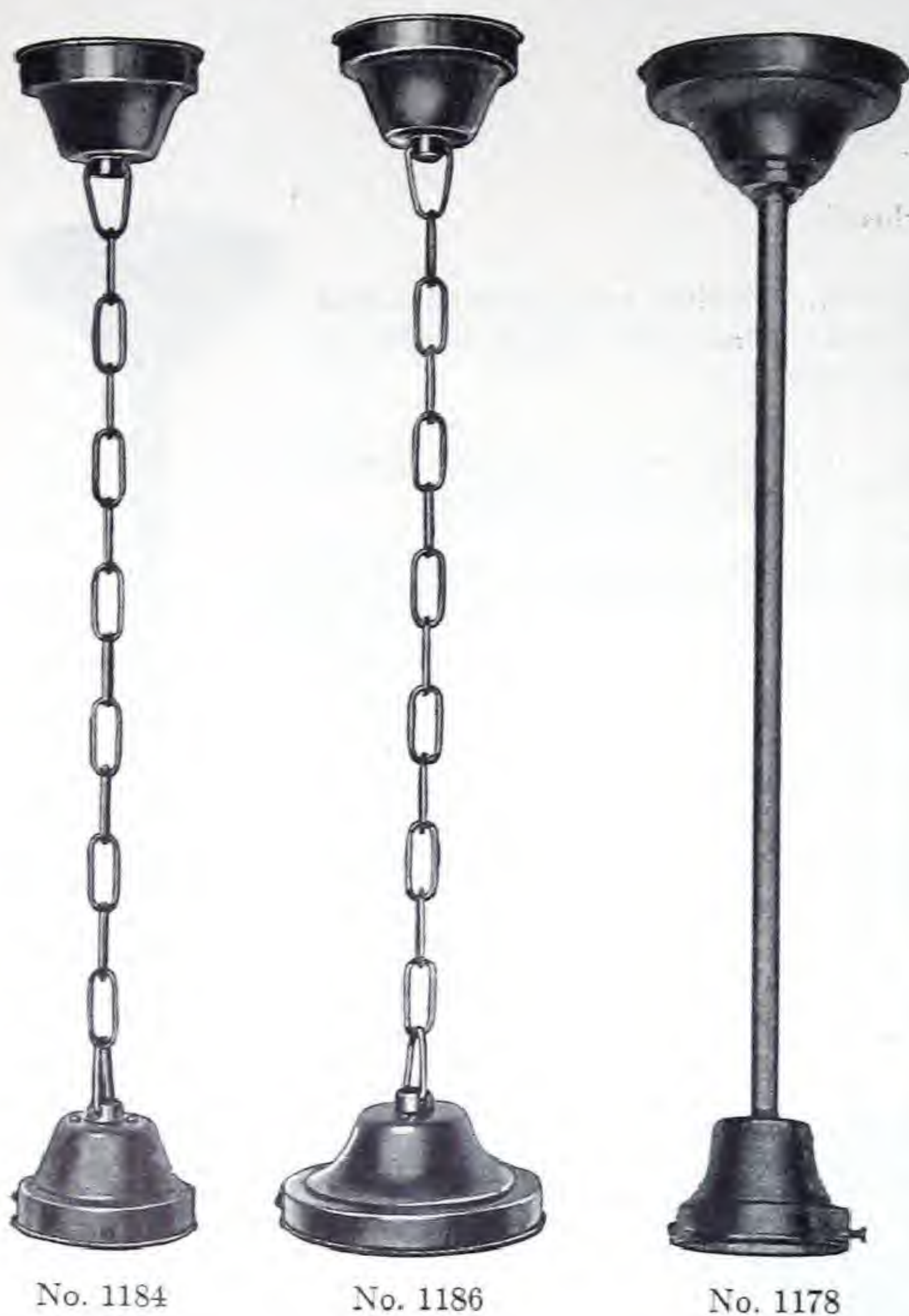
No. 1260
No. 1260M
No. 1240



No. 1176
No. 1176M
No. 1174

	Type	Socket	Size Fitter	Length Overall	Standard Package	Wgt. of Std. Pkg.	List Price Each
60	Pendant.....	Medium Base	6"	30"	24	54	\$3.00
60M	Pendant Mogul.....	Mogul	6"	30"	24	59	4.00
40	Pendant.....	Medium Base	4"	30"	24	52	3.00
60	Ceiling.....	Medium Base	6"	4¾"	24	38	2.00
60M	Ceiling Mogul.....	Mogul	6"	4¾"	24	43	3.00
40	Ceiling.....	Medium Base	4"	4¾"	24	30	1.70
74	Semi-Rigid Suspension.....	Medium Base	4"	30"	12	46	5.50
76	Semi-Rigid Suspension.....	Medium Base	6"	30"	12	48	5.50
6M	Semi-Rigid Suspension.....	Mogul	6"	30"	12	54	6.50

UTILITY HANGERS



No. 1196



No. 1194

Stamped from 24 gauge steel, very rigid, deep step canopy with K.O. for No. 61A Levolver switch, bronze plate finish, wired with No. 16 slow burning wire, porcelain medium base receptacle with covered terminals, 3 screw fitters.

List No.	Type	Size Fitter	Length Overall	Std. Pkg.	Wgt. of Std. Pkg.	List Price Each
†1184	Pendant	4"	30"	24	46	\$1.55
†1186	Pendant	6"	30"	24	50	1.65
†1194	Ceiling	4"	4½"	24	30	1.00
†1196	Ceiling	6"	5¾"	24	40	1.25
†1178	Semi-Rigid	4"	30"	12	50	4.00
†1180	Semi-Rigid	6"	30"	12	50	4.25
*1180M	Semi-Rigid	6"	30"	12	58	5.25

†Medium base socket.

*Mogul base socket.

WHITE ENAMEL KITCHEN UNITS



Diameter of Canopy 6½". Fitter 4".

Knockout for Levolver Switch. Eyelet for Pull Chain Receptacle.

26-gauge Steel, with heavy two-coat white enamel finish.

List No.	Description	Std. Pkg.	Weight Lbs. Std. Pkg.	List Price Each
1611	Unit, with two wood screws...	24	23	\$.55
1613	Unit, with mounting strap and screws.....	24	25	.65
1614	Unit, with mounting strap, screws and No. 990 Receptacle with leads.....	24	35	.85
1615	Unit, with mounting strap, screws and No. 995 Pull Chain Receptacle.....	24	36	1.25

CEILING BANDS



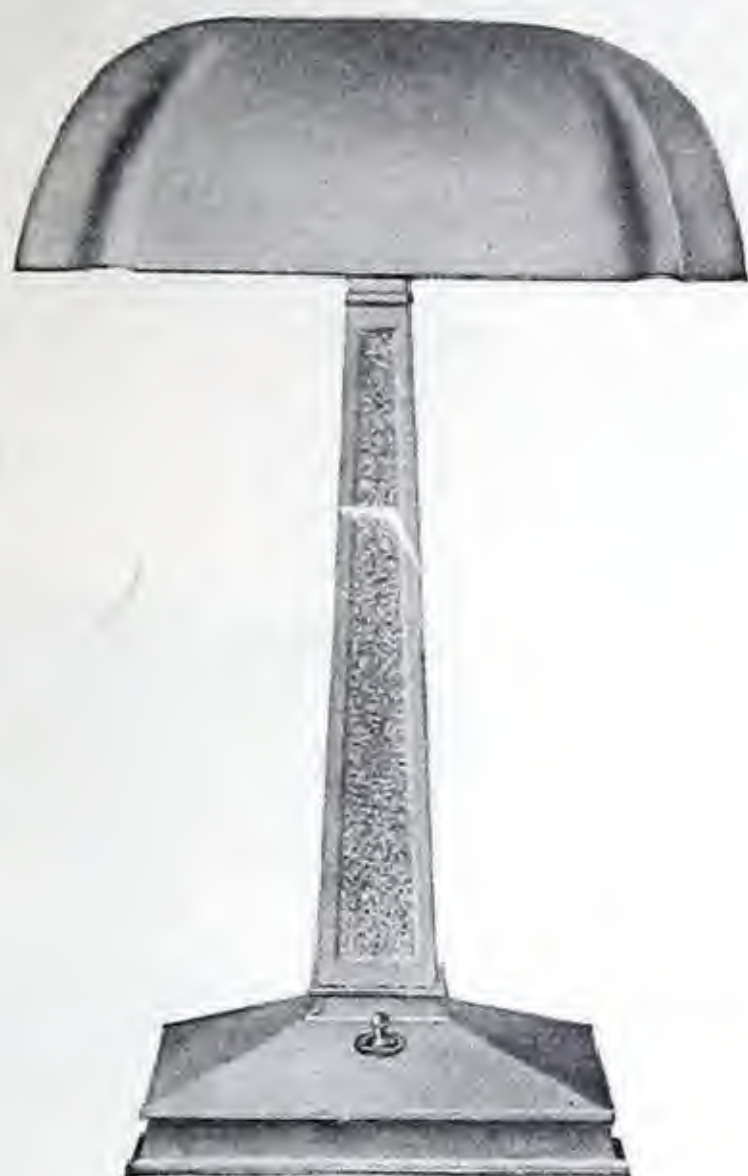
No. 7542

List No.	Description	Std. Pkg.	Weight Lbs. Std. Pkg.	List Price Each
7542	3¼" Fitter, steel, sprayed brass finish.....	100	40	\$.35
2090	4" Fitter, brass, brushed brass finish.....	50	20	.65
243	6" Fitter, brass, brushed brass finish.....	12	20	1.65

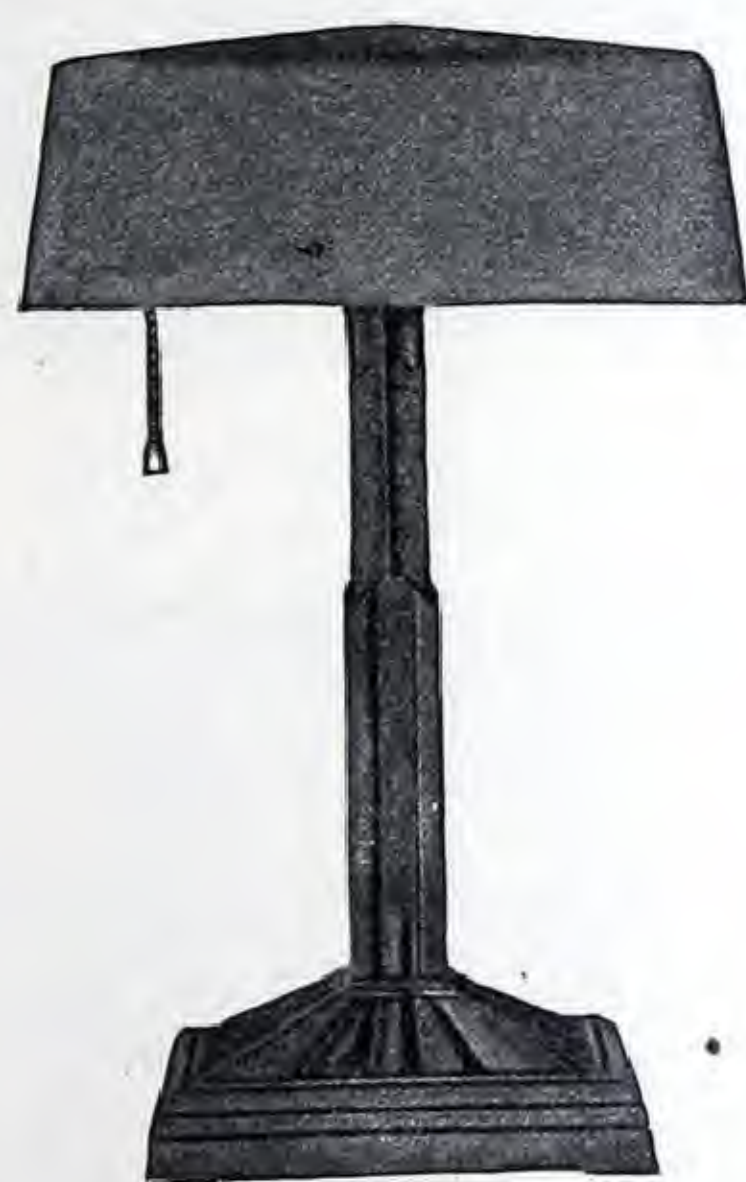
COMMERCIAL DESK LAMPS



No. 8050



No. 8051



No. 8075

Equipped with Six Feet Silk Covered Parallel Cord and Attachment Cap.

List No.	Finish	Height	Base	Shade	List Price Each
8050	Statuary Bronze with pebbled tan relief	14½"	6½"x6"	Metal	\$10.50
8051	Brass with pebbled green relief	14½"	6½"x6"	Green-Opal Cased	13.00
8075	Brown morocco	14"	6"x4¾"	Metal	4.75

Standard Package, 6. Weight, Standard Package, 72 lbs.

FLEXIBLE ARM DESK LAMPS

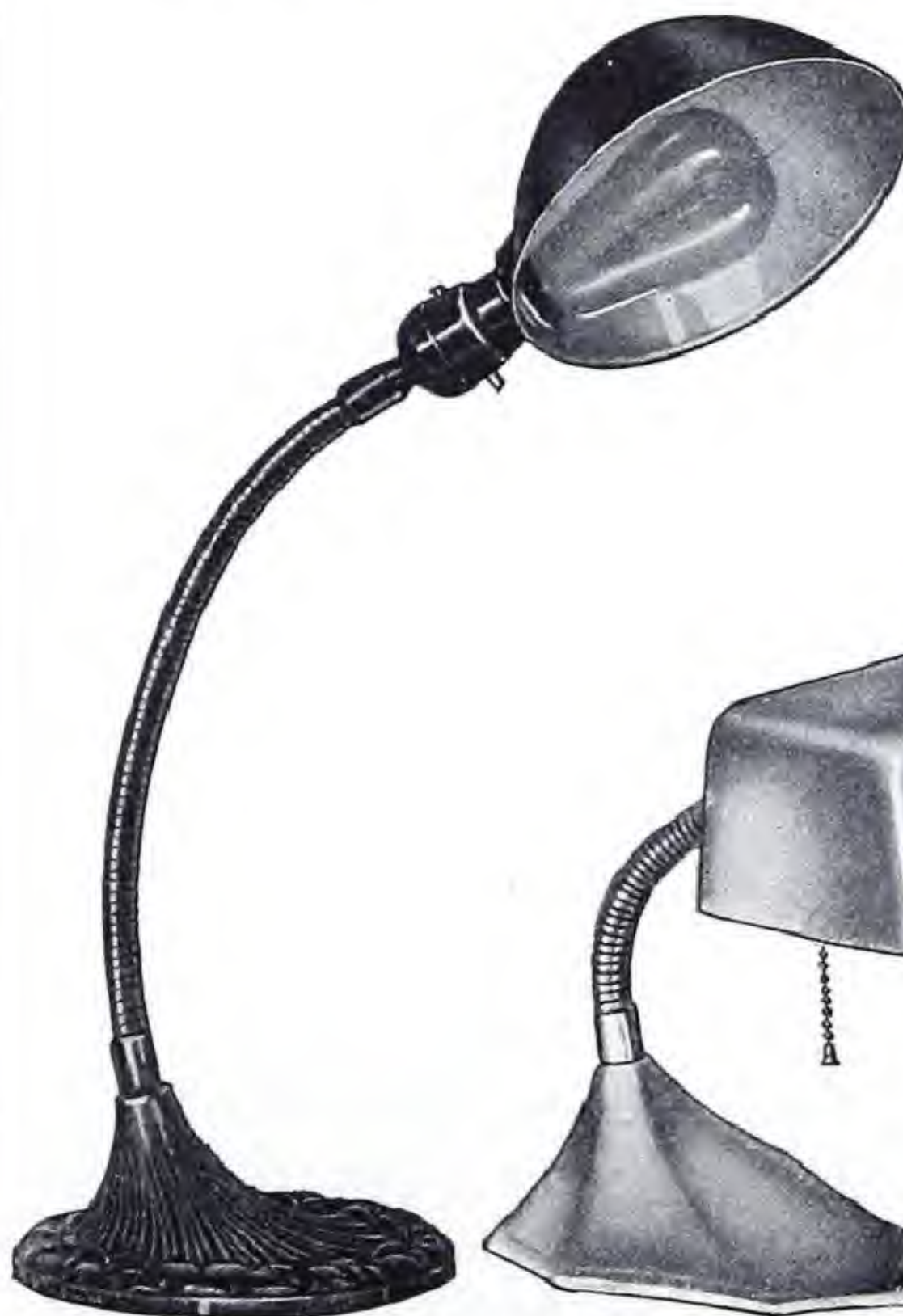
All lamps equipped with six-feet parallel silk-covered cord and attachment cap.



No. 74



No. 76



No. 73



No. 8048

List No.	Finish	Arm	Socket	Std. Pkg.	Wt. Lbs. Std. Pkg.	List Price Each
73	Autumn brown	10"	Push Thru	12	65	\$3.00
74	Spray brown	8"	Push Thru	12	55	2.25
76	Statuary bronze or polished copper	12"	Push Thru	6	36	3.65
8048	Statuary Bronze	8"	Pull Chain	6	42	5.25

All items individually packed.

UTILITY CLAMP LIGHTS



No. 8001

List No.	Finish	Socket	Std. Pkg.	Weight Lbs., Std. Pkg.	List Price Each
8001	Brushed brass.....	Push Thru	12	25	\$3.00
8003	Statuary bronze....	Push Thru	12	25	3.00

PICTURE LIGHTS

This unique design of picture light can be attached to any frame and the shade adjusted to properly illuminate canvas.



No. 8060

No. 8070

Compact—Neat Appearing—Efficient—Inconspicuous.

SATIN BRASS FINISH

Supplied with 10 ft. silk covered No. 18 parallel cord and bakelite parallel blade attachment cap.

List No.	Extension	Shade	Sockets Supplied
8060	6½"	7½"	One Intermediate Base.
8061	13¾"	14"	Two Intermediate Base.
8070	6½"	7½"	One Medium Base.
8071	13¾"	14"	Two Medium Base.

List No.	Designed for Lamp (Not Supplied)	Std. Pkg.	Weight Lbs., Std. Pkg.	List Price Each
8060	One T 6½ - 125 Volt	6	9	\$5.10
8061	Two T 6½ - 125 Volt	3	7½	6.75
8070	One T10 - 125 Volt	6	9	6.10
8071	Two T10 - 125 Volt	3	7½	7.75

PORCELAIN LIGHTING UNITS

With Pull Chain

660 Watt, 250 Volt



No. 9833



No. 9835



No. 9831

WITH BELLMOUTH

List No.	For Octagon Box	Description	Weight Lbs., Std. Pkg.	List Price Each
9835	4"	4¾" diameter by 2¾" depth, 6" chain and insulator.....	25	\$1.25
9836	4"	4¾" diameter by 2¾" depth, 6' linen cord..	25	1.50
9825	3½" or 3¼"	3⅞" diameter by 2¾" depth, 6" chain and insulator.....	20	1.00
9826	3½" or 3¼"	3⅞" diameter by 2¾" depth, 6' linen cord..	20	1.25
Standard Package, 20.				

WITH SHADEHOLDER RING

9833	4"	4¾" diameter by 2⅞" depth, 6" chain and insulator.....	22	\$1.00
9834	4"	4¾" diameter by 2⅞" depth, 6' linen cord..	22	1.25
9823	3½" or 3¼"	3⅞" diameter by 2⅞" depth, 6" chain and insulator.....	15	.75
9824	3½" or 3¼"	3⅞" diameter by 2⅞" depth, 6' linen cord...	15	1.00
Standard Package, 20.				

WITH 2¼" FITTER

9831	4"	4¾" diameter by 3" depth, 6" chain and insulator.....	22	\$1.25
9832	4"	4¾" diameter by 3" depth, 6' linen cord...	22	1.50
9821	3½" or 3¼"	3⅞" diameter by 3" depth, 6" chain and insulator.....	15	1.00
9822	3½" or 3¼"	3⅞" diameter by 3" depth, 6' linen cord...	15	1.25
Standard Package, 20.				

LINEN CORD

List No.	Description	Std. Pkg.	Weight Lbs., Std. Pkg.	List Price Each
4886	7' long, with connecting link and bell.....	10	¼	\$.10

PORCELAIN LIGHTING
UNITS

660 Watt, 250 Volts



No. 9829



No. 1674

KEYLESS FOR 4" OUTLET BOXES

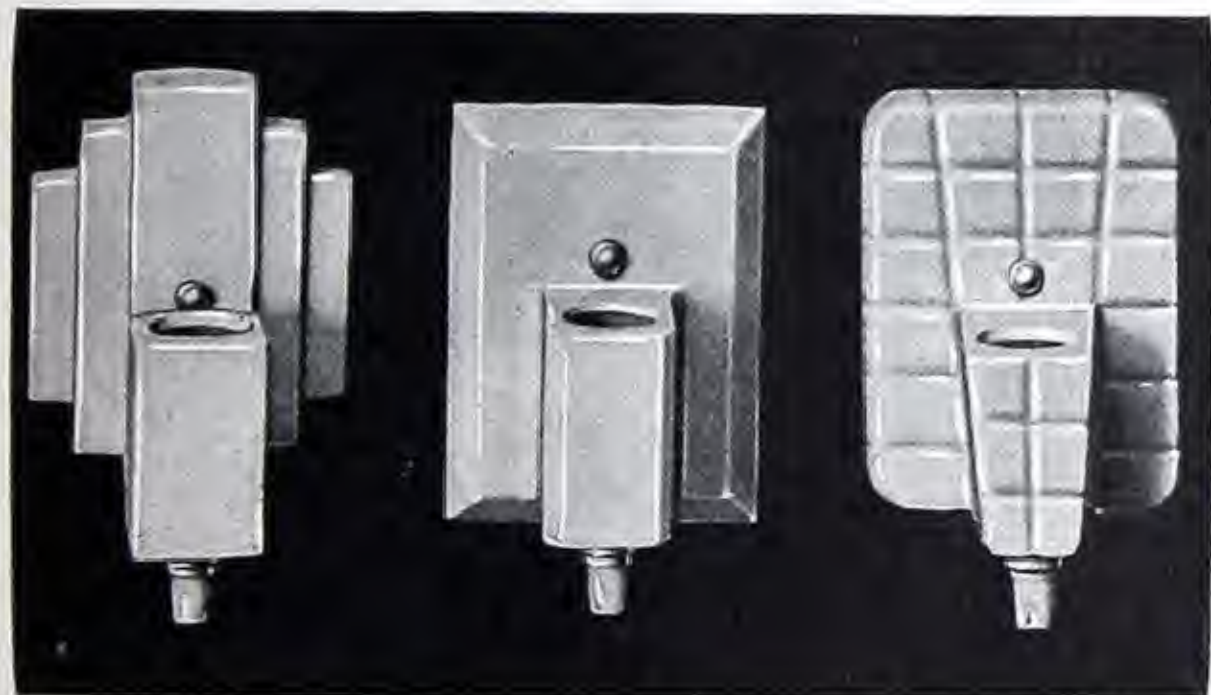
List No.	Description	Std. Pkg.	Weight Lbs. Std.	List Price Each
674	With Shade Ring.....	50	41	\$.40
837	With Bell Mouth.....	20	25	.80
839	With 2 1/4" Fitter.....	20	25	.65

KEYLESS FOR 3 1/4" and 3 1/2" OUTLET BOXES

673	With Shade Ring.....	50	31	\$.30
827	With Bell Mouth.....	20	20	.80
829	With 2 1/4" Fitter.....	20	20	.65



301 Keyless 285 Keyless 287 Keyless 293 Keyless
302 Key 286 Key 288 Key 294 Key



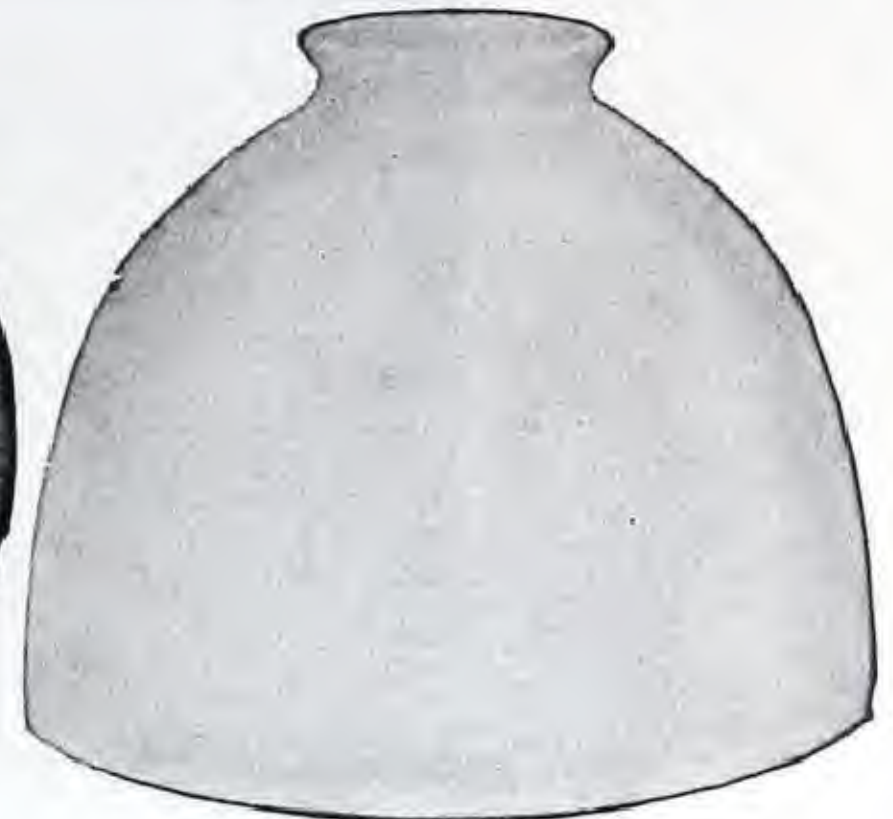
Description	Size	Colors	Std. Pkg.	Wt. Lbs.	List Price Each
5 Keyless	6" x 5"	White or Black	24	.85	\$1.05
6 Key	6" x 5"	White or Black	24	1.40	1.60
7 Keyless	6 1/2" x 5"	White or Ivory	28	.85	1.05
8 Key	6 1/2" x 5"	White or Ivory	28	1.40	1.60
3 Keyless	6 1/2" x 5"	White or Ivory	28	.85	1.05
4 Key	6 1/2" x 5"	White or Ivory	28	1.40	1.60
1 Keyless	6 1/2" x 4 3/4"	White or Black	28	.85	1.05
2 Key	6 1/2" x 4 3/4"	White or Black	28	1.40	1.60
7 Keyless	6 1/2" x 5"	White or Green	28	.85	1.05
8 Key	6 1/2" x 5"	White or Green	28	1.40	1.60
5 Keyless	6 1/2" x 4 3/4"	White or Green	28	.85	1.05
6 Key	6 1/2" x 4 3/4"	White or Green	28	1.40	1.60
1 Keyless	6 1/4" x 4 1/8"	White	24	.85	....
2 Key	6 1/4" x 4 1/8"	White	24	1.40	....

All brackets excepting Nos. 301 and 302 cover 3 1/4", 3 1/2" and 4" octagonal boxes. Nos. 301 and 302 cover 3 1/4" and 1/2" octagonal boxes.

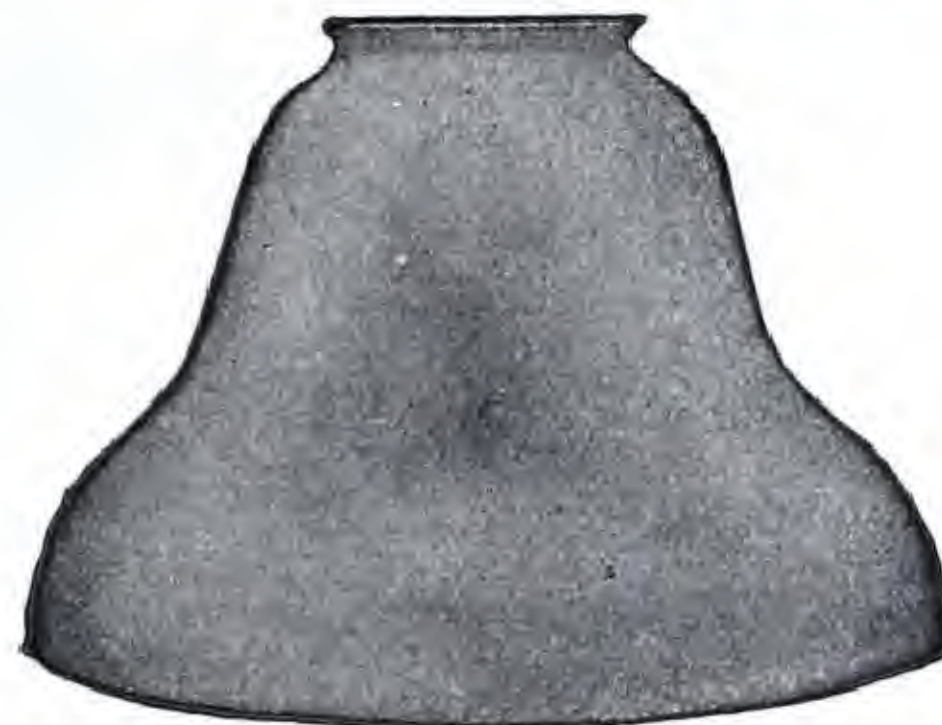
NOVA ELECTRICS, EYE SHADES,
REFLECTORS AND BALLS



No. B-57—Ball



No.—501 Reflector



No. 1520—Reflector



No. 499—Half Shade



No. 300—Electric

List No.	Stand. Pack.	Width	Length	Fitter	Wgt. Stand. lbs.	List Price
490	36	4 1/2"	x 6"	x 2 1/4"	33	\$1.25
300	36	5"	x 4 1/4"	x 2 1/4"	30	.80
1520	45	6"	x 3 7/8"	x 2 1/4"	30	1.00
1520	30	7"	x 4 1/2"	x 2 1/4"	36	1.35
1520	24	8"	x 5"	x 2 1/4"	40	1.85
501	30	6 1/4"	x 4 3/4"	x 2 1/4"	30	1.00
57	27	6"	x 6"	x 3 1/4"	26	1.05
57	12	7"	x 7"	x 3 1/4"	18	1.35
57	12	8"	x 8"	x 3 1/4"-4"	22	1.65
57	4	10"	x 10"	x 4-5-6"	15	3.85
57	1	12"	x 12"	x 6-7-8"	6	5.80
57	1	14"	x 14"	x 6-8"	8	8.80
57	1	16"	x 16"	x 6-8"	10	12.40
57	1	18"	x 18"	x 6-8"	13	22.00

Please specify sizes of 1520 and B-57 that may be desired. Also mention size of Fitter desired on B. 57 Balls.

LOUVRE LIGHTS



L-66

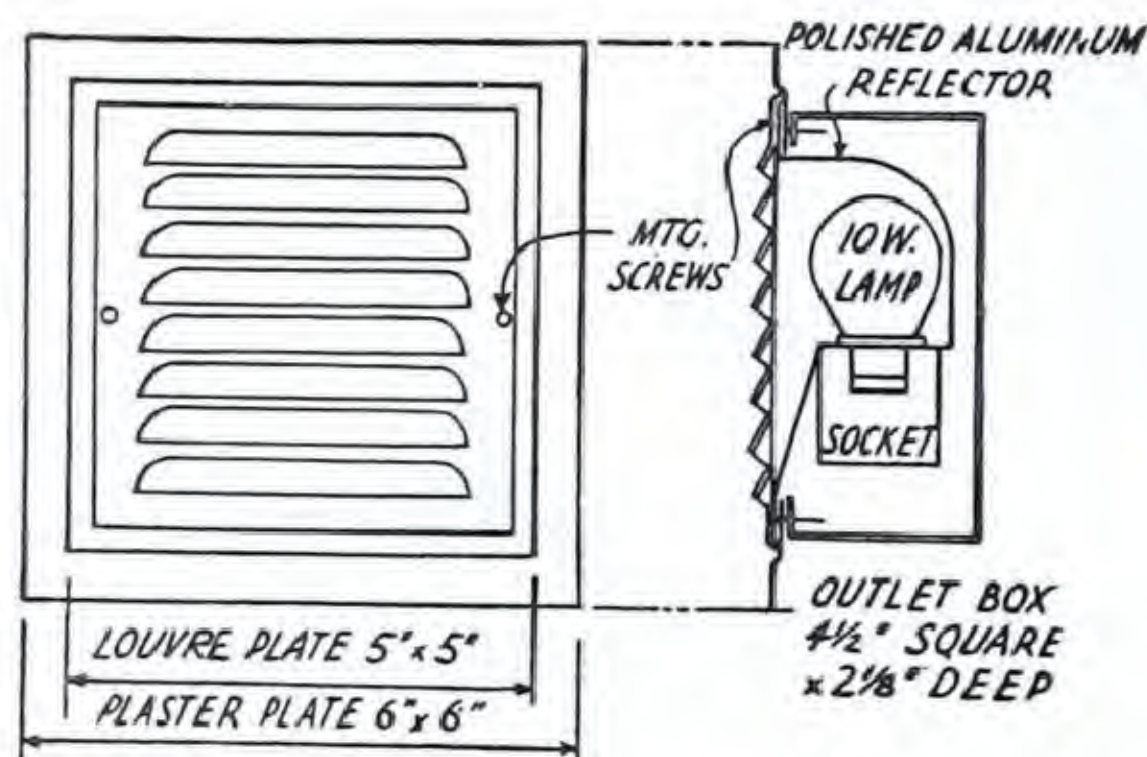
Small in size—neat in appearance—plaster plate may be set square if box is out of line.

Standard finish is white enamel, making an ideal under coat for decorating on the job. Other finishes can be furnished at additional cost.

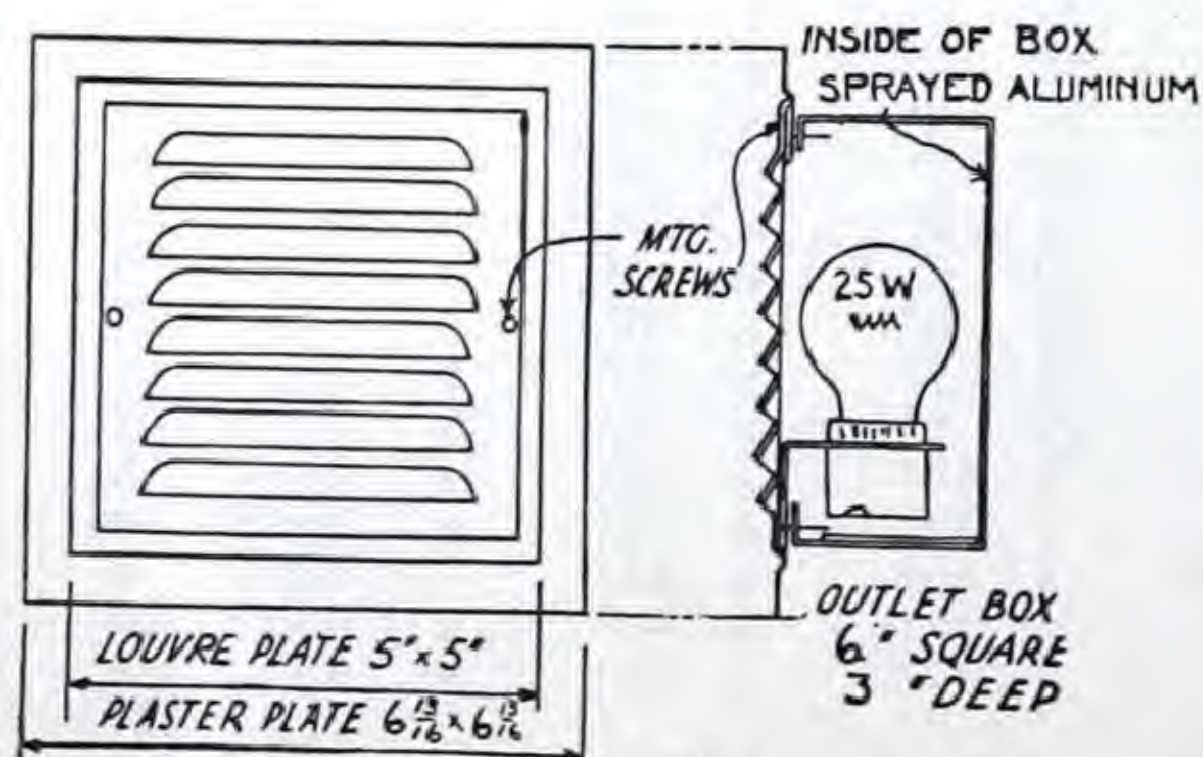
Individually packed.

List No.	Description	Wattage	Socket	Wt. lbs.	Std. Pkg.	List Price Each
L-66	Galvanized box, chromium plated reflector, porcelain receptacle, plaster plate and Louvre plate.....	10	Interm.	22		\$3.50
L-67	Galvanized box, aluminized inside, porcelain receptacle, plaster plate and Louvre plate	25	Medium	24		3.50

Standard Package, 6.
Lamps not included.



No. L-66



No. L-67

EXIT LIGHTS



No. 3480



No. 3481



No. 3482

Boxes made of 20 gauge steel.

Inside, sprayed aluminum.

Outside, sprayed bronze.

Crystal glass—black backing—red letters.

Lettering 6" high.

Equipped with one medium base porcelain receptacle.

Boxes have 1/2" K.O.'s on all sides.

The red lettering on black background, lighted from behind, makes the lettering more distinct and legible than the red lettering on opal glass, or white lettering on red background.

Flush mounting type has hinged front with two screw fastening. On other types, glass is easily removed for relamping.

List No.	Description	Box Wide	Dimensions High	Deep	Weight Lbs., Std. Pkg.	List Price Each
3480	Flush mounting	12"	8"	4"	6	\$7.00
3481	Top mounting	12"	8"	4"	5 1/2	6.50
3482	Open back	12"	8"	4"	4	5.50
3483	Open End	12"	8"	4"	4 1/2	5.50

Standard Package, 1.

INTERIOR ELECTRIC SIGNS

These signs are supplied in standard sizes and standard lettering. They are rigidly constructed, and the colored lettering on inside of the glass is more legible than the sand glass letters used on other makes of signs.



CHAIN SUSPENSION TYPE

List No.	Wide	Size of Sign High	Thick	Hanger Length	Size of Glass Wide	Size of Glass High	Type Lamps Supplied	List Price Each
121	11 1/4"	9 3/4"	5 1/2"	12"	10"	7"	1-25W-T10	\$22.50
122	15 1/4"	12 3/4"	5 1/2"	12"	14"	10"	1-50W-T8	30.00
123	21 1/4"	8 3/4"	5 1/2"	12"	20"	6"	{1-25W-T10 1-50W-T8}	32.50
124	21 1/4"	14 3/4"	5 1/2"	12"	20"	12"	{1-25W-T10 1-50W-T8}	35.00

Cartoned individually.

SEMI-RIGID SUSPENSION TYPE

List No.	Wide	Size of Sign High	Thick	Hanger Length	Size of Glass Wide	Size of Glass High	Type Lamps Supplied	List Price Each
131	11 1/4"	9 3/4"	5 1/2"	12"	10"	7"	1-25W-T10	\$25.00
132	15 1/4"	12 3/4"	5 1/2"	12"	14"	10"	1-50W-T-8	32.50
133	21 1/4"	8 3/4"	5 1/2"	12"	20"	6"	{1-25W-T10 1-50W-T8}	35.00
134	21 1/4"	14 3/4"	5 1/2"	12"	20"	12"	{1-25W-T10 1-50W-T8}	37.50

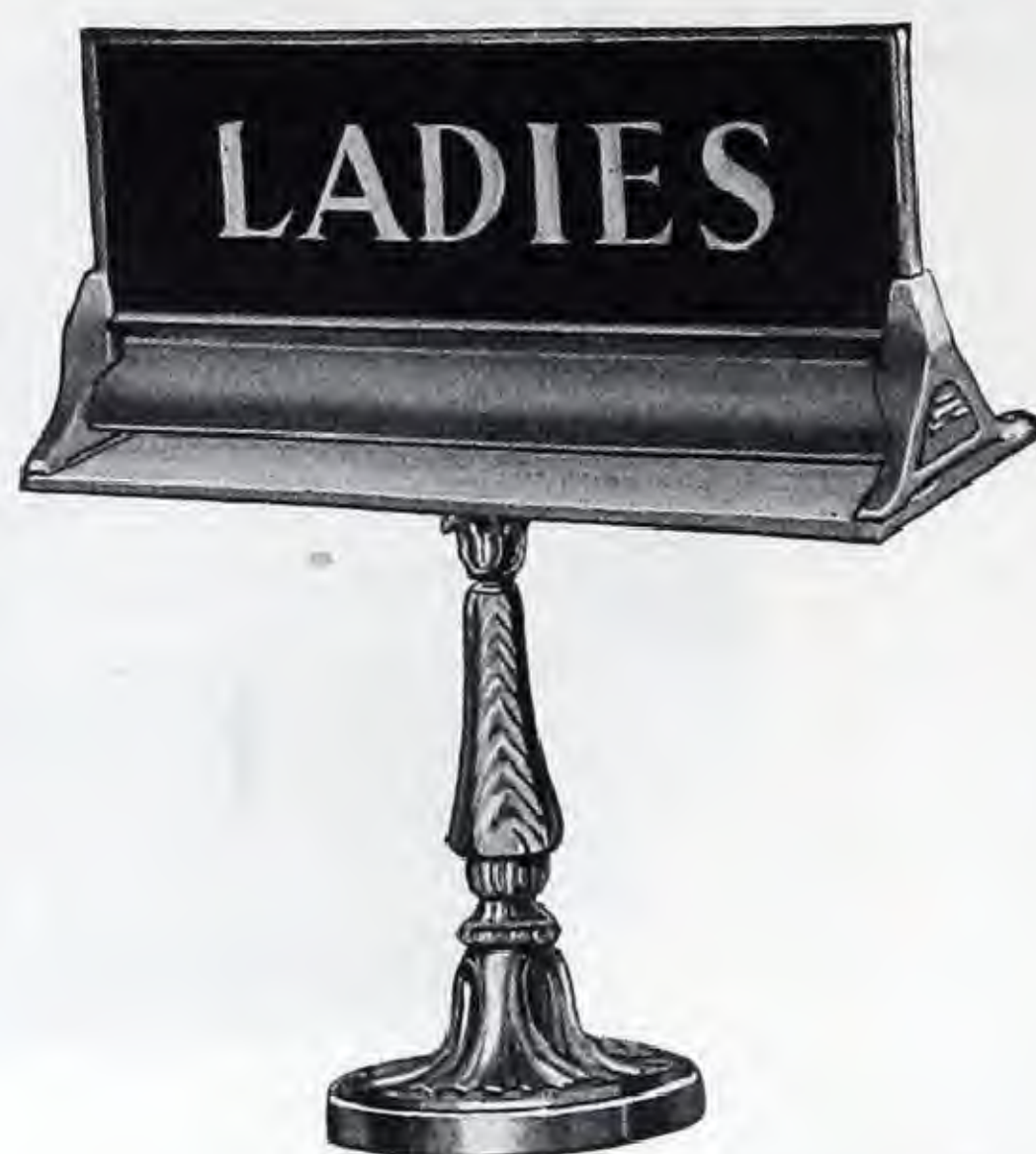
Cartoned individually.

BRACKET TYPE

List No.	Wide	Size of Sign High	Thick	Bracket Length	Size of Glass Wide	Size of Glass High	Type Lamps Supplied	List Price Each
141	11 1/4"	9 3/4"	5 1/2"	18"	10"	7"	1-25W-T10	\$27.50
142	15 1/4"	12 3/4"	5 1/2"	22"	14"	10"	1-50W-T8	35.00
143	21 1/4"	8 3/4"	5 1/2"	28"	20"	6"	{1-25W-T10 1-50W-T8}	37.50
144	21 1/4"	14 3/4"	5 1/2"	28"	20"	12"	{1-25W-T10 1-50W-T8}	40.00

Cartoned individually.

INTERIOR ELECTRIC SIGNS



PEDESTAL MOUNTING TYPE

List No.	Wide	Size of Sign High	Thick	Pedestal Length	Size of Glass Wide High	Type Lamps Supplied	List Price Each
3451	11 $\frac{1}{4}$ "	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	15"	10" 7"	1-25W-T10	\$25.00
3452	15 $\frac{1}{4}$ "	12 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	15"	14" 10"	1-50W-T8	32.50
3453	21 $\frac{1}{4}$ "	8 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	15"	20" 6"	{1-25W-T10 1-50W-T8}	35.00
3454	21 $\frac{1}{4}$ "	14 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	15"	20" 12"	{1-25W-T10 1-50W-T8}	37.50

Cartoned individually.

WINDOW OR COUNTER TYPE

List No.	Wide	Size of Sign High	Thick	Size of Glass Wide High	Type Lamps Supplied	List Price Each
3461	11 $\frac{1}{4}$ "	9 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	10" 7"	1-25W-T10	\$20.00
3462	15 $\frac{1}{4}$ "	12 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	14" 10"	1-50W-T8	27.50
3463	21 $\frac{1}{4}$ "	8 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	20" 6"	{1-25W-T10 1-50W-T8}	30.00
3464	21 $\frac{1}{4}$ "	14 $\frac{3}{4}$ "	5 $\frac{1}{2}$ "	20" 12"	{1-25W-T10 1-50W-T8}	32.50

Cartoned individually.

LETTERING

The standard lettering is in Neon green color, and any type of sign may be had with the following lettering without extra cost.

Telephone
Entrance
Men's Room
Ladies

To-day's Special
Elevator
Information

Special quotations will be made on other wording required.

The merchant's message, to be put on the sign under the heading "To-day's Special," may be put on by the use of lettering crayons or the water colors commonly used by butchers and other merchants.

FINISH

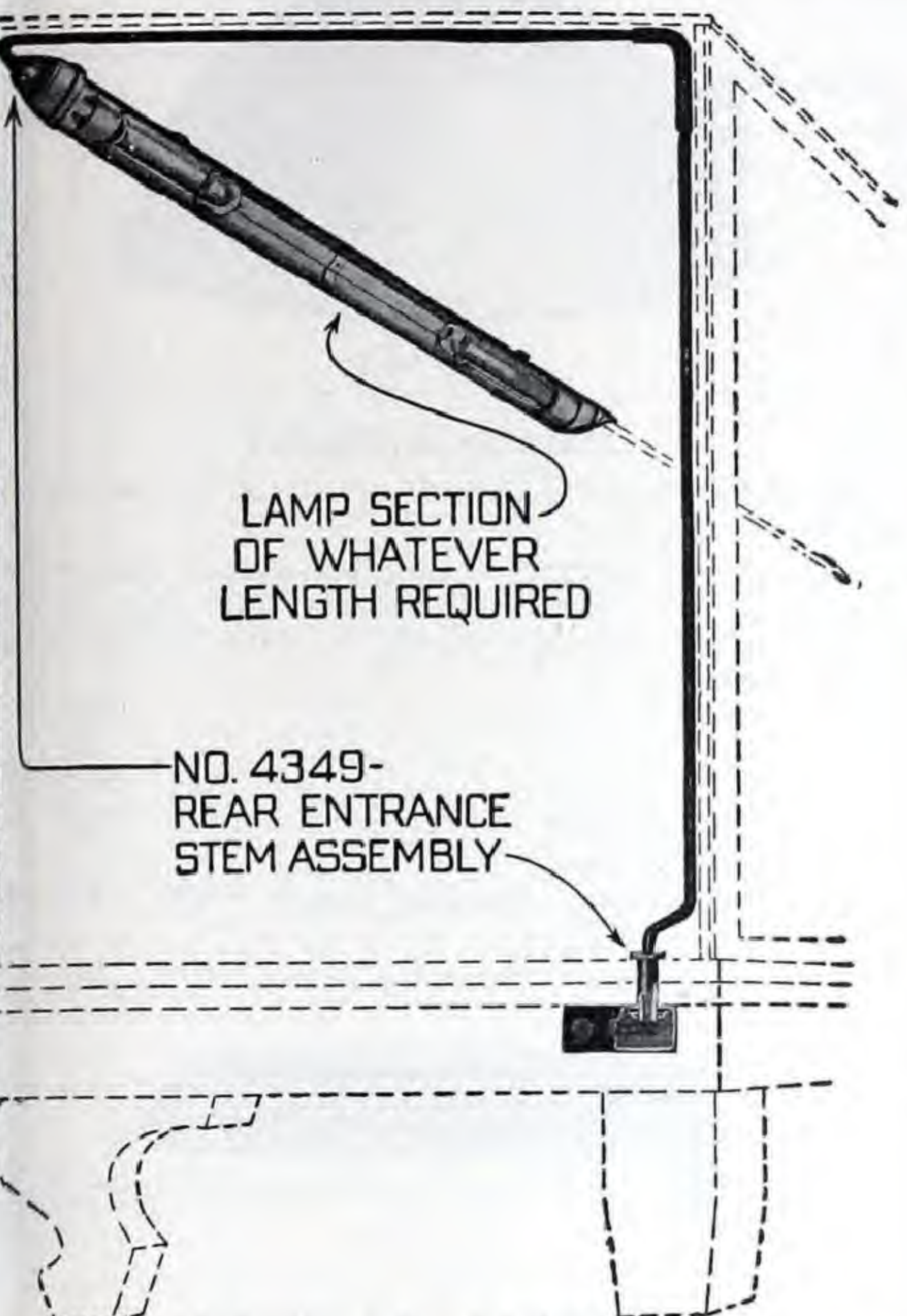
Standard finish of these signs is sprayed bronze. Quotations can be made on other finishes.

LAMPS

The proper lamps, as given in the specifications, are supplied with each sign.

Each sign supplied with 10 feet of parallel cord and rubber attachment plug.

BENJAMIN SHOW CASE LIGHTING
FIXTURES



Standard finish for parts listed below is dark bronze out-
side—lamp sections are aluminized inside.

LAMP SECTIONS

Lamp sections are completely wired for "through" connection
and take T-10 tubular lamps.

Description	No. of Lights	Weight		List Price Each
		Std	Pkg.	
8 1/2" Lamp Section.....	1	8		\$2.50
12" Lamp Section.....	1	10		3.00
16" Lamp Section.....	2	13		3.50
22" Lamp Section.....	2	18		4.00
30" Lamp Section.....	2	22		4.50
30" Lamp Section.....	4	29		6.00
34" Lamp Section.....	4	31		6.50

For Curved Part of Case

8 1/2" Lamp Section.....	1	8	2.50
18" Link Section.....	..	5	1.60

Standard Package, 5.

This unit consists of an 18" section of soft brass tubing
which can be cut and bent to fit show case curve, and
end blocks (F & H) for linking lamp sections together.

ENTRANCE STEM ASSEMBLY

Description	Std. Pkg.	Weight		List Price Each
		Lbs.	Pkg.	
Complete for rear entrance....	5	25		\$3.40

List No. 4349 consists of connecting block (F), 33" of
horizontal tubing of soft brass with 90° bend (E), elbow (D),
of vertical tubing of soft brass (C), with one end threaded
screwing into floor fitting, floor fitting (B) and outlet
box (A).

Complete for front entrance....	5	23	\$2.30
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List No. 4350 consists of connecting block (F), 33" of soft
brass tubing with 90° bend (E), outlet box (A), and floor
fitting (B). After tubing is cut to the required length the
right end should be threaded for screwing into floor fitting.
A Standard Package also consists of any assortment of 5
the above List Numbers.

BENJAMIN SHOW CASE LIGHTING
FIXTURES

List No.	Part Letter	Description	Wgt.		List Price Each
			Std. Pkg.	of Std. Pkg.	
4347	F	Connecting Block.....	5	2 1/2	\$.60
4347BX	FX	Connecting Block for BX.....	5	2 1/2	.70
4348	H	Connecting Block.....	5	2 1/2	.60
4348BX	HX	Connecting Block for BX.....	5	2 1/2	.70
4362	E	33" Tube with 90° bend..	5	5	.80
4363	C	33" Tube with Threaded end.....	5	5	.60
4358	G	18" Tube.....	5	3	.40
4364	D	Elbow.....	5	2	.50
4368	B	Floor fitting.....	5	2	.50
4369	A	Outlet Box and Cover....	5	5	.40
4346	I	Plug Socket only.....	5	1 1/2	.30
5088	†	1/8"x1/8" Threaded Coupling.....	5	1	.10

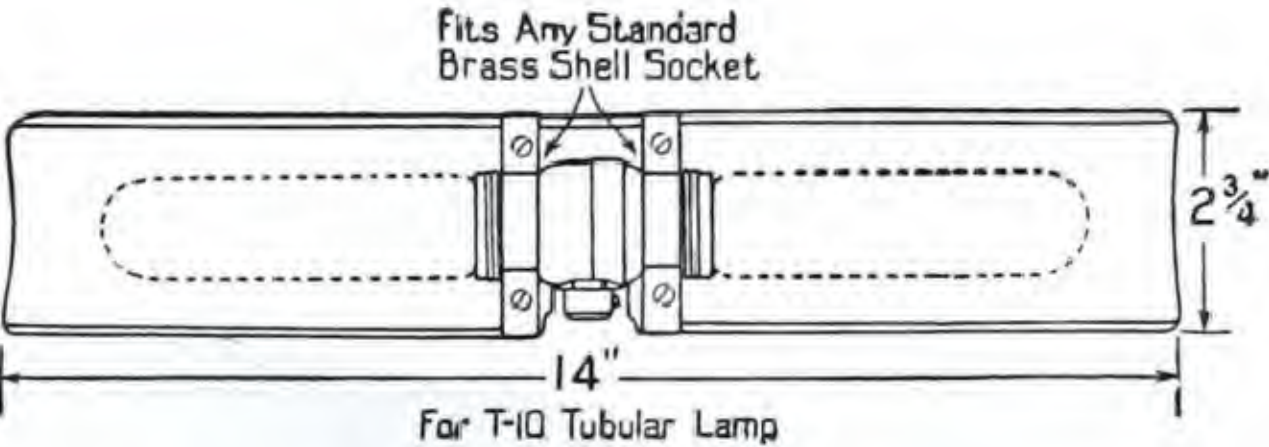
†This item is not shown in illustration but is used with
List No. 4363 for making long extensions where required in
wall case work.

Prices do not include wires or lamps, excepting as specified.

TUBULAR REFLECTORS



No. 281



For Two T-10 Tubular Lamps

Reflector Only, List No. 282, has two metal straps by
which it may be attached to any "brass shell" twin socket.
It is slotted on one side to allow adjustment half way around
the lamp. The mounting bracket may be set at any one of
the three positions shown in the diagrams below.

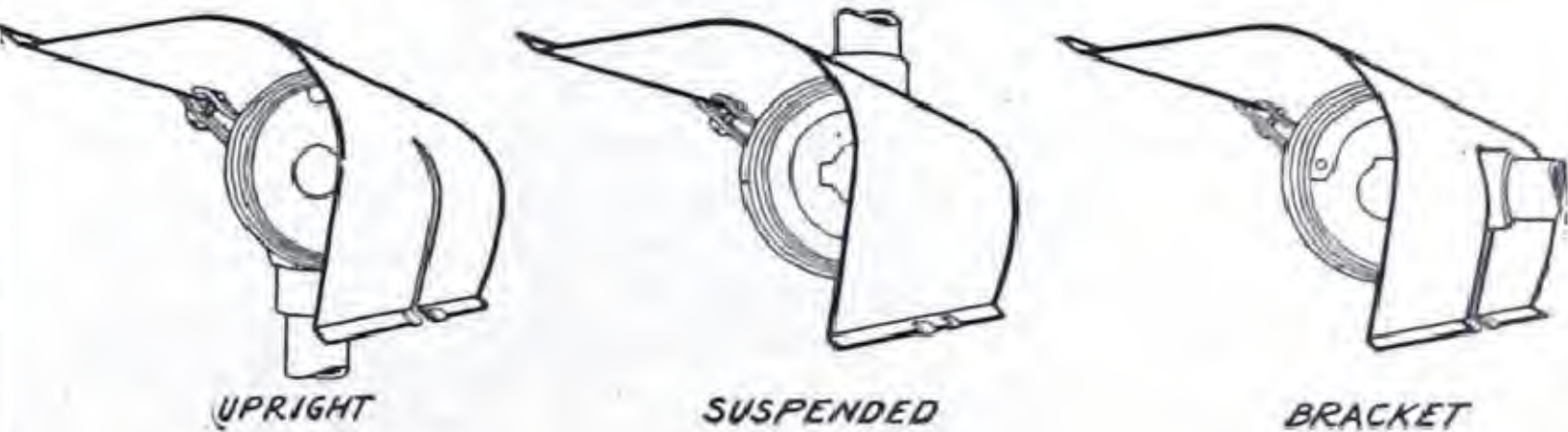
Reflector with Socket, No. 281, consists of Reflector 282
and Twin Socket 432, which is tapped 3/8 inch iron pipe size.

Finish—Both reflector and socket are polished nickel.

List No.	Description	Wght.		List Price
		Std. Pkg.	of Std. Pkg.	
282	Reflector only.....	10	7	\$1.40
281	Reflector with socket.....	10	10	2.75
432	3/8" Cap Keyless Twin Socket....	50	13	1.10

Possible Positions of Mounting

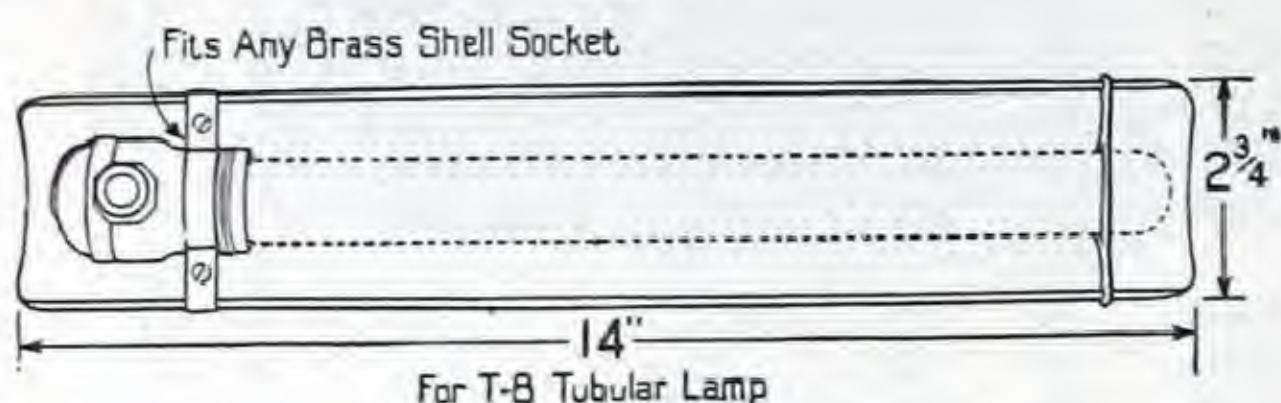
These diagrams show positions of mounting and the possible
adjustments of List No. 281.



TUBULAR REFLECTORS



No. 30



For T-8 Tubular Lamp

For One T-8 Tubular Lamp

Reflector Only, List No. 31, has a metal strap by which it may be attached to any straight or angle type of "brass shell" socket. It is usually used as illustrated in the above diagram of upright position, employing an angle socket. The Reflector may be adjusted around the lamp within an angle of 90 degrees.

Reflector with Socket, List No. 30, consists of Reflector 31 and Angle Socket 411, which is tapped $\frac{3}{8}$ inch iron pipe size.

Finish — Both reflector and socket are polished nickel.

List No.	Description	Std. Pkge	Wgt. of Std. Pkge.	List Price Each
31	Reflector only	10	6	\$2.25
30	Reflector with socket	10	10	2.85
411	$\frac{1}{8}$ " Cap Angle Keyless Socket	50	8	.70

HALF SHADES

For use with Desk Lamps, Bracket Lamps, Oil Gauge Lamps, etc.



No. 362



No. 367

Pear Shaped Half Shades

Fit Standard Brass Shell, Standard Porcelain Sockets, or Benco Sockets, and take 25, 40, 50 and 60 watt Mazda lamps.

Construction—Consists of a pear-shaped shade with a choice of three holders. The shade is of steel or brass, as indicated in listing. The holder for brass shell sockets is of brass, the holders for porcelain sockets and Benco sockets are of copper.

Finish—The inside of shade is aluminized; outside as indicated in listing.

List No.	Type of Holder	Description	Wgt. of Std. Pkge.	List Price each
362	For Std. Brass Shell Sockets	Brass Shade, fin. Brushed Brass	10	\$0.88
364	For Std. Brass Shell Sockets	Brass Shade, fin. Polished Nickel	10	1.05
365	For Std. Brass Shell Sockets	Steel Shade, fin. Green Enameled	10	.48
365P	For Std. Porcelain Sockets	Steel Shade, fin. Green Enameled	10	.53
367	For Benco Sockets	Steel Shade, fin. Green Enameled	9	.45

Standard Package, 20.

HALF SHADES



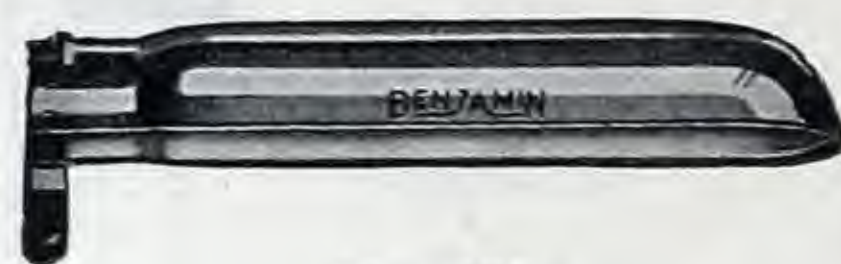
No. 74-2

Parabola Shades

Fit Standard Brass Shell Sockets and take 25, 40, 50 and 60 watt Mazda lamps.

Construction—Consist of parabolic-shaped steel reflector with thread for brass shell sockets. List No. 74-2 6 1/2" diameter by 2 1/8" high, while List No. 8000-1 is 5 5/8" diameter by 2 3/8" high.

List No.	Type of Holder	Description	Std. Pkge.	Wgt. of Std. Pkge.	List Price Each
74-2	For Std. Brass Shell Sockets	Sprayed Bronze	100	48	\$0.
8000-1	For Std. Brass Shell Sockets	Statuary Bronze	100	36	



No. 277

Tubular Half Shades

Fit Standard Brass Shell Sockets and take T-10 Tubular lamp.

Construction—Shade has hinged collar which allows it swing out and give free access to the lamp when making replacement.

Finish—Aluminized inside; outside as indicated in listing

List No.	Description	Std. Pkge.	Wgt. of Std. Pkge.	List Price Each
277	Brass Shade, finished Polished Nickel	20	7	\$0.7
278	Steel Shade, finished Green Enameled	20	7	.6

Whatever your problem may be in Commercial, Industrial, Church, School or even Street Lighting, you will find in this catalogue a representative selection of the best and latest in Lighting Equipment to choose from.

Experienced Lighting Specialists are located at our many distributing centers, alert to assist you and your electrical engineers with your lighting problems. We want you to take full advantage of their services.

X-RAY SHOW WINDOW REFLECTORS

Easy to Select the Correct X-Ray Reflector

Height Feet	Depth in Feet	Height of Background or Display							
		1 to 2 Feet	2 to 4 Feet	4 to 6 Feet	6 to 8 Feet	8 to 10 Feet	10 to 12 Feet	12 to 14 Feet	14 to 16 Feet
4	1 to 3	844	310	400					
	3	310	310	400					
6	4	310	400	400					
	5	310	400	400					
6	2	844	410	410	400				
	3 to 5	410	410	400	400				
8	5 to 7	410	410	400	400				
	7 to 9	410	400	400	400				
8	2 to 4	804	510	510	510	500			
	4 to 6	510	510	510	500	500			
10	6 to 8	510	510	500	500	500			
	8 to 10	510	500	500	500	500			
10	10 to 12	510	500	500	500	500			
	3 to 5	804	510	510	510	500	500		
12	5 to 6	510	510	510	500	500	500		
	6 to 8	510	510	510	500	500	500		
12	8 to 10	510	510	510	500	500	500		
	10 to 12	510	510	500	500	500	500		
14	4 to 6	842	510	510	510	510	510	500	
	6 to 8	510	510	510	510	500	500	500	
14	8 to 10	510	510	510	510	500	500	500	
	10 to 12	510	510	510	500	500	500	500	
16	4 to 6	842	842	1010	1010	1010	1010	900	
	6 to 8	1010	1010	1010	1010	1010	900	900	900
16	8 to 10	1010	1010	1010	1010	900	900	900	900
	10 to 12	1010	1010	1010	1010	900	900	900	900
16	12 to 14	1010	1010	1010	900	900	900	900	900
	14 to 16	1010	1010	900	900	900	900	900	900

Reflector No.	Size Lamp Watts	Reflector No.	Size Lamp Watts
310	100	804	200
400	150	842	500-300
410	150	844	150-100
500	200	900	500-300
510	200	1010	500-300

Think of the window to be lighted as though looking through the "end" of it. This will help to determine the three dimensions needed to select the proper reflector:

- The height above the floor at which the wiring for the reflectors will be mounted.
- Depth of window from front to back.
- Height of background or display.

Determine what reflector to use from the table above. Locate mounting height in the left column "Height." In the next column find the depth of window. Move along the line to the column under "height of background or display." That gives the height corresponding to that in the window. The reflector designated in this space is the one to use. Example: For show window 9 feet high, 5 feet deep, with background 5 feet high, No. 510 Reflector should be used.

Spacing of Reflectors

The number of reflectors to use is influenced by the brightness of neighboring windows, the intensity of the street illumination, goods displayed, and color of the background, as well as the merchant's realization of the advertising and selling value of bright, well lighted windows. The closer the reflectors are spaced, the brighter becomes the light in the window and vice-versa. In average installations spacing from center to center of reflectors is from 12 to 24 inches. In general, the following spacing is suggested:

- Large cities, business district, 12 inches.
- Large cities, suburban district, 12 inches to 18 inches.
- Small cities, 12 inches to 18 inches.
- Small towns, 15 inches to 24 inches.

X-RAY SHOW WINDOW REFLECTORS

No. 53 Thrifty-Three

For Three 100-Watt Lamps



A lighting appliance that makes practical, effective show window lighting at low cost available for the small store.

Furnished with 3 No. 310 Favorite Reflectors, CurtiStrip wire channel with 3 lamp sockets and holders and 2 universal hangers. Complete with wire and all parts needed, except lamps, ready for immediate use.

Length over all 39½ inches; length of CurtiStrip 36 inches; height from bottom of reflector to top of CurtiStrip channel 8½ inches.

Maximum suspension with 2 universal hangers is adjustable from 12 to 42 inches over all.

Packed in one carton; weight 16 pounds.
No. 53 Complete Unit, Wired.....List Price each \$19.75

No. 310 FAVORITE X-RAY SHOW WINDOW REFLECTORS

For 100-Watt Lamps



Designed for windows of the average small store.

Holder required is Form O 2¼ inches.

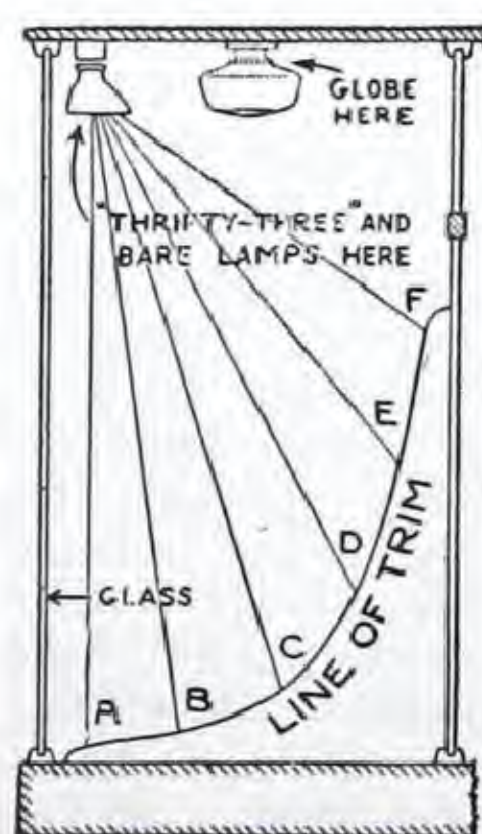
Diameter 7 inches; height of reflector only 5⅝ inches.

Standard package, 20 reflectors.

Weight, standard package, 26 pounds.

List No. 310.....List Price each \$3.50

Tests Show that X-Ray Reflectors
Save Light—Save Money



Section diagram through test window

In same window, with same goods, same current (300 watts), X-Ray Reflectors deliver twice as much light as enclosing globes and four times as much light as bare lamps.

Average of 6 Points on Display	
with	Intensity
2—150 watt or	13
3—100 watt	Foot
Bare Lamps	Candles
1—300 watt lamp	23
in	Foot
Enclosing Globe	Candles
3—100 watt lamps	56
in 3 No. 310	Foot
X-Ray Reflectors	Candles

X-RAY SHOW WINDOW REFLECTORS For Shallow Windows



No. 410 "Jill," 150 Watts
No. 510 "Queen," 200 Watts

No. 420 "Master," 150 Watts

No. 530 "Monarch," 200 Watts

Shallow windows with low trim or low background (depth approximately one-half the height) should be lighted by semi-concentrating X-Ray Reflectors. Nos. 420 and 530 provide greatest concentration of light in the Attraction-Zone, i. e., the lower portion of the window.

List No.	Width	Height	Depth	Holder	Std. Pkg.	List Price
410	9 $\frac{3}{8}$ "	8 $\frac{1}{2}$ "	9 $\frac{1}{2}$ "	Included	10 (25 lbs.)	\$5.00
510	10 $\frac{1}{2}$ "	10 $\frac{1}{4}$ "	10 $\frac{3}{4}$ "	Included	10 (38 lbs.)	6.00
420	8 $\frac{5}{8}$ "	7 $\frac{9}{16}$ "	8 $\frac{5}{8}$ "	Included	10 (20 lbs.)	4.50
530	9 $\frac{3}{4}$ "	9"	9 $\frac{3}{4}$ "	Included	10 (28 lbs.)	6.00

For Very Shallow Windows



No. 844 "Comet," 150-100 Watts

No. 804 "Aladdin," 200 Watts

No. 842-A "Corona," 500-300 Watts

These X-Ray Reflectors provide an intense concentration in the lower part of the window and uniformly illuminate the upper portion to about the same intensity.

List No.	Dia.	Height	Holder	Std. Pkg.	List Price
844	8 $\frac{5}{8}$ "	4 $\frac{3}{8}$ "	A-3 $\frac{1}{4}$ "	12 (19 lbs.)	\$3.85

For 150-watt lamp use No. 10012 extension ring (Ea. \$0.20) and No. 10300 X-Ray Holder (Ea. \$0.55) with X-Ray or CurtiStrip Sockets.

804 10 $\frac{1}{2}$ " 9 $\frac{1}{2}$ " See Note 12 (23 lbs.) \$7.15

No. 10800 X-Ray Holder (Ea. \$1.00) can be used only with X-Ray or CurtiStrip Sockets.

842-A Corona 13 $\frac{1}{4}$ " 12" See Note 10 (53 lbs.) \$17.50

Includes No. 842-R Reflector (\$13.50); and No. 10414 Holder, No. 8300-B Mogul $\frac{1}{2}$ " Socket.

For Deep Windows



No. 400 "Jack" for 150 Watt Lamp

No. 500 "King" for 200 Watt Lamp.

Deep windows with a high background or trim (depth and height approximately equal) should be lighted by distributing X-Ray Reflectors. "Jack" and "King" provide this wide spread of light with greater concentration in the lower portion of the window.

List No.	Width	Height	Depth	Holder	Std. Pkg.	List Price
400	8 $\frac{1}{2}$ "	8 $\frac{3}{8}$ "	8"	Included	10 (21 lbs.)	\$5.00 ea.
500	10"	10"	10 $\frac{1}{2}$ "	Included	10 (30 lbs.)	6.00 ea.

X-RAY SHOW WINDOW REFLECTORS For Super-Lighting



Nos. 900, 910, 1010 500 or 300 Watt Lamps Holder and Socket included with each. Super lighting is high intensity lighting, generally used in large windows or to reduce reflections in plate glass during the day-time.

DEEP WINDOWS

List No.	Width	Depth	Height	Std. Pkg.	List Price Each
No. 900—"Giant"	13"	13"	13 $\frac{3}{4}$ "	4 (26 lbs.)	\$13.75

SHALLOW WINDOWS

List No.	Width	Depth	Height	Std. Pkg.	List Price Each
No. 910—"Leviathan"	13"	13"	14 $\frac{1}{8}$ "	4 (29 lbs.)	13.75
No. 1010—"Blimp"	13"	13"	12 $\frac{3}{8}$ "	4 (26 lbs.)	13.75

(Holder and $\frac{1}{2}$ " Socket bushed to $\frac{3}{8}$ ", included with each.)

No. 7 SCOOP JR. X-RAY SHOW WINDOW REFLECTORS

For 75, 60, 40 or 25-Watt Lamps



For small size deep window and average deep display cases.

Holders required for various size lamps: 75 or 60-watt, Form H 2 $\frac{1}{4}$ inches; 40 or 25-watt, Form O 2 $\frac{1}{4}$ inches.

Width 5 inches; depth front to back 4 $\frac{7}{8}$ inches; height of reflector only 3 $\frac{7}{8}$ inches.

Standard package, 20 reflectors.

Weight, standard package, 11 pounds.

List No. 7. List price, each..... \$2.75

No. 11 HOOD JR. X-RAY SHOW WINDOW REFLECTORS

For 75, 60, 40 or 25-Watt Lamps



For small shallow window and average wall display cases.

Holders required for various size lamps: 75 or 60 watt, Form H 2 $\frac{1}{4}$ inches; 40 or 25-watt, Form O 2 $\frac{1}{4}$ inches.

Width 5 inches; depth front to back 5 $\frac{7}{16}$ inches.

height of reflector only 3 $\frac{1}{2}$ inches.

Standard package, 20 reflectors.

Weight, standard package, 15 pounds.

List No. 11. List price, each..... \$3.50

Old Types of Reflectors

(Listed for reference only, where additional reflectors are required on old jobs.)

List No.	Width	Height	Depth	Holder	Std. Pkg.	List Price Each
515	6 $\frac{1}{4}$ "	2 $\frac{1}{8}$ "	2 $\frac{7}{8}$ "	included	36 (16 lbs.)	\$3.50
731	8 $\frac{7}{8}$ "	6 $\frac{1}{2}$ "	9"	"H" 2 $\frac{1}{4}$ "	16 (30 lbs.)	6.00
750	14"	6 $\frac{1}{8}$ "	7"	Included	8 (26 lbs.)	19.00
778	7 $\frac{1}{2}$ "	6 $\frac{5}{16}$ "	7 $\frac{1}{8}$ "	"O" 2 $\frac{1}{4}$ "	24 (37 lbs.)	4.00

X-RAY COLOR RAYS



Color-Ray is an accessory for producing color lighting effects with standard X-Ray Window Reflectors. It consists of a simple metal frame with 4 sheets of colored gelatin (red, blue, green and amber); clips securely on the reflector; easy to install or to change colors.

Standard package, 10.

	For Use with Reflector	Wt. Lbs. Std. Pkg.	List Price Each
40	No. 400 Jack.....	7	\$2.50
41	No. 410 Jill.....	7	2.50
55	Nos. 500 and 510.....	7	2.75
99	Nos. 900 and 910.....	7	4.40
1070	No. 1010 Blimp.....	7	5.25

COLOR GELATIN SHEETS

Size 11½ x 11½ Inches

For Nos. 440 and 441, also
A, 303-A and 338.

Size 15 x 15 Inches

For Nos. 55, 99 and 10870,
also Nos. 88, 808 and 888.

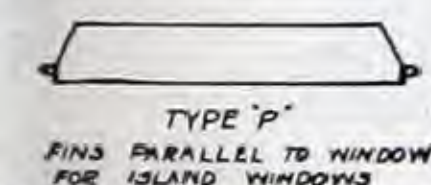
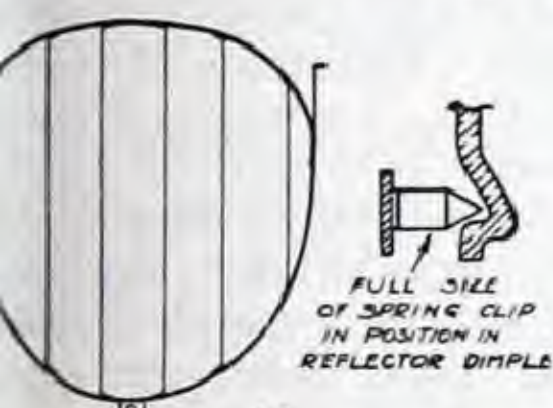
	List Price Each	List Price Each
372 Red	\$0.30	10472 Red \$0.35
373 Amber	0.30	10473 Amber 0.35
374 Green	0.30	10474 Green 0.35
375 Blue	0.30	10475 Blue 0.35

Standard package; 10 sheets one color or assorted.

Weight, standard package, approximately, one pound.

X-RAY LOUVERS

For Concealing Light Source from View



Corner or island type windows often require a means of concealing the lamps and light from reflectors along the adjacent side. Louvers can be installed at any time in dimpled X-Ray Reflectors.

Hinged sections of continuous louvers available on order. Each louver is a complete unit; finish, gray. Standard package, 1.

TYPE N LOUVERS, FINS AT RIGHT ANGLES TO GLASS

	For Use with Reflector	Wt. Lbs. Each	List Price Each
400-N	No. 400 Jack.....	1	\$4.00
410-N	No. 410 Jill.....	1	4.00
500-N	No. 500 King.....	1	4.00
510-N	No. 510 Queen.....	1	4.00
900-N	No. 900 Giant.....	2	5.00
910-N	No. 910 Leviathan.....	2	5.00
1010-N	No. 1010 Blimp.....	2	6.00

TYPE P LOUVERS, FINS PARALLEL TO GLASS

	For Use with Reflector	Wt. Lbs. Each	List Price Each
410-P	No. 410 Jill.....	1	\$4.00
510-P	No. 510 Queen.....	1	4.00
910-P	No. 910 Leviathan.....	2	5.00
1010-P	No. 1010 Blimp.....	2	6.00

X-RAY FINISHING FLANGES AND PLASTER RINGS

For Recessing X-Ray Reflectors above Ceiling of Window
Finishing Flanges



Recessing the reflectors and wiring above the ceiling gives the window a neat appearance. Light-weight cast flanges finish off the opening, support the reflector in correct position and reinforce plywood ceilings that would otherwise be weakened after openings are cut. Louvers and colorray can be used the same as when equipment is supported from transom bar or ceiling. On newly plastered

ceilings, use plaster rings described below. Flanges are supplied unfinished; may be painted to match window ceiling.

Standard package, 10.

Flange No.	For Reflector	Std. Pkg. Wt., Lbs.	List Price Each
10394	No. 11 Hood Jr.....	9	\$0.45
10594	No. 11 Hood Jr. with Louver...	12	3.75
14310	No. 310 Favorite.....	3	.65
11400	No. 400 Jack.....	15	.85
11410*	No. 410 Jill.....	16	.85
11500	No. 500 King.....	22	1.10
11510*	No. 510 Queen.....	24	1.10
10329	Nos. 600 and 610.....	..	1.50
10349	No. 731 Hood.....	..	1.25
10417	Nos. 804 and 810.....	24	1.60
14004*	Nos. 842 and 848.....	26	3.95
10517	No. 844 Comet and No. 420....	16	.75
10432*	Nos. 900 and 910.....	26	1.65
14110*	No. 1010 Blimp.....	26	1.90

*Plaster ring available for use with this flange shown below.

PLASTER RINGS



Plaster rings, made of light-weight cast iron, are used where reflectors are to be recessed above plaster ceilings. They serve as a ground to plaster to, as a base for securely mounting ceiling finishing flanges, and make the ceiling rigid by reinforcing the lathing around the opening.

Plaster rings are installed by the lathing contractor. Plastering contractor places final coat of

plaster flush with the bottom of the plaster ring. Finishing flanges support the reflector in the proper position and finish off the opening in the ceiling. Lugs on sides are placed off-center to allow for close spacing between reflectors.

Plaster rings are also available for hinged rims and general lighting reflectors.

Plaster rings should be ordered early, even before reflector equipment, so that they will be on the job ready for use when lathing is being done.

Standard package, 10.

List No.	For Reflector	Finishing Flange No.	Std. Pkg. Wt., Lbs.	List Price Each
14006	No. 410 Jill.....	11410	20	\$1.25
14007	No. 510 Queen.....	11510	24	1.65
14008	No. 900 Giant or No. 910 Leviathan.....	10432	26	2.00
14111	Nos. 842, 848 and 1010	{14004} {14110}	26	3.00

X-RAY INTERIOR FLOODLIGHTS

Three Types of Light-Control

Three general types of light-control are provided with X-ray interior floodlights. The illustrations below give an idea of the distribution from each unit. These three types are briefly described as follows:



CENTER SPOT BEAM

This combination of a flood and spotlight has a wide range of uses because of its intense concentration and wide general illumination. Small shop windows can be completely lighted with one or two of this type of unit so that the principal portions of the display are highlighted. At the same time there is sufficient light provided for the rest of the display.

On Short Swivel Base		
List No.	Std. Lamp Watts	
44	150-100	
*33-A	200	
33-B	200	
*88	500-300	
88-B	500-300	

On Portable Stand
54" High

List No.	Std. Lamp Watts	
*303-A	200	
303-B	200	
*808	500-300	
808-B	500-300	



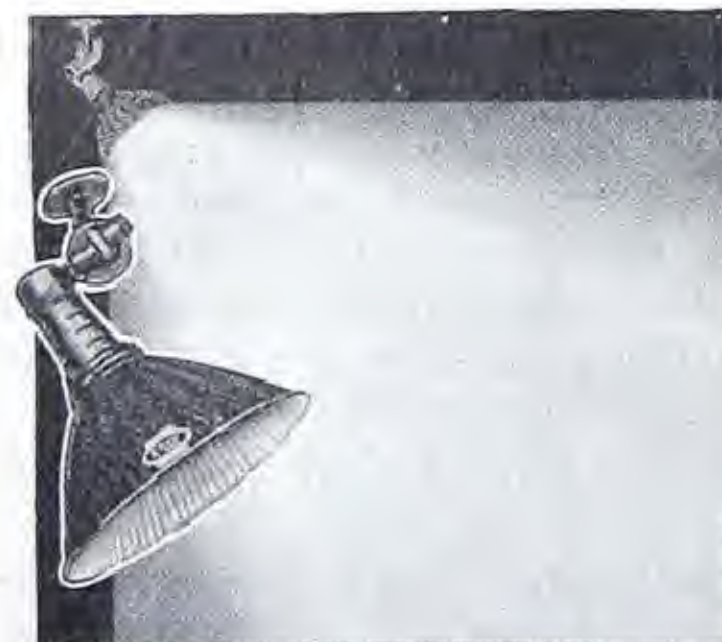
SPOT BEAM

Where the general flood of light is not wanted but instead more of a spotlight effect is needed the Spot Beam should be used. A control-ring is used with the regular Type 33-A or 88 to confine all of the light into one powerful spot beam. This combination is generally used in store interiors for spotlight sales and wherever the light source should be concealed.

On Short Swivel Base		
List No.	Control Ring No.	Std. Lamp Watts
*33-A	13351	200
33-B	13351	200
*88	18860	500-300
88-B	18860	500-300

On 54" Portable Stand

List No.	Control Ring No.	Std. Lamp Watts
*303-A	13351	200
303-B	13351	200
*808	18860	500
808-B	18860	500-300



FLOOD OF LIGHT

This distribution is readily understood. In X-Ray interior floodlights the overall spread is approximately 100° with the greatest concentration of light in the 40° zone.

The two sizes of this type of unit have a wide variety of uses.

On Short Swivel Base		
List No.	Std. Lamp Watts	
*338	200	
338-B	200	
*888	500-300	
888-B	500-300	

On Portable Stand
54" High

Nos. 338, 338-B, 888 and 888-B can be supplied on portable stand 54 inches high by so specifying.

*Regularly supplied with Color-Frame and red, blue, green and amber gelatin for color highlighting. All others have no color equipment and are for white lighting only.

No. 44 X-RAY INTERIOR FLOODLIGHTS
For 150 or 100-Watt Lamps

Concentrating type for white lighting only; no color equipment available. This is a combination of spot and floodlight. Base has universal adjustment.

Diameter of reflector 8 1/2 inches. Depth from back of socket to front of reflector 7 1/2 inches with 100-watt lamp, 7 1/2 inches with 150-watt lamp using holder extension (included). Diameter of base 3 1/4 inches.

Standard package containing one unit weighs 5 pounds. List No. 44. List price, each, \$8.2

No. 33-A X-RAY INTERIOR FLOODLIGHT
For 200-Watt Lamps

Concentrating type for white or colored lighting. For smooth soft edge beam use inside frosted lamp. Base has universal adjustment. Color equipment consists of 4 pieces of gelatin (red, blue, green and amber) frame and clips.

Diameter of reflector 10 1/2 inches. Depth back of socket to front of reflector 10 3/4 inches. Diameter of base 3 1/4 inches.

List No. 33-A with Color Equipment, wt., 7 lbs, each, \$13.2

List No. 33-B without Color Equipment, each, 11.0

List No. 303-A Portable with Colors, wt., 31 lbs, each, 24.2

List No. 303-B Portable without Colors, each, 22.0

Portables have 54-in. stand and 10-ft. cord with plug.

No. 88 X-RAY INTERIOR FLOODLIGHT
For 500 or 300-Watt Lamps

Concentrating type for white or colored lighting. Base has universal adjustment. Diameter of reflector 13 1/4 in. Depth from back of socket to front of reflector 11 1/8 in. Diameter of base 3 1/4 in. Color equipment consists of 4 pieces of gelatin (red, blue, green and amber) frame and clips.

List No. 88 with Color Equipment, each, \$22.5

List No. 88-B without Color Equipment, each, 18.5

List No. 808 Portable with Colors, each, 34.0

List No. 808-B Portable without Colors, each, 30.0

Weight, No. 88, 12 lbs., No. 808, 30 lbs.

Portables have 54-in. stand and 10-ft. cord with plug.

X-RAY CONTROL-RINGS
For Interior Floodlights

A louver for converting regular interior floodlight into commercial spotlight. Consists of a circular shield for eliminating the spill of light common to a floodlight and confining the light to one straight controlled beam.

Control-ring is used only with concentrating types and is available only for 200 and 500-300 watt sizes listed below. Attached by snapping spring clips over the lip of the floodlight reflector. Does not interfere with the use of color-ray and can be used with reflectors when recessed.

Standard package, 1; shipping weight, 1 pound.

List No. 13351 for Nos. 33-A, B and 303-A, B, each, \$5.2

List No. 18860 for Nos. 88, 88-B, 808 and 808-B, each, 4.1

X-RAY GENERAL LIGHTING REFLECTORS



Used for lighting factories, armories, gymnasiums, shops. Mounted individually or in groups above glass panels or skylights, etc. Nos. 585, 54, 848 and 590, furnished with Mogul Socket and Holder, are designed especially for high interiors.

DISTRIBUTING REFLECTORS

Code Name and Description	Std. Pkg.	Wt. Lbs.	Price Each
"Mill" 25-75-W. lamp.....	(20)	12	\$1.65
Holder required: For 75- and 60-W. lamp, Form "H" 2 1/4" Holder; for 40- or 25-W. lamp, Form "O" 2 1/4".			
"Hickory" 60-100-W. lamp.....	(24)	22	2.20
Holder required: For 100-W. lamp, Form "H" 2 1/4" Holder; for 75- or 60- W. lamp, Form "O" 2 1/4".			
"Oak" 150-W. lamp.....	(16)	33	3.85
Form "A" 3 1/4" Holder required.			
"Ash" 200-W. lamp.....	(8)	24	4.70
Form "A" 3 1/4" Holder required.			
"Spruce" 500 or 300-W. lamp....	(4)	24	12.65
Holder and 1/2" Mogul Socket (with 3/8" reducer) inclusive.			
-R Reflector only for No. 585.....	(4)		8.80

SEMI-CONCENTRATING REFLECTORS

"Radish" 60-100-W. lamp.....	(24)	30	\$3.30
Holder required: For 100-W. lamp, Form "H" 2 1/4", for 75- or 60-W., Form "O" 2 1/4".			
"Carrot" 150-W. lamp.....	(18)	32	6.60
Form "H" 2 1/4" Holder required.			
"Crown" 200-W. lamp.....	(6)	19	8.25
Form "A" 3 1/4" Holder required.			
"Little Boy" 500-300-W. lamp... (6)	33	17.50	
Holder and Mogul 1/2" Socket (with 3/8" reducer) incl.			
-R Reflector only for No. 848.....	(6)		13.50
"Big Boy" 1500-1000-W. lamp... (2)	42	35.00	
Holder and Mogul Socket (with loop) incl.			
-R Reflector only for No. 590.....	(2)		26.00

X-RAY PORTABLE FOOTLIGHTS

150-100*-Watt Lamps on 12-Inch Centers



Designed for show windows, small stages and wherever standardized or portable footlight is needed. Sturdily constructed of heavy gauge steel with inside finished aluminum bronze. X-Ray reflectors on 12-inch centers. Height over all 5 5/8 inches. Depth from front to back 5 1/2 inches. Provided in 2 standard lengths, 4 and 8 feet, but can be made to any length. Furnished unwired (without wire) and unassembled. Removable wireway cover makes wiring easy.

Standard finish, statuary bronze lacquer enamel.

Standard package is one section. Average shipping weight per foot on sections 4 feet long or more is 4 1/2 pounds.

No. 10584 Section 4 Feet Long for 4 lamps.....each \$53.10

No. 10588 Section 8 Feet Long for 8 Lamps.....each 98.75

No. 10589 (Use this number for other lengths).

On Orders up to 8 Feet.....per foot \$15.00

On Orders for More than 8 Feet.....per foot 13.75

Specify length required.

*With 100-watt lamps use short (7/8-inch) socket extension.

CURTISTRIP



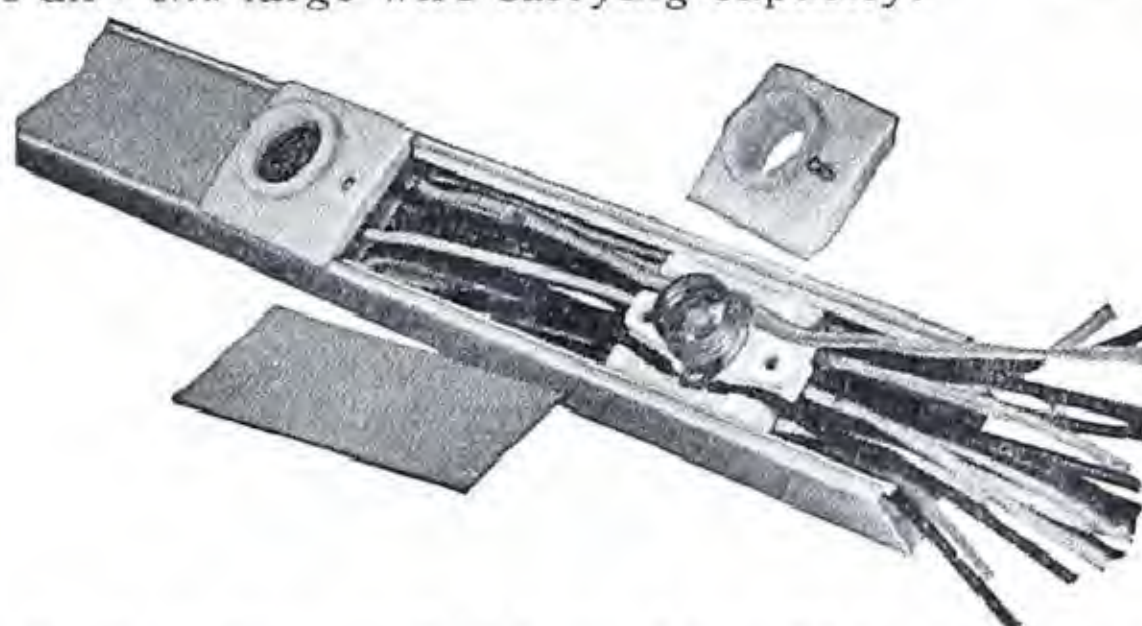
CurtiStrip is a simplified wiring channel and race-way. Standardized fittings permit almost any assembly. The patented snap-in flat cover permits outlets to be placed on any spacing. The cover, placed between sockets or fittings, is cut to length required with tinners' shears and snaps firmly in place in the lip of the channel. Channel is cut to any length with a hack saw. Sections longer than 10 feet are coupled together with No. 16 coupling.

Channel and cover are made of No. 20 U.S. gauge cold rolled steel cadmium plated, a process that presents an attractive finish and protects the metal. This surface may be painted on the job, or it can be brushed and lacquered where a satin silver finish is wanted.

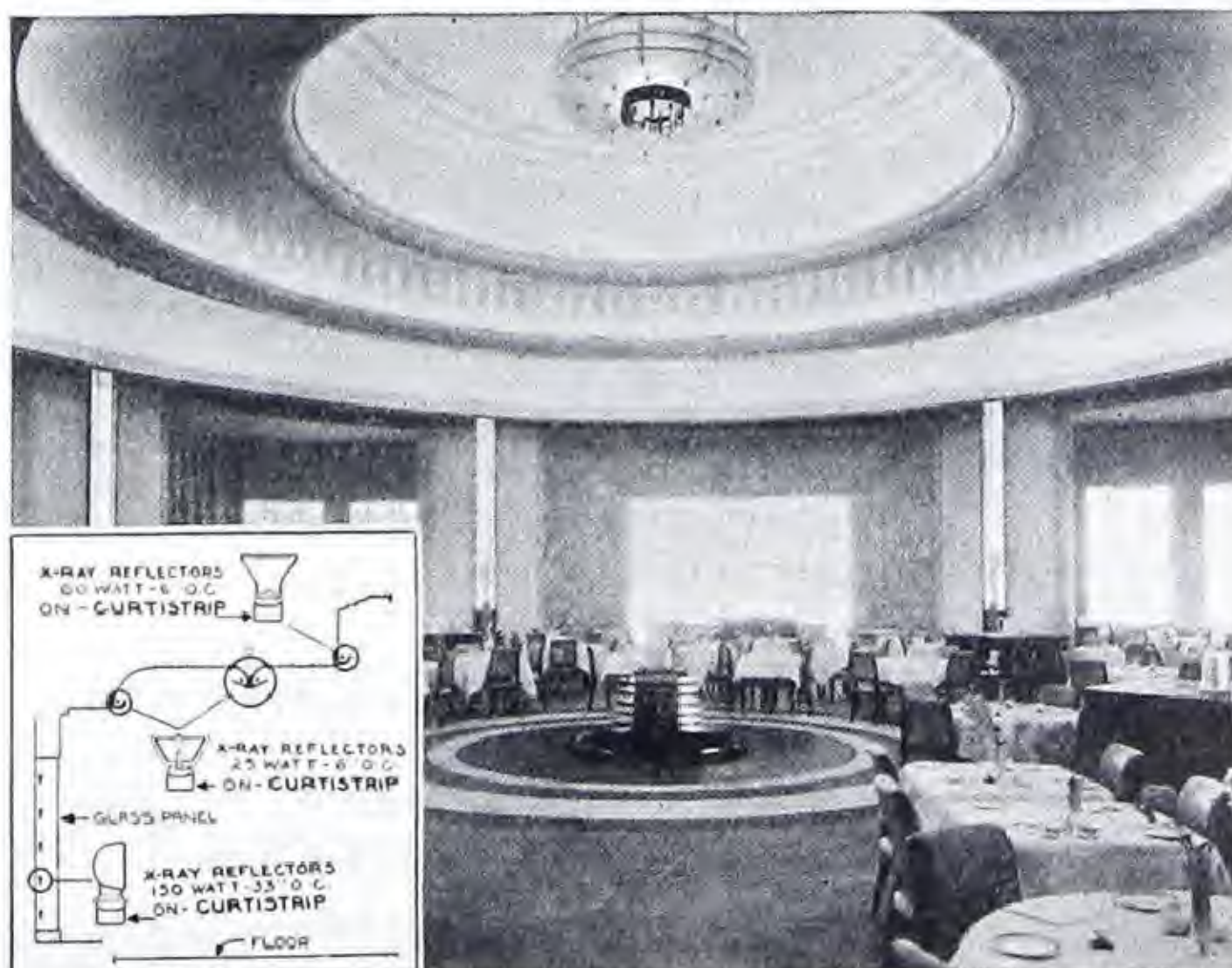
CURTISTRIP CHANNEL

CurtiStrip Channel is made in only one size 2 1/2 inches wide, 1 5/8 inches deep. The wire way is large enough to carry as many as 30 No. 14 rubber covered wires under sockets, local inspection permitting. This is important where many circuits or a long run of outlets would otherwise make it necessary to put in additional risers at several points.

Illustration below shows one spacer and socket cover removed from a section of CurtiStrip, giving a clear idea of how wires are laid under terminal screws of CurtiStrip sockets and the large wire carrying capacity.



Standard package is 100 feet of ten 10-foot lengths.	
No. 1 Channel with Cover, per foot.....	\$0.60
Weight, standard package, 130 pounds.	
No. 1-A Channel without Cover, per foot.....	.55
Weight, standard package, 103 pounds.	
No. 1-B Cover Only for No. 1-A Channel, per foot....	.10
Weight, standard package, 40 pounds.	



Recessed and Cove Lighting

CURTISTRIP SOCKETS AND RECEPTACLES

Sockets and receptacles can be spaced as close as $2\frac{3}{4}$ inches on centers. Their 2-piece construction saves time and simplifies wiring.

Cover spaces are cut $2\frac{1}{4}$ inches shorter than the center to center measurements between outlets.

Example: Outlets on 18-inch centers have $15\frac{3}{4}$ -inch spacers.



Wires are not cut but stripped and laid under terminal screws along groove. Porcelain top completely covers bare wire. Not necessary to compound terminals.

No. 4 PLUG-IN PORCELAIN RECEPTACLES



Polarized receptacle—15 amperes 125 volts, 10 amperes 250 volts dead front.

Height over all in CurtiStrip $2\frac{1}{4}$ inches.

Standard package of 10 weighs 7 pounds.

List No. 4.....List Price each \$0.70

No. 5 STANDARD PORCELAIN SOCKETS



Standard porcelain socket with shade holder groove for use with X-Ray reflectors having Form X Holders and for all other standard shade holders used on porcelain sockets.

Height over all in CurtiStrip $2\frac{7}{8}$ inches.

Standard package of 50 weighs 27 pounds.

List No. 5.....List Price each \$0.60

No. 5-A SPECIAL PORCELAIN SOCKETS

Special porcelain socket, no shade holder groove, for use with X-Ray holders and cove lighting reflectors.

Height over all in CurtiStrip $2\frac{7}{8}$ inches.

Standard package of 50 weighs 27 pounds.

List No. 5-A.....List Price each \$0.60



No. 8 PORCELAIN ANGLE SOCKETS

Porcelain angle socket for X-Ray cove lighting reflectors.

Height over all in CurtiStrip $5\frac{1}{4}$ inches. Top of CurtiStrip to center of socket $2\frac{3}{4}$ inches.

Standard package of 50 weighs 47 pounds.

List No. 8.....List Price each \$1.50

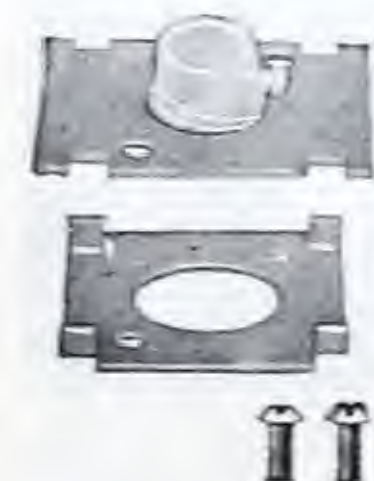


No. 19 NIPPLE ATTACHMENTS

Nipple attachments, $\frac{3}{8}$ -inch female thread, for supporting reflectors on nipple or for use with X-Ray cove lighting reflectors.

Standard package of 10 weighs 3 pounds.

List No. 19.....List Price each \$0.50



No. 19-BX ATTACHMENTS

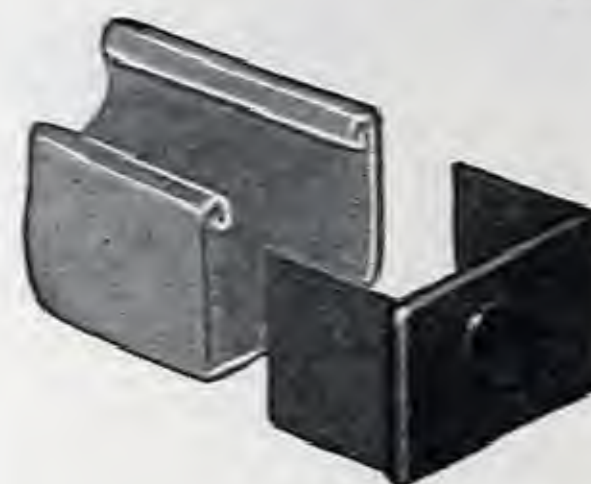
Attachment designed to connect $\frac{1}{2}$ -inch BX to CurtiStrip or for attaching $\frac{1}{2}$ -inch socket to CurtiStrip by using chase nipple.

Standard package of 10 weighs 3 pounds.

List No. 19-BX.....List Price each \$0.40

CURTISTRIP FITTINGS Standard Finish, Cadmium Plated

No. 6 End Caps

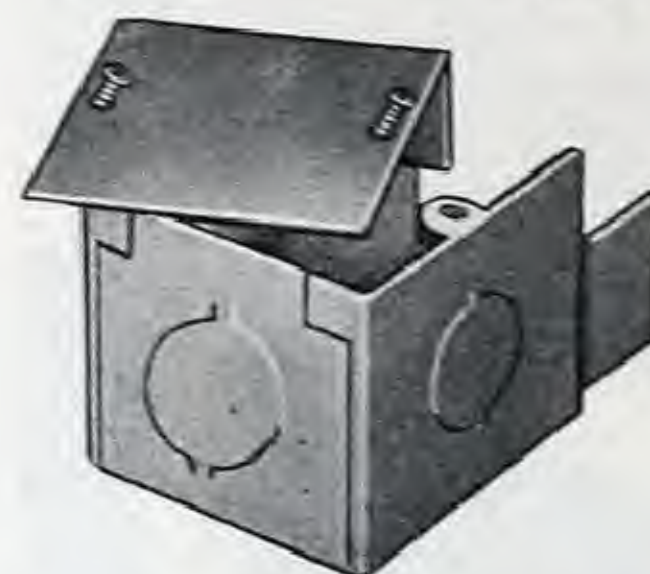


Designed to close and finish end of CurtiStrip. Provided with $\frac{1}{2}$ -inch knockout (can be reamed to $\frac{3}{4}$ inch) for lead-in circuits.

Standard package of 10 weighs 3 pounds.

List No. 6.....List price each \$0.40

No. 12 Service Boxes



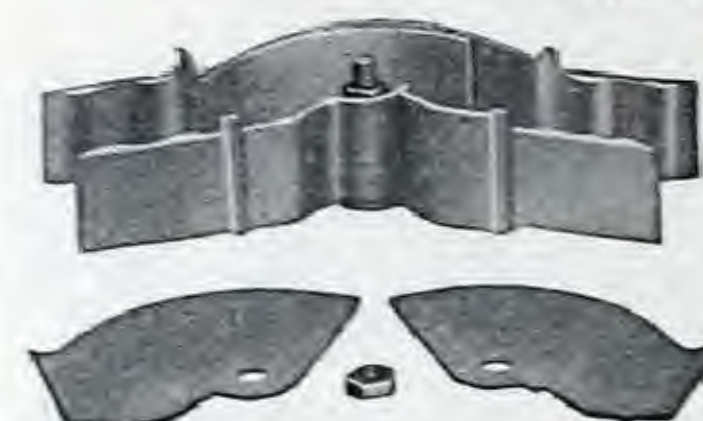
Designed for use when conduit larger than $\frac{3}{4}$ inch is necessary.

Has four $\frac{3}{4}$ -inch knockout bottom, end and 2 sides, that may be reamed up to 1 $\frac{1}{2}$ inches. Size extending outside of CurtiStrip $2\frac{3}{4}$ x $2\frac{3}{4}$ x $2\frac{3}{4}$ inches.

Standard package of 10 weighs 12 pounds.

List No. 12. List Price each.....\$1.50

No. 14 Elbows



Elbow is adjustable from 70 to 180 degrees. Cover is removable and eliminates fishing of wires. Separable body permits using elbow as splice box.

Standard package of 10 weighs 3 pounds.

List No. 14. List price each.....\$1.60

No. 16 Couplings



This coupling is used for connecting 2 pieces of CurtiStrip.

Does not reduce size of wireway or interfere with use of other CurtiStrip sockets and receptacles.

Standard package of 10 weighs 3 pounds.

List No. 16. List price each \$0.40

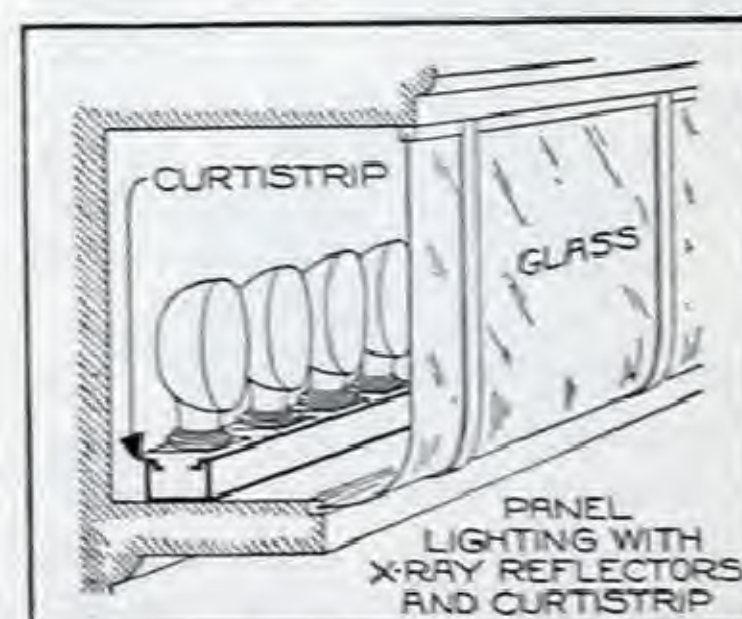
No. 18 Box Adapters



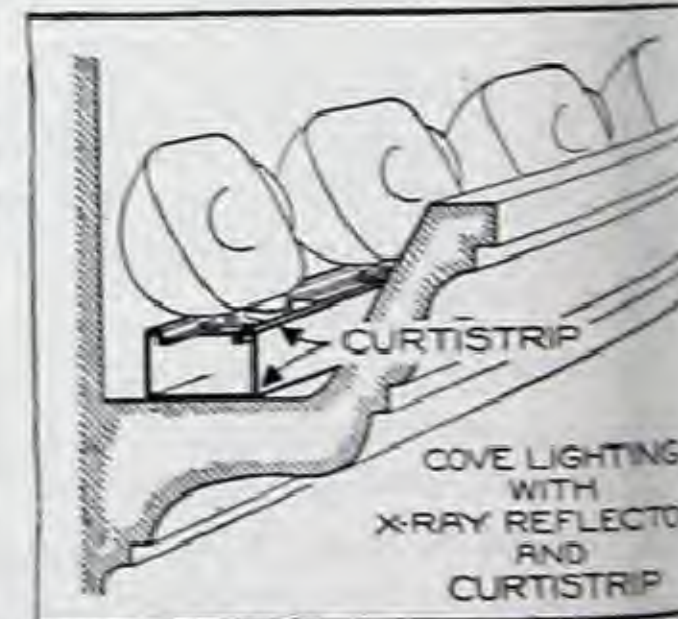
For connecting CurtiStrip to 4-inch standard octagonal outlet box. 1, 2, 3 or 4 adapters may be used so that CurtiStrip may be run in as many different ways from one outlet box.

Standard package of 10 weighs 3 pounds.

List No. 18. List price each.. \$0.70



X-Ray cove lighting reflectors may be mounted on No. 5-A Socket and entire length of CurtiStrip tilted to secure correct distribution of light.

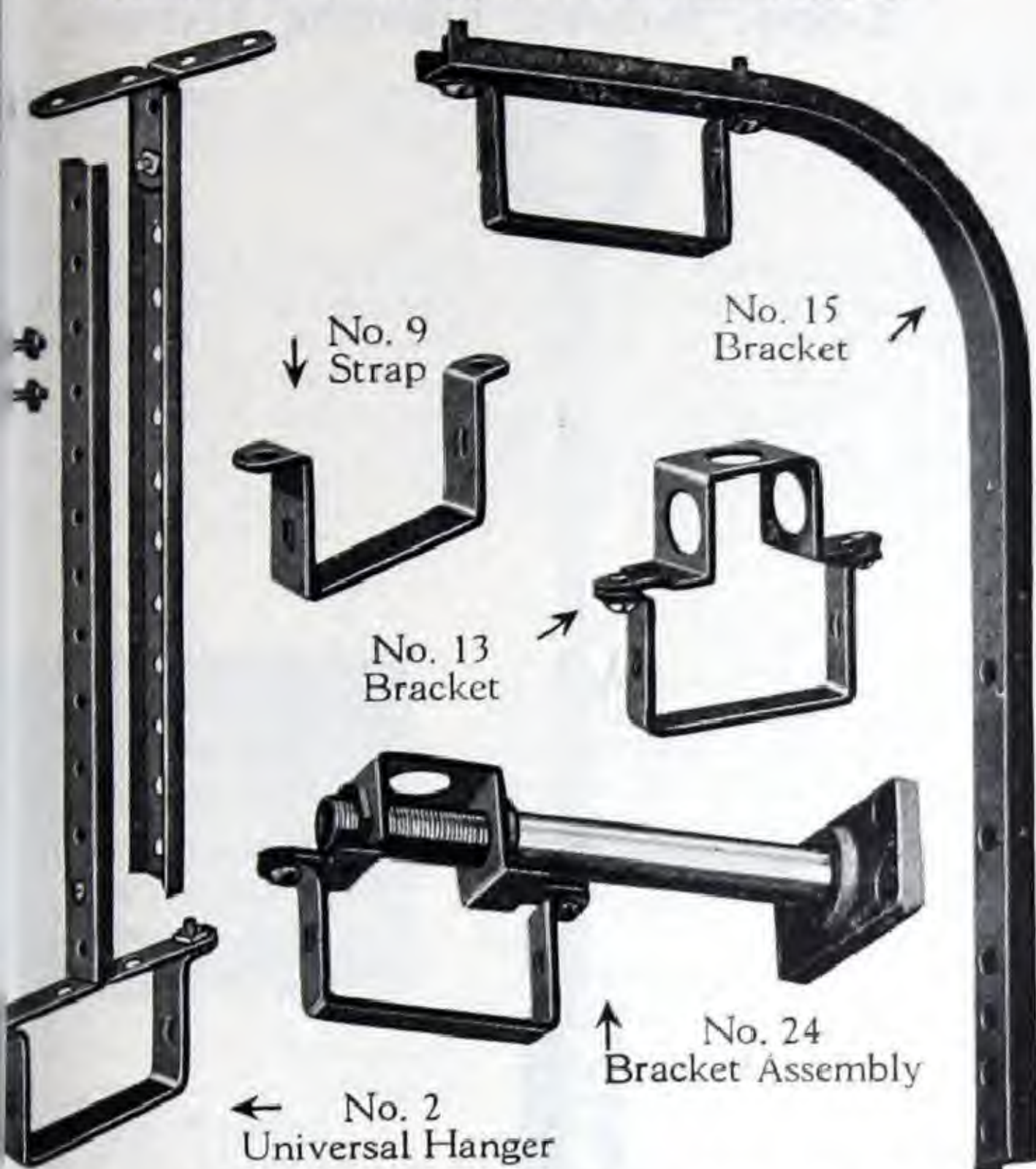


Reflectors mounted on No. 8 Socket or No. 19 Nipple Attachments are adjustable individually.

CurtiStrip is generally fastened with No. 9 Strap.

CURTISTRIP SUPPORTS

Standard Finish, Cadmium Plated



Five standard X-Raylets (CurtiStrip fittings) offer complete flexibility for mounting CurtiStrip. To bolt against any flat surface use No. 9 Strap. To hang down from beam or ceiling use No. 2 hanger. This is adjustable from 4 to 14 inches over all, where a chain or rigid rod hanger is to be used, the No. 13 bracket should be substituted.

No. 2 UNIVERSAL HANGERS

This hanger can be made any length from 4 to 34 inches. Includes 2-piece perforated hanger, one No. 9 strap, 4 angle brackets and 6 bolts.

Standard package of 10 weighs 16 pounds.

List No. 2.....List Price each \$1.00

No. 9 STRAPS

For holding CurtiStrip against any flat surface. Spread over all $3\frac{15}{16}$ inches. Holes on $3\frac{5}{16}$ -inch centers. Standard package of 10 weighs 2 pounds.

List No. 9.....List Price each \$0.15

No. 13 BRACKETS

Designed to hang CurtiStrip on pipe or chain hanger, pipe or chain not included.

Height top to bottom 3 inches.

Standard package of 10 weighs 4 pounds.

List No. 13.....List Price each \$0.55

No. 15 HANGERS

For mounting CurtiStrip on wall or transom bar. May be used as shown or reversed.

With long leg of bracket at wall the distance from wall to center of CurtiStrip is 5 inches. Height of bracket may be varied from $12\frac{1}{8}$ to $8\frac{1}{4}$ inches or less by drilling new holes. With short leg of bracket at wall, distance from wall to center of CurtiStrip may be varied from $8\frac{1}{4}$ to $10\frac{1}{8}$ inches, height varying from 5 to 7 inches.

Standard package of 10 weighs 11 pounds.

List No. 15, Includes No. 9 Strap.....List Price each \$0.85

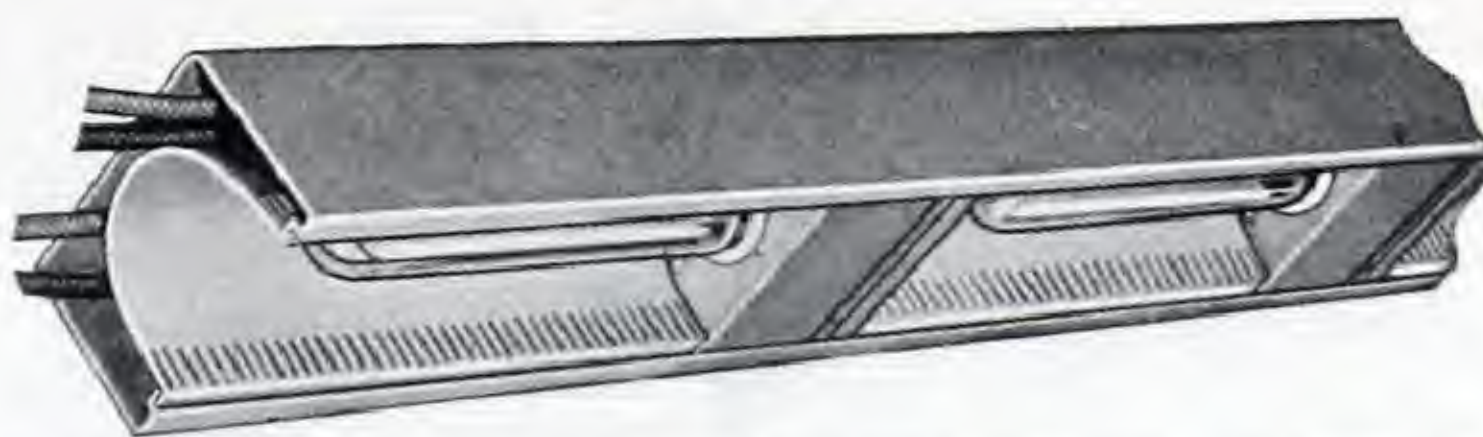
No. 24 BRACKET ASSEMBLY

For mounting CurtiStrip out from transom bar or for suspending from ceiling. Includes $1\frac{1}{2}$ x 3-inch rectangular flange, $\frac{3}{8}$ -inch nipple $6\frac{1}{4}$ inches long with 2 locknuts and No. 13 brackets.

Standard package of 10 weighs 9 pounds.

List No. 24.....List Price each \$1.00

LIGHTSTRIP



LightStrip is a standardized lighting channel and can be made to any length with outlets spaced as required on the job. It is made with CurtiStrip and LightStrip unit assemblies in 3 sizes from 25 to 150 watts capacity.

Each section of LightStrip requires the same total length of No. 1 CurtiStrip also 2 No. 6 end caps and No. 16 couplings to connect short pieces of CurtiStrip or pieces over 10 feet long. It may be a short 1-light section or a longer section with many lights. It is wired on the bench, is easily installed and quickly connected to the lighting circuit like a fixture. It has ample capacity for carrying wires. The same methods of support used for CurtiStrip are used for mounting LightStrip. All CurtiStrip fittings and plug-in receptacles are standard for LightStrip.

Reflectors are bright aluminum finish; other metal parts are cadmium-plated.

FOR 25-WATT T-6½ INTERMEDIATE BASE TUBULAR LAMPS

No. 26 Unit Assembly

List No. 26 assembly includes bright aluminum reflector and intermediate base socket unit. Minimum spacing between units 8 inches on centers. Cover spacers are cut 8 inches less than actual center to center spacing between units.

Standard package of 10 sets weighs $4\frac{1}{2}$ pounds.

List No. 26 Assembly. List Price per set..... \$1.95

FOR 25 TO 150-WATT MEDIUM SCREW BASE TUBULAR LAMPS

These assemblies include bright aluminum reflector with spring clip to hold lamp and medium screw base tilting socket. Socket tilts out for inserting or removing lamp.

No. 27 Unit Assembly

For 25-watt T-10 medium screw base lamps. Minimum spacing between units 9 inches on centers. Cover spacers are $8\frac{5}{8}$ inches less than actual center to center spacing.

Standard package of 10 sets weighs $5\frac{3}{4}$ pounds.

List No. 27 Assembly. List Price per set..... \$2.25

No. 28 Unit Assembly

For 40 or 50 watt T-8, 75 or 150-Watt T-10 medium screw base tubular lamps. Minimum spacing between units 15 inches on centers. Cover spacers are cut $14\frac{3}{8}$ inches less than actual center to center spacing.

Standard package of 10 sets weighs 7 pounds.

List No. 28 Assembly. List Price per set..... \$2.50

WATTAGE REQUIRED WITH LIGHTSTRIP

The same total wattage will generally be used with LightStrip as would normally be employed.

Panel Lighting: For even lighting on flashed opal glass panels, the light source must be kept at proper distance from glass.

For narrow panels distance from front of LightStrip to glass must not be less than panel width.

For wide panels where several rows of LightStrip are used, distance between rows must not exceed distance from front of LightStrip to glass.

Where No. 27 or 28 are used behind glass panels, allow $\frac{1}{2}$ inch of space between top of CurtiStrip and underside of glass.

For room illumination from panels 4 watts per square foot of floor area will generally give approximately 6 to 8 foot candles.

Color Lighting Effects: Wattage and spacing should be the same as for white lighting.

CURTIS LIGHTING

Eye Comfort Standard Fixtures



"GEM". LIST No. 5050

For 500 or 300 watt standard lamp; 200 watt if socket reducer is used.

FINISH: SILVER GREY

Diameter of bowl $13\frac{1}{2}$ inches; depth $6\frac{3}{4}$ inches. Suspension 36 inches.

Packed in a carton with No. 14 wire for quick delivery. Shipping weight 12 lbs.

List Price each..... \$16.50

"JEWEL". LIST No. 6040

For 750, 1000 or 1500 watt standard lamp.

Husk to cover neck of lamp included.

FINISH: SILVER GREY

Diameter of bowl 18 inches; depth 9 inches.

Suspension 48 inches.

Packed in a carton with No. 14 wire for quick delivery. Shipping weight 21 lbs.

List Price each..... \$27.00

CURTIS LIGHTING

X-Ray, Indirect Lighting Fixtures



List No. 7200
500—300 Watts
Diameter—19"
Depth—6"
Finish—Silver Grey
List Price \$26.00



List No. 5870
500—300 Watts
Diameter—18"
Depth— $7\frac{1}{2}$ "
Finish—Silver Grey
List Price \$26.00

PERMAFLECTORS

For Show Window Lighting

Permafectors are silver-plated glass reflectors with a permanent reflecting surface.

FINISH

The silver color satin finish has many advantages both to user and to the trade; it makes the reflector less conspicuous when not concealed by valance or sign; harmonizes more universally with the variety of colors found in show window ceilings and backgrounds; is suggestive of light, silver and glass; and unlike the enamel heretofore used for reflector backing, this silver color will not darken under the heat of the Type "C" lamp.



No. 55

Concentrating type. For medium size shallow windows; medium high trim; island windows, or windows with upper part of background of glass.

Lamp: 100 watt, A-23 (inside frosted) and 150 watt PS-25.

Holder.....2 1/4" Form "O"

Dimensions:

Height, as shown.....6 3/16"

Height, adapter extended.....6 7/8"

Opening circular, diameter.....8 1/2"

Standard Package.....40

List Price: Reflector and one Adapter.....\$4.80



No. 77

For shallow windows, medium trim, open back.

Lamp: 100 watt A-23.

Holder: 2 1/4" Form OB or OP.

Dimensions:

Height.....5 1/2"

Diameter.....7"

Center to back.....2 3/16"

Standard Package.....48

List Price: Each.....\$5.10



No. 110

For low, deep windows, 3 to 7 feet high, in which trim is carried to level of reflectors.

Lamp: 100 watt, A-23 (inside frosted) and 150 watt PS-25.

Holder.....2 1/4" Form "O"

Dimensions:

Height, as shown.....7 9/16"

Height, adapter extended 8 1/4"

Opening circular, diam...8 1/2"

Standard Package.....40

List Price: Reflector and one Adapter.....\$4.80

PERMAFLECTORS

For Show Window Lighting

Permafectors are silver-plated glass reflectors with a permanent reflecting surface.

FINISH

The silver color satin finish has many advantages both to the user and to the trade; it makes the reflector less conspicuous when not concealed by valance or sign; harmonizes more universally with the variety of colors found in show window ceilings and backgrounds; is suggestive of light, silver and glass; and unlike the enamel heretofore used for reflector backing, this silver color will not darken under the heat of the Type "C" lamp.



No. 54

For shallow windows 7 to 10 feet high, medium trim, island windows or open back windows.

Lamp: 150 watt PS-25; 200 watt PS-30.

Holder.....2 1/4" Form "O"

Dimensions:

Height, as shown.....7 3/8"

Height, adapter extended...8"

Opening circular, diam...9 1/2"

Standard Package.....32

List Price: Reflector and one adapter.....\$6.10



No. 100

Designed particularly for windows having depth of one-half to three-fourths the distance from floor to reflectors. Ideal for windows having high trim.

Lamp: 150 watt PS-25; 200 watt PS-30.

Holder.....2 1/4" Form "O"

Dimensions:

Height, as shown.....8 3/8"

Height, adapter extended 9 1/16"

Width.....8 1/8"

Front to back.....8 1/2"

Center to back.....3 5/8"

Standard Package.....40

List Price: Reflector and one Adapter.....\$5.75



No. 112

Designed for a dual service—lighting both window display and transparent sign, as in drug stores, cigar stores, etc.

Lamps: 100 watt A-23; 150 watt PS-25; 200 watt PS-30.

Holder.....2 1/4" Form "O"

Dimensions:

Height, as shown.....6 11/16"

Height, adapter extended 7 3/8"

Opening circular, diam...9 1/2"

Standard Package.....32

List Price: Reflector and one Adapter.....\$6.35

Whatever your problem may be in Commercial, Industrial, Church, School or even Street Lighting, you will find in this catalogue a representative selection of the best and latest in Lighting Equipment to choose from.

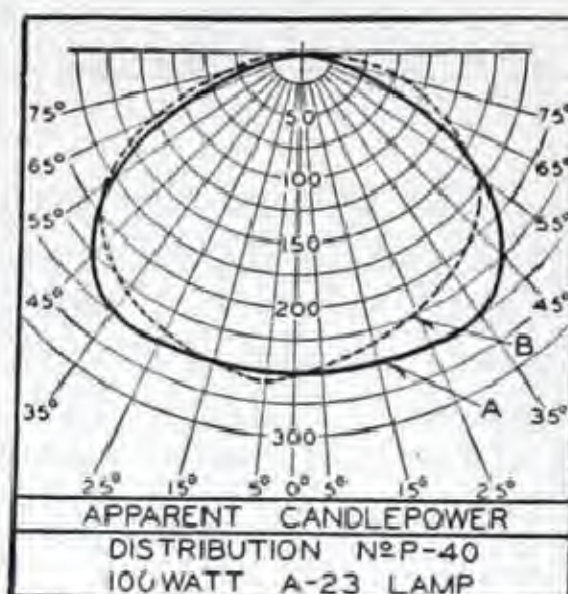
Experienced Lighting Specialists are located at our many distributing centers, alert to assist you and your electrical engineers with your lighting problems. We want you to take full advantage of their services.

PERMAFLECTORS

No. P-40



No. P-40



For indirect lighting from coves. Broad distribution. Minimum spacing 8 in. o.c. Also for lighting wall cases, bank cages, indirect lighting fixtures, art gallery, lighting, etc.

Lamp—50-60-75 watt A-21, with 2¼-in. holder Form "O"; 100 watt A-23, with 2¼-in. Holder Form "H."

Dimensions—Height, 2¾ in. Width, 4¼ in. Length, 5½ in.

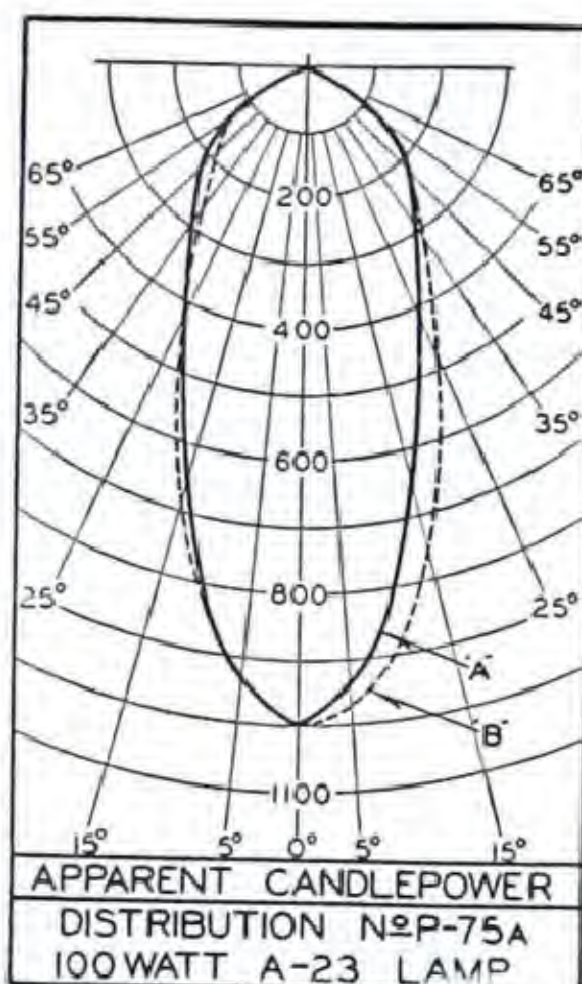
Standard package—48. Weight, approximately 40 lbs. Standard carton—24.

List Price—Each.....\$3.75

No. P-75-A



No. P-75-A



For cove lighting where a concentrated distribution is required for throwing the light some distance. Also for stock quotation boards; art galleries, small shallow show windows where overhead room is limited and high intensity is desired; and for indirect lighting fixtures.

Color-Lite—No. 4-A.

Lamp—100 watt A-23.

Holder—Standard 2¼ in. Form "O"; or "Pittsburgh" Form "S" OB Holders.

Dimensions—Height, 3⅝ in. Diameter, 6¾ in. Length, 7 in.

Standard package—24. Weight, approximately 75 lbs. Standard carton—6.

List Price—Each.....\$4.50

No. P-25

For cove lighting, wall cases, bank cages, etc. Also for multi-unit, low wattage, indirect and luminous bowl fixtures.

Lamp—25-40-watt, A-19; 50-watt, P-19.

Holder—2¼ in. Form "O," or 2¼ in. Form "S."

Dimensions—Height 3¼ in.; diameter 3⅛ in.; length, 4⅜ in.

Standard package—48. Weight—Approximately 30 lbs.

Standard carton—24. Weight—Approximately 15 lbs.

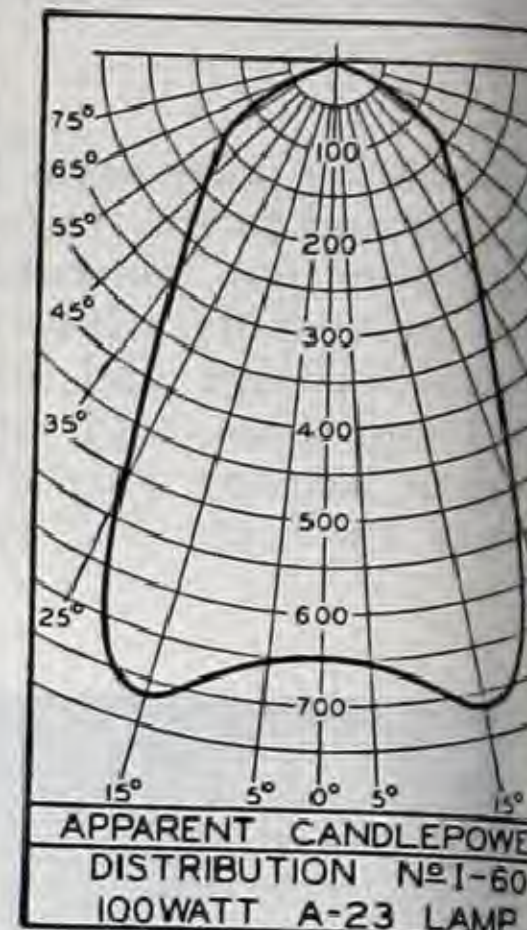
List Price—Each.....\$3.00

PERMAFLECTORS
For Industrial Lighting

No. I-60



No. I-60



For the same uses as No. I-25. Also for low mounting industrial use, as over benches, inspection tables, stock shelves, etc.

FLUSH MOUNTING RING—No. I-60.

Color-Lite—No. 4-A.

Lamp—60 watt A-21 or 100 watt A-23.

Holder—2¼ in. Form "O" for 60 watt. 2¼ in. Form "H" for 75-100 watt.

Dimensions—Height 4⅞ in. Diameter 6¾ in.

Standard Package—40. Weight, approx. 52 lbs.

Standard Carton—10.

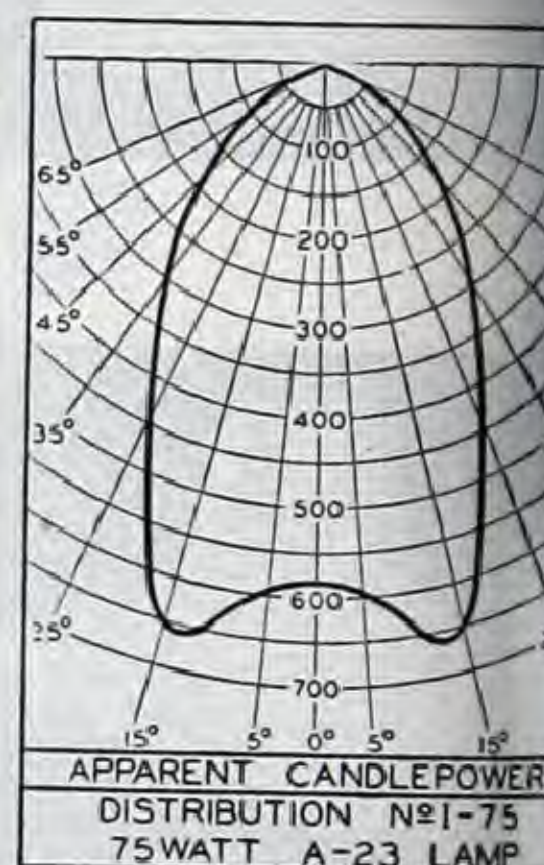
List Price—Each.....\$3.0

No. I-75

For low mounting localized industrial lighting (5 to 12 ft above work plane). Also for ornamental direct lighting fixture; for flush mounting in low ceilings.



No. I-75



FLUSH MOUNTING RING—No. 55.

Lamp—100 watt A-23.

Holder—2¼ in. Form "H."

Dimensions—Height 4¾ in. Diameter 8⅜ in.

Standard Package—40. Weight, approx. 69 lbs.

Standard Carton—10.

List Price—Each.....\$3.30

No. I-100

Companion to No. I-75

FLUSH MOUNTING RING—

No. I-201

Lamp—150 watt with 2¼ in. Form "H" Holder; 100 watt A-23 with 2¼ in. Form "O" Holder.

Dimensions—Height 5⅞ in. Diameter 9¾ in.

Standard Package—40. Weight, approx. 85 lbs.

List Price—Each.....\$3.60

PERMAFLECTORS For Industrial Lighting

No. I-200



No. I-200

For use whenever a highly concentrated beam over a limited area is desired. Primarily a local lighting unit. Adapter No. 1256 supplied.

Lamp—200 watt, Adapter extended; 150 watt, Adapter pressed.

Holder—2 1/4 in. Form "O."

Dimensions—Height... 7 5/8 in. Diameter... 11 in.

Standard Package—32. Weight, approx. 100 lbs.

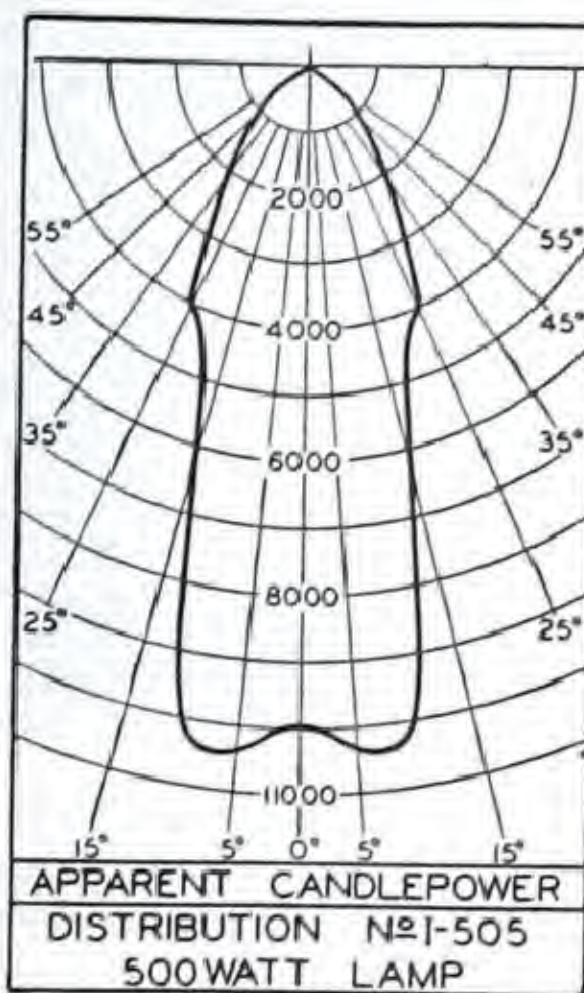
Standard Carton—8.

List Price—Each..... \$6.25

No. I-505



No. I-505



For high bay industrial lighting where the lighting equipment is located 25 ft. or more above the floor and exceptional penetration is required. Also very effective for lighting through skylights as in art galleries, bank lobbies and similar locations. Also a splendid reflector for service in direct lighting ornamental lanterns.

In industrial lighting the spacing between Permalectors should not exceed their height above the work plane.

Lamp—300-500 watt.

Holder—Furnished with 4-in. round box cover, Mogul socket and Form "M" holder.

Dimensions—

Height, overall, including 4 in. outlet box..... 14 5/8 in.

Height of Permalector..... 9 3/4 in. Diameter..... 16 in.

When used on Conduit No. 6, discard box cover and attach holder to conduit.)

Standard Package—10. Weight, approx. 80 lbs.

Standard Carton—5.

List Price—Each, as illustrated..... \$20.50

I-505-GO (reflector only)..... 16.50

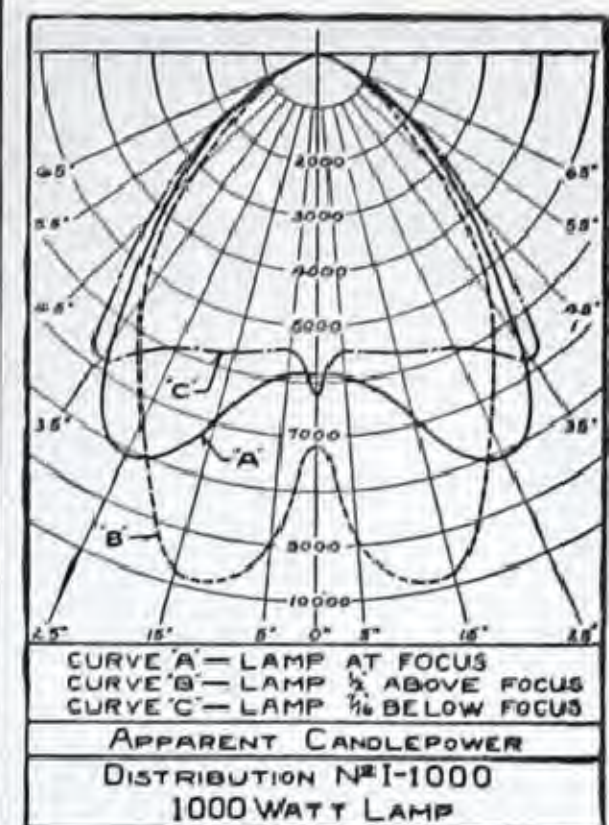
I-505-B—

Attach to 1/2-in. Conduit Stem: Without extra charge, No. I-505 will be furnished equipped with Box No. KO-11, Mogul Socket and Form M Holder. When so ordered, specify I-505-B.

PERMAFLECTORS For Industrial Lighting

No. I-1000

No. I-1000



For industrial lighting where the lighting unit must be from 25 to 50 ft. or more above the floor and exceptionally concentrating in distribution. Also for lighting through skylights. Spacing between Permalectors should not exceed their height above the work plane.

Flush Mounting Ring—No. I-1000.

Lamp—300-500-750-1000 watt.

Holder—Mogul Socket and special holder furnished, tapped for 1/2-in. conduit. Two socket positions; one for 300-500 watt; one for 750-1000 watt.

Dimensions—

Height over all... 16 3/4 in. Height of Reflector... 8 5/8 in.

Diameter of Reflector..... 16 in.

Standard Package—1. Weight, approx. 19 lbs.

Standard Carton—1.

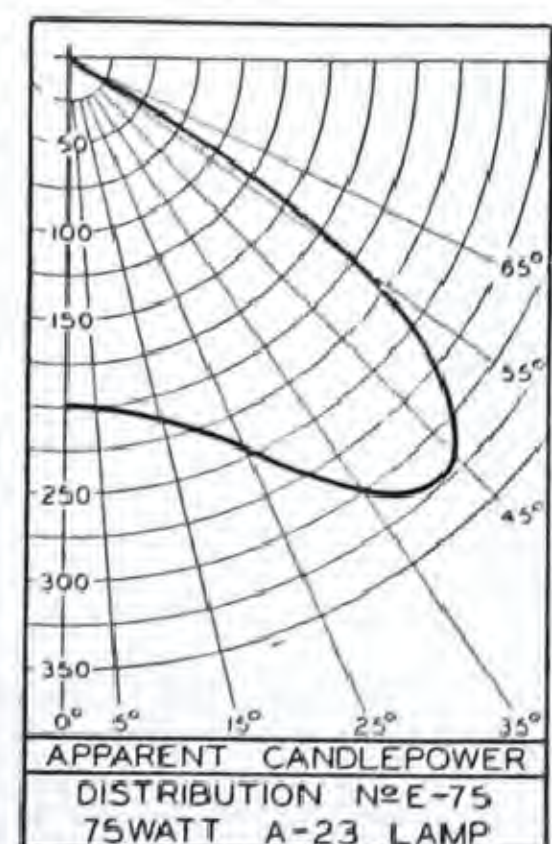
List Price—As shown..... \$22.50

I-1000-GO (reflector only)..... 16.50

No. E-75



No. E-75



Distributing type for low mounting (5-12 ft. above work plane), industrial service; for use in ornamental direct lighting fixtures, and for use in flush mounting in low ceilings.

Flush Mounting Ring—No. I-60.

Lamp—75 watt A-21; 100 watt A-23.

Holder—2 1/4 in. Form "H".

Dimensions—Height 4 3/4 in. Diameter 16 3/4 in.

Standard package—32. Weight, approx. 42 lbs.

Standard carton—8.

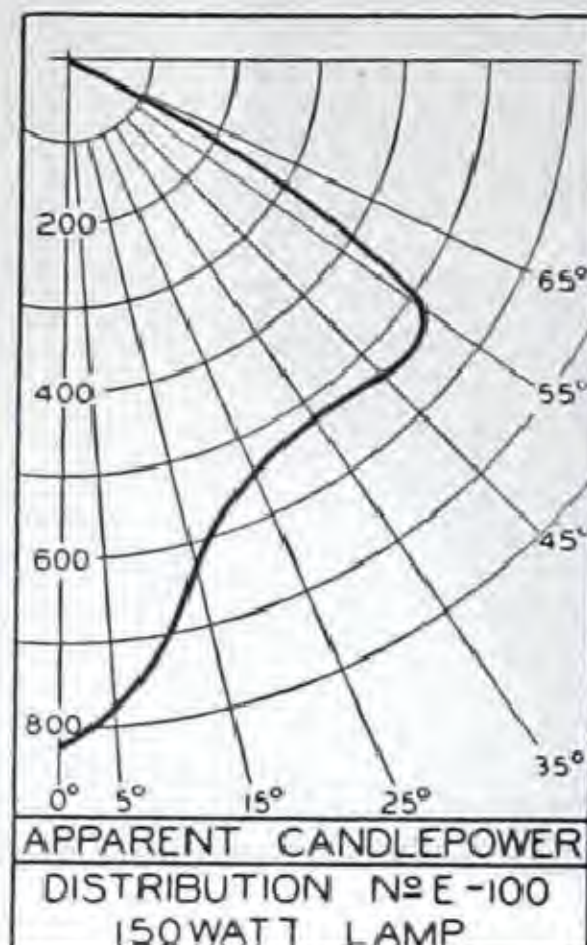
List Price—each..... \$2.50

PERMAFLECTORS For Industrial Lighting

No. E-100



No. E-100



Companion to No. E-75.
Flush Mounting Ring—No. 55.
Hinged Ceiling Roundel—special.

Lamp—150 watt PS-25 with $2\frac{1}{4}$ ". Form "H" holder;
100 watt A-23 with $2\frac{1}{4}$ ". Form "O" holder. When equipped
with "LC" holder, No. E-100 in combination with Hinged
Ceiling Roundel No. 1 takes the 200 watt PS-30 lamp.

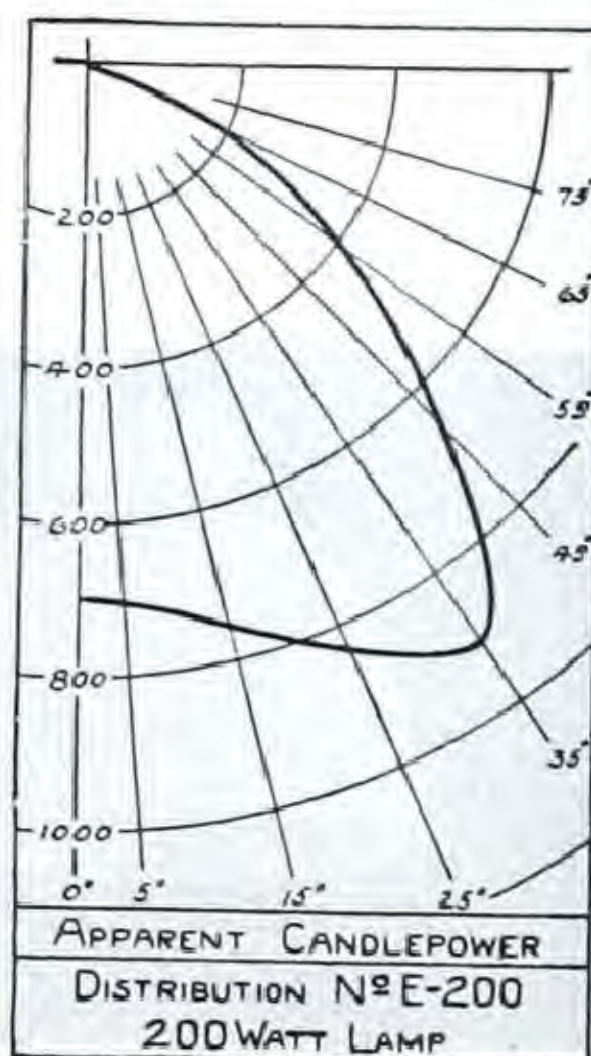
Dimensions—Height $6\frac{1}{4}$ ". Diameter $8\frac{1}{2}$ ".
Standard package—28. Weight, approx. 56 lbs.
Standard carton—7.

List Price—each..... \$3.75

No. E-200



No. E-200



Companion to No. E-75. Adapter No. 1256 supplied.
Flush Mounting Ring—No. 54.

Lamp—200 watt PS-30, Adapter extended; 150 watt PS-
25, Adapter compressed.

Holder— $2\frac{1}{4}$ ". Form "O."
Dimensions—Height $9\frac{3}{8}$ ". Diameter $9\frac{1}{2}$ ".
Standard package—28. Weight, approx. 82 lbs.
Standard carton—7.

List Price—each..... \$4.80

INDOOR DISPLAY-SPOTS



No. 420

For 100 Watt or 150 Watt Lamp



No. 421

For 200 Watt Lamp

Display-Spots are indoor spotlights, primarily designed
show window lighting, but have many other applications
such as the lighting of display pieces in stores and like
objects.

They have a spun aluminum reflector, equipped with a
porcelain receptacle, and provided with a combination adjustable
base and bracket, designed to permit the unit to stand on
fasten to flat surfaces. They can be placed on the floor
mounted on the ceiling or sidewall and adjusted for directing
the light from any desired angle.

Finished outside in Satin Brown, and the inside of the
reflector is oxidized aluminum.

Three gelatine color discs (green, red and amber), together
with six feet of heater cord and an attachment plug, are
provided with each Display-Spot.

List No.	Description	Std. Pkg.	Weight Lbs., Std. Pkg.	List Price Each
420	For 100 watt or 150 watt lamp	6	30	\$5.
421	For 200 watt Lamp.....	6	32	7.

Individually packed.

Whatever your problem may be in
Commercial, Industrial, Church, School
or even Street Lighting, you will find in
this catalogue a representative selection of
the best and latest in Lighting Equipment
to choose from.

Experienced Lighting Specialists are
located at our many distributing centers,
alert to assist you and your electrical
engineers with your lighting problems.
We want you to take full advantage of
their services.

PERMAFLECTOR WINDO-FLOODS

WINDO-FLOOD No. 100

Reflector 6 $\frac{3}{4}$ " diameter; height overall including bracket, 10 $\frac{1}{2}$ ".

Lamp: 100 watt A-23.

Standard Package.....8

Furnished complete, without lamp, including 30" of cord and plug.

List Price.....\$7.00

Reflector only.....\$3.00

No. I-60

Reflector used with WF-100



No. WF-100

WINDO-FLOOD No. 200

Same as Windo-Spot No. 200, excepting reflector has a different design, giving wider distribution of light, with less intense central spot.

Reflector 9 $\frac{1}{8}$ " diameter; height overall including bracket, 11 $\frac{1}{4}$ ".

Lamp: 200 watt PS-30 must be used.

Standard Package.....8

Complete, excepting lamp, and including 30" of cord with plug.

List Price.....10.00

Reflectors only (I-201).....6.25

No. I-201-A

Same reflector as used with the Windo-Flood is furnished equipped with adapter for attaching to Conduit No. 1 or 2 $\frac{1}{4}$ " O shade holder. Good for certain applications in high shallow windows.

List Price (including Adapter No. 1256).....\$9.35



No. WF-200

WINDO-FLOOD No. 500

Similar to Windo-Spot No. 500, excepting reflector is of different design, to throw a broad flood of light rather than a spot of light.

Lamp: 300 watt PS-35; 500 watt PS-40.

Height overall including bracket...18"

Diameter of Permaflector.....11 $\frac{1}{8}$ "

Standard Package.....1

List Price: Complete as shown, without lamp, including 30" of cord and attachment plug.....\$20.50

Reflector only.....\$9.35



No. WF-500

No. E-500

Same reflector as used with Windo-Flood No. 500.

PERMAFLECTOR SPILL SHIELDS

For the purpose of eliminating the spill light of the Windo-Spot reflectors, without interference with the beam of light.

Consists of spun metal ring and metal cup supported on tripod as shown. Suspended by means of springs same as Colorlites.

Colorlite Roundels may also be used.



No. SS-200

List Prices—

Spill Shield SS-100 (for use with Windo-Spot WS-100).....\$4.25

For colored lighting use 8 in. diameter (red, amber, green, blue).....Extra 2.40

Spill Shield SS-200 (for use with Windo-Spot WS-200).....5.55

For colored lighting use 9 $\frac{1}{8}$ in. diameter (red, amber, green, blue).....Extra 2.40

Spill Shield SS-300 (for use with Windo-Spot WS-300).....6.80

For colored lighting use 10 $\frac{3}{4}$ in. diameter (red, amber, green, blue).....Extra 6.80

Spill Shield SS-500 (for use with Windo-Spot WS-500).....7.65

For colored lighting use 13 in. diameter (red, amber, green, blue).....Extra 12.75

PERMAFLECTOR WINDO-SPOTS

These provide an effective method of high lighting with clear or colored light portions of the window display to which particular attention should be drawn.

WINDO-SPOT No. 100

Reflector 8 $\frac{1}{8}$ " diameter; height overall including bracket 11".

Lamp: 100 watt A-23 only.

Standard Package.....8

Complete, excepting lamp, including 30" of cord and plug.

List Price.....\$7.70

Reflector only.....\$3.60

No. C-100

Reflector only, used in Windo-Spot No. 100.

List Price.....\$3.00



No. WS-100

WINDO-SPOT No. 200

Reflector 10" diameter; height overall including bracket 13 $\frac{1}{2}$ ".

Lamp: 200 watt PS-30 must be used.

Standard Package.....8

Furnished complete, excepting lamp, and including 30" of cord and plug.

List Price: Each.....\$10.00

Reflector only, (C-201) Price. \$6.25

No. C-201-A

Same reflector as used with Windo-Spot No. 200 is furnished equipped with adapter for attaching to conduit No. 1 or 2 $\frac{1}{4}$ " O shade holder. Good for certain applications in very high and shallow windows.

List Price (including Adapter No. 1256).....\$9.35



No. WS-200

WINDO-SPOT No. 300

Reflector 11 $\frac{1}{2}$ " diameter; height overall including bracket 13 $\frac{3}{4}$ ".

Lamp: 300 watt PS-35.

Standard Package.....8

Furnished complete as shown, without lamp, including 30" of cord and plug.

List Price.....\$14.50

Reflector only (C-300).....\$8.75

No. C-300-A

Same reflector as used with Windo-Spot No. 300 is also furnished for lighting certain high shallow show windows having low trim, as follows:

No. C-300 (no holder and fittings).....\$11.90

No. C-300-A (includes reflector, mogul socket, 4" box cover and Holder No. 12-A).....\$17.00

No. C-300-B (includes reflector, mogul socket, Holder No. 12-A and Box KO-11).....\$17.00



No. WS-300

WINDO-SPOT No. 500

Reflector 13 $\frac{1}{2}$ " diameter; height overall including bracket.....18"

Furnished complete, as shown, without lamp and including 30" of cord and attachment plug.

Lamp: 300 watt PS-35; 500 watt PS-40.

Standard Package.....1

List Price: Each.....\$22.00

Reflector only, (C-500) Price 12.00

No. C-500-A

Same reflector as used with Windo-Spot No. 500 is also furnished for lighting certain high shallow windows where very high intensity is required, as follows:

No. C-500 (no holder and fittings).....\$13.05

No. C-500-A (includes reflector, mogul socket, 4" box cover and "M" holder).....19.55

No. C-500-B (includes reflector, mogul socket, Box KO-11 and "M" holder).....19.55



No. WS-500

PORTABLE BASE

For use with Windo-Spot or Windo-Flood.

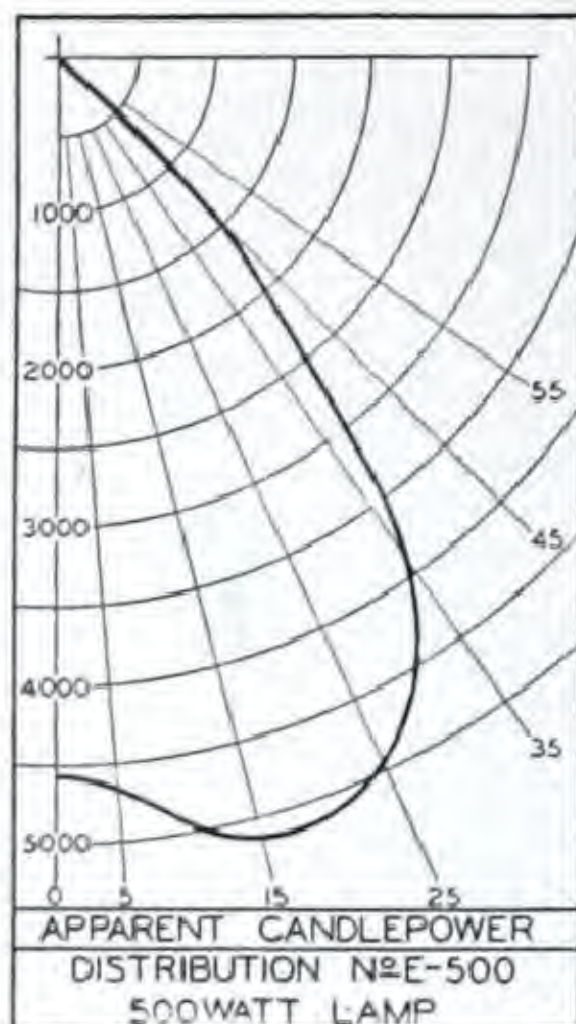
Cast iron, 8" diameter.

List Price: Each.....\$2.15



PERMAFLECTORS For Industrial Lighting

No. E-500



No. E-500

Distributing type intended for intermediate mounting high intensity industrial service; mounting 12 to 25 feet above the work plane; for the lighting of gymnasiums; and for flush mounting in ceiling in combination with Hinged Ceiling Roundel No. 2.

Also useful for installation in Gothic and other designs of lanterns, in churches and public buildings.

Flush Mounting Ring—No. E-500.

Hinged Ceiling Roundel—Special.

Lamp—300-500 watt, clear or bowl frosted.

Holder—Form "M," with Mogul Socket and 4-in. round outlet box cover.

Dimensions—

Glass, height..... $9\frac{1}{8}$ in.

Glass, diameter..... $11\frac{7}{8}$ in.

Overall height, including 4-in. outlet box..... 14 in.

Standard package—8. Weight, approx. 74 lbs.

Standard Carton—1.

List Price—Complete as shown..... \$13.50

List Price—Glass only..... 9.50

No. E-500-B.

To attach to $\frac{1}{2}$ -in. Conduit Stem: Without extra charge No. E-500 will be furnished equipped with Box No. KO-11, Mogul Socket and Form "M" holder. When so ordered specify as No. E-500-B.

HINGED CEILING ROUNDELS

No. 1—Diameter 10 in. Includes stippled glass roundel. For use with Permalectors Nos. 55, 110, E-100 and I-75.

The E-100, when used with Ceiling Roundel No. 1 may be used with 200-watt lamp if attached to LC holder.

No. 2—Diameter $13\frac{3}{4}$ in. Includes heat resisting stippled glass roundel. For use with Permalector No. E-500.

No. 3—Diameter $19\frac{1}{2}$ in. Includes heat resisting stippled glass roundel. For use with Permalector No. I-1000 or B-1001.

No. 5—Diameter $6\frac{1}{2}$ in. Includes stippled glass roundel. For use with I-25 or E-25-A Permalectors.

List Prices

No. 1—Complete.....	\$7.75
No. 1—Glass only ($8\frac{3}{8}$ in. diam.).....	2.75
No. 1—Band only.....	6.80
No. 2—Complete*.....	20.00
No. 2—Glass only (12 in. diam.).....	12.00
No. 2—Band only.....	11.05
For heavy wire guard attached to hinged member add. \$4.00	
No. 3—Complete.....	\$37.40
No. 3—Glass only ($15\frac{3}{4}$ in. diam.).....	18.70
No. 3—Band only.....	18.70
No. 5—Complete.....	3.00
No. 5—Glass only ($4\frac{3}{8}$ in. diam.).....	.90
No. 5—Band only.....	2.55



Hinged Ceiling Roundel

PERMAFLECTOR COLOR-LITES

The Color-Lite is an auxiliary to the Windo-Spot, Win Flood and other Permalectors, providing color mediums either gelatin films or glass.

COLOR-LITE No. 1

Standard Package.....

List Price: Each, including one gelatin sheet each of red, blue, green and amber. \$2.00
Gelatin Circles only, Ea. 0.50
For use with reflectors Nos. 100, 54, I-100, I-200, C-201, E-200, E-225, Win Flood Spot No. 200, Windo-Flood No. 200.



Color-Lite No. 1

COLOR-LITE No. 2

Color medium is glass. Fits same Permalector as No. 1. Colors red, blue, green and amber.

List Price: Including color of glass..... \$3.00

Glass Roundels only, Each..... \$2.00



Color-Lite No. 2

COLOR-LITE No. 2-DBX

Consists of hinged metal frame supported from hush WS-200 or WF-200 by three metal straps and equipped with stippled daylight roundel.

List Price: Each, including daylight blue glass roundel \$7.00

COLOR-LITE No. 5

Similar to No. 1, for use with Permalectors Nos. 100, 55, C-100, C-101, E-100, I-75 and Windo-Spot No. 100.

List Price: Each..... \$2.00

Gelatin Circles only, Each..... \$0.50

COLOR-LITE No. 7

Similar to No. 1, but larger, for use with Permalectors Nos. 500, 555, C-500 and Windo-Spot No. 500.

List Price: Each, including one gelatin sheet each of red, blue, green and amber..... \$5.00

Gelatin Circles only, Each..... \$0.50

COLOR-LITE No. 9

Gelatin Color-Lite for Windo-Spot No. 300; similar to Color-Lite No. 1. Diameter $11\frac{3}{4}$ in.

List Price: Each, including one gelatin sheet each of red, blue, green and amber..... \$3.00

Gelatin Circles only, Each..... \$0.50

COLOR-LITE No. 10

Glass Color-Lite for Windo-Spot No. 300; similar to Color-Lite No. 2. Diameter $11\frac{3}{4}$ in.

List Price: Each, including one color of glass..... \$8.00

Glass Roundels only, Each..... \$6.00

HEAT RESISTING SQUARE GLASS PLATES— (UNCOLORED)

Plate No.	Size in Inches	Description	List Price
1*	$13\frac{5}{8}$ square	Stippled inside	\$17.00
2*	$13\frac{5}{8}$ square	60° spread, ribbed inside	17.00
3*	$17\frac{7}{8}$ square	Stippled inside	25.00
4*	11 square	Stippled inside	9.00
5*	$10\frac{1}{2}$ square	Stippled inside	8.00
6*	$8\frac{1}{2}$ square	Stippled inside	5.00
7*	7 square	Stippled inside	4.00
8*	$9\frac{1}{4}$ square	Stippled inside	7.00

*Available in colors (red, amber, green, blue) on special orders of 25 plates or more of any one size and color. This day delivery.

PERMAFLECTORS

FLUSH MOUNTING

For convenience in making flush mounting installations, Pittsburgh Outlet Box Cover Assemblies, to which the Adapters of holders of the Permaflectors are directly attached, are used. It will be noted that Permaflectors No. 100, No. 110 and No. 500 are cut off at an oblique angle. To successfully set these Permaflectors flush, it is necessary to construct the ceiling with a dip towards the plate glass at the same angle.

When flush mounting Permaflectors it is necessary that the opening in the ceiling be cut to the proper size. Upon request a templet or drawing for cutting the opening will be supplied.

For high wattages in confined spaces it may be desirable to provide ventilation to prevent abnormal temperatures.

FLUSH MOUNTING RINGS



No. 500



No. 55

Flush Ring No.	For Permaffector No.	Min. spacing on centers, inches	Diam. of hole in ceiling, inches	List Price
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CIRCULAR

28*	28; E-26	7½	5¾	\$0.60
54*	54; E-200; E-225; D-200	12	9¾	.90
55*	55; 110; E-100; I-75	10½	8¾	.60
555*	555	15	12¾	1.30
C-100	C-100; C-101	10¾	8¾	.60
C-200	C-200	12	10¼	1.30
C-201	2-201; I-201; I-100	12	10¼	.90
E-500	E-500	15	12¼	3.00
I-25	I-25; E-25-A	6	4¾	.40
I-60	I-60; E-75	8½	7	.50
I-1000	I-1000	24	16¼	4.25

NON-CIRCULAR

100	100	11	Templet free on request	1.50
500**	500	15		3.50

*Blueprint free on request, showing how to locate centers.

**Blueprint free on request, shows exact size to cut hole in ceiling.

***Furnished with wire mesh guard at \$7.65.

PERMAFLECTORS

Holders

Form "O" and Form "H" Holders are common to the trade and may be had at any electrical store or jobber. These holders are not a part of the Permaffector line, but we supply them as a matter of accommodation.



No. OB

FORM "O" (LOW) HOLDER, 2¼ IN.
No. OB—The Uno Holder for brass shell, threaded sockets.

List Price—Each \$0.21



No. OP

No. OP—Weatherproof for porcelain sockets with holder grooves.

List Price—Each \$0.45



No. S

No. S—For Sockets No. 1 or 3 or Assemblies Nos. B-1 or B-2.

List Price—Each \$0.30

FORM "O" (LOW) HOLDER, 3¼ IN.
No. S-3¼—Similar to No. S.
List Price—Each \$0.85



No. HB

FORM "H" (HIGH) HOLDER, 2¼ IN.
No. HB—The Uno Holder, for brass shell, threaded sockets.

List Price—Each \$0.55



No. HP

No. HP—Weatherproof, for porcelain sockets with holder grooves.

List Price—Each \$0.65



No. L

No. L—For Sockets Nos. 1 or 3, Assemblies Nos. B-1 or B-2.

List Price—Each \$0.45



No. 810

No. LC—Same as No. L, excepting it is ¼ in. longer.

List Price—Each \$0.45

No. LCA—Same as L, excepting it is 5/8 in. longer.

List Price—Each \$0.45

ADAPTER No. 810

Combines functions of former No. 8 and No. 10 holders. In compressed position, for use with B-508, with B-3 Assembly or No. 6 Conduit.

In extended position, for use with Permaffector No. 54 and 300-watt PS-35 lamp for indirect lighting service only as in wall urns.

List Price—Each \$2.15



No. 12A

HOLDER No. 12-A

For use with No. 300 and C-300 on B-3 Assembly or No. 6 Conduit. Socket goes inside of holder.

List Price—Each \$3.40



No. M

FORM "M" HOLDER

Form "M" Holder is a 4-in. safety holder for use with Mogul Socket No. 4 and Permaffector Nos. 500, 555, C-500, E-500, I-505 and B-1001.

List Price—Each \$2.15



No. M-3

FORM M-3 HOLDER

Form M-3 holder is a 4-inch safety holder for use with Mogul Socket No. 4 and Permaffector B-1001.

List Price—Each \$2.15

PERMAFLECTOR KNOCK OUT STRIP



No. KO-1. Furnished in 10-foot Lengths with Knock Outs 3 inches on Centers

KNOCK OUT STRIP

Permaflexor Knock Out Strip is wiring duct or conduit for unit assembly of reflector type illumination equipment. Provides a time and money-saving method of installation in show windows and for many other applications. May be used with any standard reflector and shade holder.

It consists of two main parts; the face and the back. The face is provided with suitably shaped knock-outs spaced three inches on centers, providing for quick installation of sockets on any desired spacing. The back fits closely over the face covering three sides of the strip, assuring ample protection to the wiring.

The square shape of Knock Out Strip is a new idea in wiring duct construction. With Knock Out Joint No. KO-4, it is now possible to turn corners vertically as well as horizontally.

Requires no bending, drilling or punching and a minimum of cutting on the job. Hack-saw and screw-driver are the only tools required.

Material is corrosion-proof and finished in standard Permaflexor silver coloured satin finish.

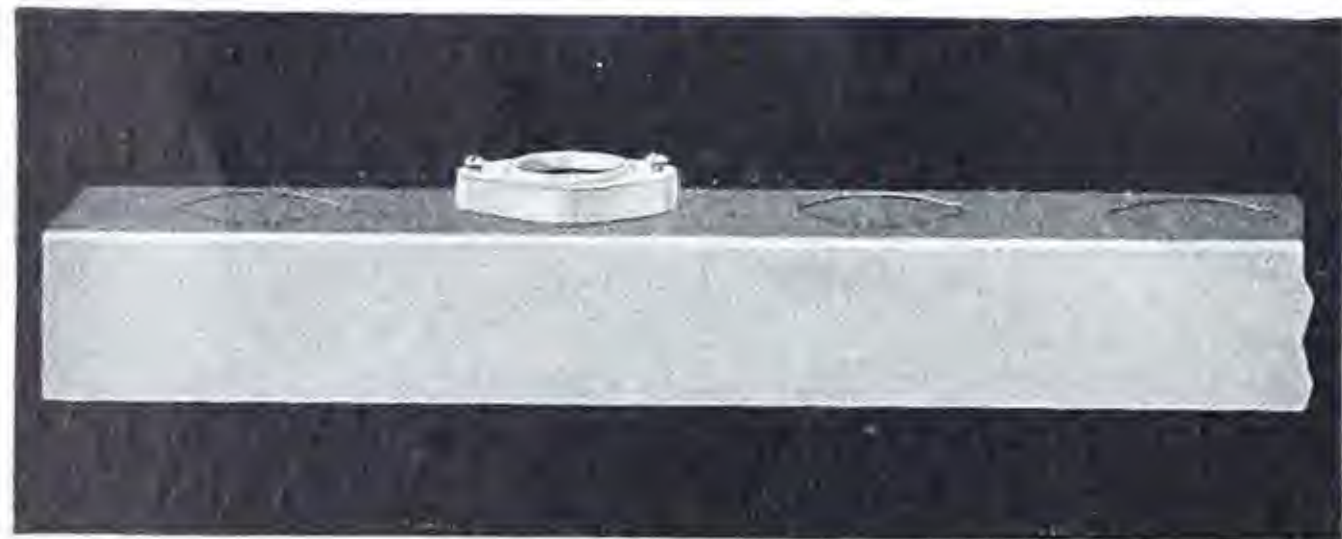
Permaflexor Knock Out Strip is furnished in standard ten-foot lengths.

Size—1-27/32" square.

Standard package—Ten 10-ft. lengths.

Weight—141 lbs.

List Price—Per foot..... \$0.85



Knock Out Socket Inserted in Knock Out Strip

The screws for attaching the Permaflexor Adapter or shade holder when tightened engage the slots in the Knock Out Strip, thus locking the socket firmly in position. The wiring is easy and simple; the back member being off, the binding screws in the sockets are exposed, convenient for quick wiring. Weight of reflector carried on lugs of socket.

KNOCK OUT SOCKET

Permaflexor Knock Out Socket is a porcelain medium screw socket especially designed for Knock Out Strip. It has no springs or other parts to get out of order. Merely insert socket in knock-out opening and turn. The socket can be inserted in only one position, thus automatically fixing the polarity and lining up the conductor connections.

Standard package—100.

Weight—21 lbs.

List Price—each..... \$0.50



Socket No. KO-8

PERMAFLECTORS

TO ATTACH ADAPTERS

Loosen the two screws in socket. Place large holes of openings in rim of adapter over the screw heads, and turn slightly so that screw heads engage in smaller portion of the openings. Then tighten screws (screw heads are then within the adapter).



Do not attempt to assemble by putting the receptacle inside the adapter. The "S" Holder and the Knock Out Fitter No. KO-9 are attached in same manner as adapters.

KNOCK OUT FITTER

Provides shade holder groove for attaching any standard holder. It is attached in same manner as adapters.

Standard Package.....25

Weight.....1 lb.

Price—Each..... \$0.50



Fitter No. KO-9

KNOCK OUT COUPLING

Permaflexor Knock Out Coupling is used for joining together lengths of Knock Out Strip. It is fixed in position by means of set screws.

Standard Package.....10

Weight.....7 lbs.

Price—Each..... \$0.70



Coupling No. KO-3

KNOCK OUT END

Permaflexor Knock Out End is used at the end of Knock Out Strip. It is provided with a knock-out for standard 3/4-in. conduit or BX connector. It is held fixed by set screws furnished.

Standard Package.....10

Weight.....4 1/2 lbs.

Price—Each..... \$0.50



End No. KO-2

KNOCK OUT JOINT

Permaflexor Knock Out Joint slips over the Knock Out Strip and is fixed in place by the set screws. Permits any angle to be made between adjacent sections of Knock Out Strip from 65 to 180 degrees, inclusive. Being square it is reversible on the Knock Out Strip.

Standard Package....8

Price—Each..... \$2.55



Joint No. KO-4

Weight.....14 lbs.

PERMAFLECTORS
KNOCK OUT BOX



Box No. KO-11

Method of wiring for 500-watt equipment.
Standard Package, 10; Weight, 7 lbs.
List Price—Each..... \$1.70

KNOCK OUT HUB



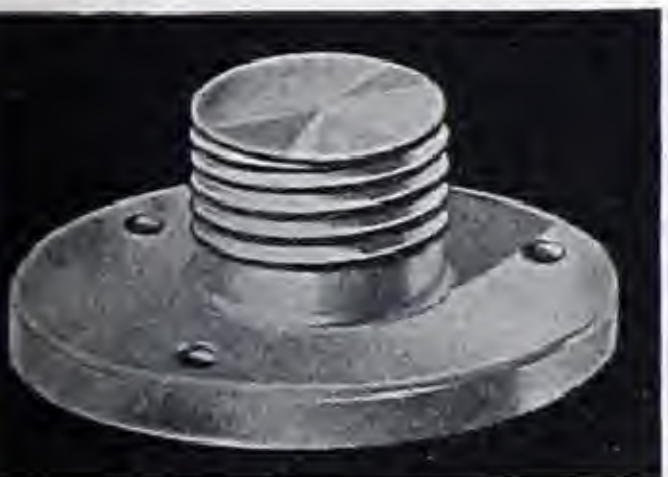
Hub No. KO-10

Attaches to 1/2-in. conduit stem hanger or nipple. Accommodates Mogul Socket No. 4 and Holder M, as used with Permaflectors No. 500, 555, E-500 and I-505. In combination with Knock Out Strip, Knock Out Hub No. KO-10, 1/2-in. nipple or hanger, provides the convenient

Fits into knock out in face of Strip and is fixed in position by two screws. Permits attachment of 500-watt reflector equipment supported on 1/2-in. conduit stems. Makes it possible to enter face of Strip at any convenient point either with 1/2-in. rigid conduit, cord and 1/2-in. porcelain bushing or armored cable and 1/2-in. cable connector. Particularly useful for flush mounting window lighting installations, where connection from wiring duct to individual reflectors is made by means of armored cable.

Standard Package, 10; Weight, 3 lbs.
List Price—Each \$0.85

KNOCK OUT FLANGE



Flange No. KO-12

Screws into Hub No. KO-10. Flange provides base for support of Permaflector Windo-Spots and Floods. Three No. 8/32 machine screws furnished for fastening spot and flood bases in position.

Standard Package, 10; Weight, 2 1/2 lbs.
List Price—Each \$0.85

KNOCK OUT U-STRAP



U-Strap No. KO-7

Permaflector Knock Out U-Strap is designed for surface mounting of Knock Out Strip. It fits neatly around the Knock Out Strip. Use No. 9 wood screw for fastening in position.

Standard Package, 10; weight, 2 lbs.
List Price..... Each \$0.25

KNOCK OUT BRACKET



Bracket No. KO-5

Permaflector Knock Out Bracket is designed for supporting Knock Out Strip from the transom bar, or other vertical surfaces. A set screw furnished in the Knock Out Bracket fixes the Knock Out Strip in position. Use No. 9 wood screw for fastening in position.

Standard Package.....6
Weight.....9 lbs.
List Price—Each.....\$0.70

PERMAFLECTORS

KNOCK-OUT SPLICE BOX—
No. KO-14

Permaflector Knockout Splice Box is used at the end of Knockout Strip instead of End KO-2, where it is desired to enter with more than one conduit or armored cable. It has removable cover for access to box when splicing wires; and has 3/4-in. knockout in bottom and in end and two 1/2-in. Knockouts in each side.

Standard Package.....8
Weight.....9 lbs.
List Price—Each.....\$2.15

KNOCK OUT HANGER

Permaflector Knock Out Hanger is used for supporting Knock Out Strip at a distance below the ceiling. It is adjustable from 20 to 37 inches and if legs are cut with hack-saw at desired points, can be used for shorter suspension than 20 inches. A set screw fixes Knock Out Strip in position. Use No. 9 wood screws for fastening in position.

Standard package.....6
Weight.....15 lbs.
List Price—Each.....\$1.70



Hanger No. KO-6

PERMAFLECTOR

Heat-Resisting Cover Glasses



Clear



Stippled



Spread

Size	Type	Description	List Price
8"	C	Clear	\$ 4.10
8"	ST	Stippled	4.10
9 7/16"	C	Clear	8.50
9 7/16"	ST	Stippled	8.50
9 7/16"	SP	Spread	8.50
11 1/4"	C	Clear	10.20
11 1/4"	ST	Stippled	10.20
11 1/4"	SP	Spread	10.20
12"	C	Clear	11.50
12"	ST	Stippled	11.50
12"	SP	Spread	11.50
13 3/4"	C	Clear	13.60
13 3/4"	ST	Stippled	13.60
13 3/4"	SP	Spread	13.60
16 3/4"	C	Clear	25.50
16 3/4"	ST	Stippled	25.50
16 3/4"	SP	Spread	25.50
18 3/4"	C	Clear	29.75
18 3/4"	ST	Stippled	29.75
18 3/4"	SP	Spread	29.75

PERMAFLECTORS

For Indirect Luminaires

(Lamps Burning Base Up)

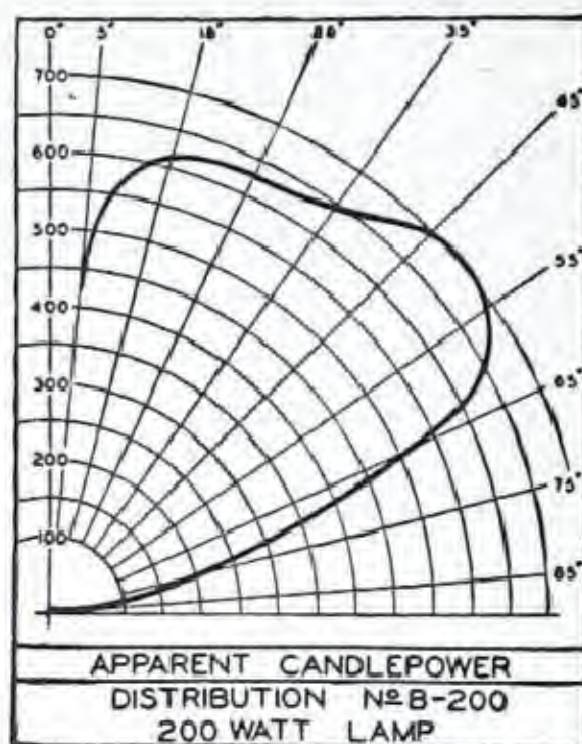
The Permaflectors are designed for use in indirect luminaires, lamps hanging pendant base up. The exterior surface of these Permaflectors is deeply cross-fluted, in order to provide a smooth distribution of light over the ceiling. The interior glass surface, however, is smooth which makes it easy to clean. There are no deep wrinkles in the glass surface in which dust and dirt may lodge.

The light distribution is very broad thus covering a large ceiling area with a single unit, smoothly and uniformly graded without sharp cut-off.

PERMAFLECTOR No. B-200



No. B-200



Application.—For use in opaque bowl, indirect luminaires such as our Luminaire B-2-P.

Lamps.—200 watt PS-30, 150 watt PS-25, 100-watt A-23. Preferably use inside frosted lamps. To produce light distribution indicated by curve, center contact of base of 200-watt lamp must be $4\frac{7}{8}$ in. above top rim of Permaflector B-200.

Dimensions—Diameter $9\frac{1}{2}$ ". Depth $4\frac{3}{4}$ ".

Standard package—40. Weight, approx. 60 lbs.

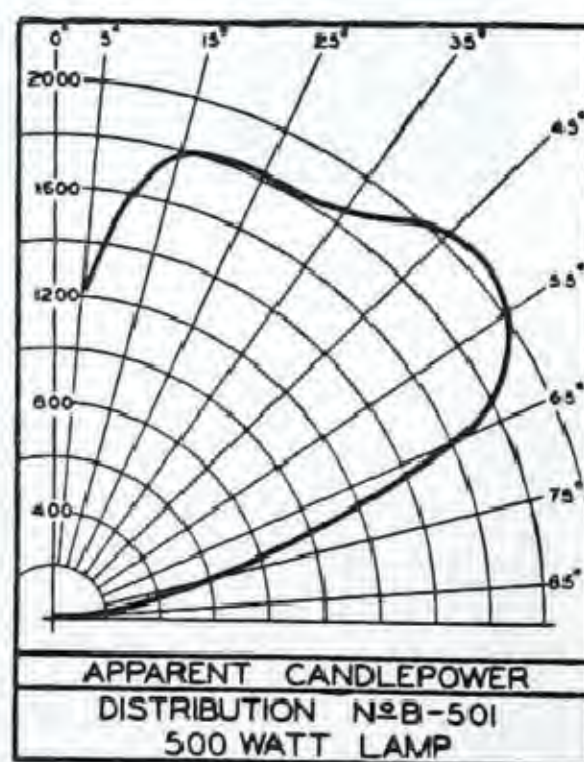
Standard carton—10. Weight, approx. 15 lbs.

List Price—each..... \$5.70

PERMAFLECTOR No. B-501



No. B-501



Application.—For use in opaque bowl, indirect luminaires such as our Luminaire B-5-P.

Lamps.—500 watt PS-40, 300 watt PS-35. Preferably use inside frosted lamps. To produce light distribution indicated by curve, center contact of base of 500-watt lamp must be $5\frac{3}{8}$ in. above top rim of Permaflector B-501.

Dimensions—Diameter 12". Depth 6".

Standard package—14. Weight, approx. 56 lbs.

Standard carton—7. Weight, approx. 28 lbs.

List Price—each..... \$7.20

PERMAFLECTORS

Permaflectors for Urns, Floor and Table Lamps, Box Type Luminaires and Built-in Indirect Lighting Equipment.

PERMAFLECTOR No. B-208

Application—For indirect lighting service, lamps vertical base down position. Consists of Permaflector B-200, $3\frac{1}{4}$ in. deep outlet box and cover, socket and holder.

Lamps—200 watt PS-30. Unless a stippled cover glass be used over the Permaflector, we recommend the use of the inside frosted lamp.

Dimensions—Diameter $9\frac{1}{2}$ in. Overall depth $8\frac{3}{8}$ in.

Standard Package—40. Weight, approx. 84 lbs.

Standard Carton—10. Weight, approx. 21 lbs.

List Price—B-208 each (includes $3\frac{1}{4}$ in. box, cover, socket, holder)..... \$5.00

PERMAFLECTOR No. B-1001



No. B-1001

Application—For indirect lighting service, lamps vertical base down position. Consists of Permaflector, 4 in. deep box, cover, mogul socket and M-3 Holder.

Lamps — 1000 watt PS-52, 750 watt PS-52. Unless stippled cover glass be used over the Permaflector, we recommend the use of the inside frosted lamp.

Dimensions—Diameter 16 in. Overall depth $13\frac{5}{8}$ in.

Standard Package—8. Weight, approx. 80 lbs.

Standard Carton—1. Weight, approx. 10 lbs.

List Price—B-1001 each (consists of Permaflector, 4 in. box and cover, mogul socket and Holder M-3)..... \$23.45

List Price—B-1001-GO (reflector only)..... \$14.70

PERMAFLECTOR No. B-508

Application—For indirect lighting service, lamps vertical base down position. Consists of Permaflector, 4 in. deep outlet box, cover, mogul socket and Adapter No. 810.

Lamps—500 watt PS-40, 300 watt PS-35. Unless stippled cover glass be used over the Permaflector, we recommend the use of the inside frosted lamp.

Dimensions—Diameter 12 in. Overall depth $11\frac{1}{4}$ in.

Standard Package—14. Weight, approx. 80 lbs.

Standard Carton—7.

Weight, approx. 40 lbs.

List Price — B-508 (includes 4 in. outlet box cover, mogul socket and Adapter No. 810)..... \$13.45

List Price — B-508-GO (reflector only)..... \$7.20



No. B-508

HOLOPHANE WINDOW REFLECTORS



No. 916

This new Holophane Window Reflector is more efficient than any reflector on the market. This increase is due to a combination of new reflecting and refracting prism designs. This new reflector is most flexible in application. It can be exposed on the window ceiling or flush into any type of building construction. The bottom flange is horizontal so that no complicated ceiling construction is necessary for flushing-in. The required ceiling opening is circular which facilitates installation as compared with odd-shaped openings for other reflectors.

No. 916. For use with flat (2 1/4" Form "O") holder. The metal grooved neck provides a secure means of holding unit. Holder supplied with unit.

No. 913. For 1/2" pipe mounting.

No. 914. For outlet box mounting. The flange collar attaches directly to the ears of a 3 1/4" outlet box offering a simple and convenient means of support.

	Overall Diam.	Dimen. Depth	Lamp Wattage	List Price
.....	11"	9 1/8"	200 W	\$ 7.00
.....	11"	11 7/8"	200 W	10.50
.....	11"	11 1/4"	200 W	12.20



No. 963

No. 981-983

Use:

No. 963 for very high or shallow windows.

No. 981 and No. 983 for small and medium size, average windows. Also for enclosed back windows where the refinement of the anti-glare screen is unnecessary.

Spacing:

No. 963—12" on centres. May be spaced as close as 11". Recommended more than 18" apart.

No. 981—9" to 12" on centres. Never more than 18".

No. 983—12" on centres. Never more than 18".

Schedule "R" 2 1/4"—H Holder

	Std. Qty.	Wgt. Std. Pkg.	Dimensions Diam.	Height	Mazda Lamp	List Price Each
.....	8	23	10 5/8"	5 1/4"	100†-150	\$4.50
.....	30	60	8 1/2"	5"	100	3.00
.....	8	23	10 3/8"	6 1/2"	100†-150	4.50

Use 7/8" socket extension with 100 watt lamp or change to "O" Holder.

HOLOPHANE WINDOW REFLECTORS



No. 936 V.F.

The 936 has a velvet finish vertical diffusing screen which shields the eyes of those who stand in front of it when lighted. It is the most powerful light director for window displays, and gives illumination to the transparent sign or valance by transmitted light rays which other devices absorb.

For open and closed back windows, also for island windows.

Spacing:

12" to 15" on centres.

Schedule "R"
2 1/4" "O" Holder

List No.	Std. Qty.	Wgt. Std. Pkg.	Dimensions Diam.	Height	Mazda Lamp	List Price Each
936 V.F.	10	80	10"	8"	200	\$6.00



No. 944 V.F.
Completely Enclosing

Windows of refinement are especially suited by the illumination from, and appearance of, this light director. The window display is made clearly visible in thoroughly diffused illumination. A complete absence of all harsh unmodified rays. Exceptionally desirable for instance, in furniture display lighting.

For large windows with open or closed backs, and for island windows.

Spacing: 12" on centers.

Schedule "R"
2 1/4" "O" Holder

List No.	Std. Qty.	Wgt. Std. Pkg.	Dimensions Diam.	Height	Mazda Lamp	List Price Each
944 V.F.	8	90	10"	9 1/4"	200	\$10.50

Information on Colour Filters and Ceiling Flanges for all Window Reflectors supplied on request.

HOLOPHANE FIXTURES



Ceiling Type

Nos. CF-100, CF-200, CF-300

For ceilings not exceeding 12 feet high. (Except on ceilings with interfering beams use suspension type). Permanent depreciation is impossible. Temporary depreciation due to dust and dirt is at least 25 per cent less rapid than with any other indirect lighting fixture. Approximately 50 per cent of the light distribution is upward and 30 per cent downward, producing little or no contrast between the brightness of the unit and the lighted ceiling. The upward light is thrown off at wide angles so that there are no ceiling shadows or bright spots and no definite cut off on the ceiling.

Fixtures are heavy gauge brass, modern design, suitable for high class interiors. Standard finish bank bronze. Brush brass finished without extra charge on special orders. Fixtures complete with wire and socket.

We list and recommend the use of Holophane glassware with holophane hangers as complete units because that is the only method by which we can assure correct illumination.

Always use Holophane glass with Holophane fixtures to obtain best results.

Schedule "R" Discounts

Complete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wgt. Qt.	Dimensions Dia. Depth	Holder	Mazda Lamp	List Price Each
CF-100	0400	5	90	12"	14"	4" Special	100†-150	\$18.20
CF-200	7322	5	70	12"	10 1/2"	4"	200	24.90
CF-300	0401	4	24	9 1/4"	16 5/8"	5 1/2"	200	5.40
	7344	4	88	14"	13 5/8"	5 1/2"	300	19.50
	0402	3	18	9 1/4"	16 5/8"	5 1/2"	300	6.20
	7344	3	66	14"	13 5/8"	5 1/2"	300	19.50

HOLOPHANE FIXTURES



Suspension Type

Nos. F-100, F-200, F-300



No. C-1011, C-1211, C-1411



No. B-3354

Schedule "R" Discounts

Complete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wgt. Qt.	Dimensions Dia. Depth	Holder	Mazda Lamp	List Price Each
F-100	0380	5	91	12"	34"	4" Special	100†-150	\$19.20
	7322	5	70	12"	10 1/2"	4"	200	26.60
F-200	0381	4	114	14"	37"	5 1/2"	200	7.10
	7344	4	88	14"	13 5/8"	5 1/2"	300	19.50
F-300	0382	3	21	6"	24"	5 1/2"	300	27.40
	7344	3	66	14"	13 5/8"	5 1/2"	500	7.90
F-500-16"	0386*	2	110	16 1/2"	36"	Special Band	500	19.50
	7366	2	90	16"	16 1/4"	"	500	75.00
F-500-18"†	0383**	1	119	21 3/4"	48"	"	500	45.00
	7388	1	45	21 3/4"	32 1/2"	"	500	46.50
				74	18"	23"		45.00

Prices on special fixture finishes and rigid stem fixtures furnished on request.

†Use 7/8" socket extension with 100 watt lamp.

‡Has ornamental cast metal supporting ring at widest point of glass.

*Swivel Rod Suspension.

**Four Chain Suspension.

On special orders polished metal liners can be supplied instead of the standard white glass liners. Prices on application.

The C-1011, C-1211, C-1411, fixtures are made of heavy gauge brass, hinged to facilitate re-lamping.

Bank bronze finish. Wire is not included.

Beside the main socket there is an extra intermediate base socket for 10 watt night light service on separate circuit.

The units often present the only way to secure an efficiently controlled illumination under very low ceilings, such as mezzanines.

Spacing should not exceed twice the mounting height.

The B-3354 fixture is made of heavy gauge brass, bank bronze finish.

Schedule "R" Discounts

Complete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wgt. Qt.	Dimensions Dia. un-der Flge.	Depth	Mazda Lamp	List Price Each
C-1011	0310	3	60	13"	7 1/4"	7 1/4"	75-100	\$17.55
	1011	3	25	13"	2 5/8"	2 5/8"	150	14.20
C-1211	0312	3	35	10"	9 1/2"	4 3/4"	75-100	3.35
	1211	3	94	15 1/2"	8 5/8"	8 5/8"	150	25.20
	0314	3	29	15 1/2"	3 1/8"	3 1/8"	150	19.00
C-1411	1411	3	65	12"	11 1/2"	5 3/4"	200	6.20
	0314	3	108	18"	10 1/8"	10 1/8"	200	41.50
	1411	3	30	18"	3 5/8"	3 5/8"	200	28.40
B-3354	0373-B	20	78	14"	13 1/2"	6 3/4"	60-100	13.10
	3354	20	100	9"	11 1/4"	11 1/4"	60-100	7.55
		20	45	8"	5 5/8"	5 5/8"	60-100	5.20
		20	55	6"	6 1/4"	6 1/4"	60-100	2.35



"Realite"

The Holophane "Realite" (R-500 and R-1000) meets present day requirements for totally indirect lighting due to modernistic design, efficient operating qualities and flexibility of fixture treatment. Its ability to direct the light upward and upward at wide angles to the ceiling results in indirect illumination of exceptional quality. Cleaning is accomplished by simply wiping off the smooth outside of the glass refractor.

Complete Unit	Optical Assembly	Std. Qt.	Ship. Wgt. Qt.	Dimensions Diameter	Depth	Mazda Lamp	List Price Each
500	7180-A	4	92	24"	30"	300-500	\$44.00
	7190-A	4	80	11 1/4"	12 1/8"	300-500	28.00
		4	200	30"	42"	1000	66.00
	7190-A	4	110	14 1/4"	16 3/4"	1000	30.00

HOLOPHANE FIXTURES



No. C-2172

For corridors and industrial aisles. The effective illumination from these units is far greater than can be obtained from any symmetric lighting equipment in such locations. Fixture fits 3¼"–4" outlet boxes. Bank bronze finish.

Spacing not to exceed two and a half times the mounting height.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship Wgt. Std. Qt.	Dimensions Dia. Depth	Mazda Lamp	List Price Each
C-2172	....	....	8	75	9⅞" 12"	75†-100†-150	\$11.15
	0396	....	8	20	6" 4¾"		4.40
	....	2172	8	55	9⅞" 7½"	75†-100†-150	6.75

†Use ⅞" socket extension with 75 or 100 watt lamp.

Above Unit available with threaded fitter.



No. 02176

Use on spacings not exceeding 7 feet. Mount 7 feet from the floor.

For library book stacks, stock bins and similar places.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship Wgt. Std. Qt.	Dimensions Dia. Depth	Mazda Lamp	List Price Each
02176	....	....	8	73	9⅞" 6¾"	60	\$8.35
	0366	....	8	18	5⅞" 1"		1.60
	....	2176	8	55	9⅞" 6½"	60	6.75

Above unit available with threaded fitter.

Note:

Write for booklet No. 1000 on Holophane Specifications for Library Bookstacks, Record Vaults and Similar Locations.

HOLOPHANE FIXTURES

Nos. 681-AL, 690-AL,
691-ALNos. 622-AL, 652-AL,
692-AL

These heavy duty Industrial units are designed to give maximum downward illumination and are specially intended for mounting high above the work.

The 681-AL and 691-AL are for all High Bay locations—that is where the mounting above work equals or exceeds the spacing distance.

The 690-AL is for High Bay locations where the spacing less than the mounting height.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship Wgt. Std. Qt.	Dimensions Dia. Depth	Mazda Lamp	Pri Eac
681-AL*	....	....	5	105	15¾" 20⅞"	300-500	\$21.
	0673	....	5	40	15¾" 20⅞"		6.
	....	6681-AL	5	83	15⅞" 7⅞"	300-500	15.
690-AL	....	....	3	150	22" 27½"	750-1000-1500	42.
	0675	....	3	40	22" 27½"		14.
	....	6690-AL	3	110	21⅞" 11⅞"	750-1000-1500	27.
691-AL	....	....	4	155	19¾" 27"	500†-750-1000-1500	42.
	0674	....	4	40	19¾" 27"		14.
	....	6691-AL	4	115	19⅞" 9¾"	500†-750-1000-1500	27.

*681 can be furnished, clear glass minus aluminum cover at \$17.00 list.

†If 500 watt lamps are to be used specify for 500 watt. These units have an overall length of 27" when used with lamps larger than 500 watts. When set for 500 watt the depth is 24½".

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship Wgt. Std. Qt.	Dimensions Dia. Depth	Socket	Mazda Lamp	Li Ea
622x	....	....	94	12½"	20¼"	Medium	100-150-200	\$13.
	0671	....	25	12½"	20¼"	Medium		4.
	....	6522	69	11⅞"	6⅞"	Medium	100-150-200	8.
652x	....	....	101	13¼"	20⅞"	Mogul	200†-300-500	16.
	0672E	....	30	13¼"	20⅞"	Mogul		6.
	....	6552	71	12⅞"	7⅞"	Mogul	200†-300-500	10.
622-AL†	....	....	98	12½"	20¼"	Medium	100-150-200	17.
	0671	....	25	12½"	20¼"	Medium		4.
	....	6522-AL	73	11⅞"	6⅞"	Medium	100-150-200	13.
652-AL†	....	....	105	13¼"	20⅞"	Mogul	200†-300-500	21.
	0672E	....	30	13¼"	20⅞"	Mogul		6.
	....	6552-AL	75	12⅞"	7⅞"	Mogul	200†-300-500	15.
692-AL†	....	....	140	19¾"	27½"	Mogul	500-1500	42.
	0674E	....	35	19¾"	27½"	Mogul		14.
	....	6692-AL	105	19⅞"	10⅞"	Mogul	500-1500	27.

622x, 652x, 622-AL, 652-AL, Standard quantity 5.
692-AL, Standard quantity 3.

xThese units not supplied with aluminum cover.

†Complete with dust-tight aluminum cover spun permanently over reflector.

‡Socket adapter required to change from mogul to medium base lamp.

HOLOPHANE FIXTURES



No. 685 V.F.

This unit uses 200, 300 and 500 watt lamps and has been designed especially as a replacement unit to put new life in those parts of the plant where old, depreciated or obsolete types of reflector equipment are in use. Where a higher level of illumination is needed, but larger lamps cannot be used because of limited circuit capacity, it is especially applicable. The deep prismatic glass bowl is held rigidly between a socket cover and a supporting ring by three rods with knurled nuts. By unscrewing the nuts and lowering the bottom ring the glass is easily removed either for cleaning, or replacement. Unit has $\frac{1}{2}$ " female pipe thread fitting. Mogul socket is standard.

For best results the spacing should not exceed $1\frac{1}{2}$ times the mounting height above the work. However, enameled metal reflectors can be replaced by this new unit regardless of the spacing with no sacrifice in uniformity and a 30% gain in illumination can be expected.

For use on present outlets using condulets, outlet boxes or wiremold. An easy to attach aluminum cover can be put over the reflector when used in extremely dirty or hazardous locations.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions Diam. Depth	Mazda Lamp	List Price Each
685 V.F.	.....	.....	4	47	12 $\frac{1}{2}$ " 12 $\frac{3}{8}$ "	200*-300-500	\$10.35
.....	0685	.....	4	15	5 $\frac{3}{4}$ " 5 $\frac{1}{8}$"	.....	5.25
.....	.....	6585V.F.	4	32	12 $\frac{1}{2}$ " 7 $\frac{1}{4}$ "	200*-300-500	5.10

*Use mogul to medium adapter with 200 watt lamp.



No. 6484 V.F.

The No. 6484 is an extensive type industrial light director made of heavy pressed prismatic glass with reinforced flange at the bottom edge and terminating at the neck so as to accommodate a $3\frac{1}{4}$ " set screw fitter. The glassware is engaged by three heavy set screws with bevel ends to prevent backing out under vibration which is also insured by knurled head lock nuts. The fitter is of heavy gauge spun brass with a porcelain mogul socket terminating in $\frac{1}{2}$ " female pipe thread for pendant mounting on any $\frac{1}{2}$ " male pipe device or reinforced cord with $\frac{1}{2}$ " cord grips. The fitter finish is dull nickel.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions Diam. Depth	Mazda Lamp	List Price Each
6484V.F.	.....	.....	8	95	12" 12 $\frac{3}{8}$ "	300	\$8.65
.....	0650	.....	8	15	4 $\frac{5}{8}$ " 4 $\frac{1}{2}$"	.....	3.55
.....	.....	6488V.F.	8	80	12" 8 $\frac{1}{2}$ "	300	5.10

HOLOPHANE FIXTURES



No. 6531-6541



No. 6533-6543-6583



No. 671



No. 653-654

These units are usually recommended on ordinary factory ceiling heights up to but not exceeding 20 feet. The Nos. 653 and 654 series are made of heavy pressed prismatic glass with reinforced flange at the bottom edge. They are equipped with metal extension necks in three different types of construction to suit as many different wiring conditions. Units No. 653 and 654 are designed for mounting on any standard $2\frac{1}{4}$ " form "O" holder. Fixtures for Nos. 6531 and 6541 are designed for mounting on 4" outlet box. Fixtures for Nos. 6533, 6543 and 6583 are designed for use on $\frac{1}{2}$ " conduit or reinforced cord with $\frac{1}{2}$ " cord grips.

Nos. 6533, 6543 and 6583 have porcelain sockets with threaded neck and lock nut so that the entire socket assembly can easily be taken out of the fixture for wiring. Metal parts, dull nickel finish.

All of these units are particularly suitable for use in general factory lighting installations where the electric outlets are grouped to conform to the machinery arrangement. The maximum spacing for all reflectors should be $1\frac{1}{4}$ times the mounting height above work.

Com- plete Unit	Fix- ture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions Diam. Depth	Mazda Lamp	List Price Each
653*	.....	.....	8	42	9" 7 $\frac{1}{8}$ "	100†-150	\$3.20
.....	0936	.....	8	20	3 $\frac{3}{4}$ " 2 $\frac{1}{2}$"	.....	1.00
.....	.....	6573*	8	22	9" 5 $\frac{1}{8}$ "	100†-150	2.20
654*	.....	.....	6	48	10 $\frac{3}{8}$ " 8 $\frac{1}{2}$ "	200	4.15
.....	0936	.....	6	20	3 $\frac{3}{4}$ " 2 $\frac{1}{2}$"	.....	1.00
.....	.....	6575*	6	28	10 $\frac{3}{8}$ " 6 $\frac{1}{4}$ "	200	3.15
6531*	.....	.....	8	45	9" 9 $\frac{1}{2}$ "	100†-150	7.15
.....	0641	.....	8	23	4 $\frac{1}{2}$ " 4 $\frac{1}{2}$"	.....	4.95
.....	.....	6573*	8	22	9" 5 $\frac{1}{8}$ "	100†-150	2.20
6533*	.....	.....	8	42	9" 10 $\frac{1}{2}$ "	100†-150	5.95
.....	0643	.....	8	20	3 $\frac{3}{4}$ " 5 $\frac{3}{8}$"	.....	3.75
.....	.....	6573*	8	22	9" 5 $\frac{1}{8}$ "	100†-150	2.20
6541*	.....	.....	6	51	10 $\frac{3}{8}$ " 10 $\frac{5}{8}$ "	200	8.10
.....	0641	.....	6	23	4 $\frac{1}{2}$ " 4 $\frac{1}{2}$"	.....	4.95
.....	.....	6575*	6	28	10 $\frac{3}{8}$ " 6 $\frac{1}{4}$ "	200	3.15
6543*	.....	.....	6	48	10 $\frac{3}{8}$ " 11 $\frac{3}{4}$ "	200	6.90
.....	0643	.....	6	20	3 $\frac{3}{4}$ " 5 $\frac{3}{8}$"	.....	3.75
.....	.....	6575*	6	28	10 $\frac{3}{8}$ " 6 $\frac{1}{4}$ "	200	3.15
6583*	.....	.....	10	101	11 $\frac{3}{8}$ " 12 $\frac{1}{2}$ "	300	8.65
.....	0644	.....	10	23	3 $\frac{3}{4}$ " 6"	.....	4.60
.....	.....	6588*	10	78	11 $\frac{3}{8}$ " 6 $\frac{3}{4}$ "	300	4.05
671†	.....	.....	5	95	13 $\frac{1}{4}$ " 20 $\frac{5}{8}$ "	100-150-200	13.35
.....	0672	.....	5	15	13 $\frac{1}{4}$ " 20 $\frac{5}{8}$"	.....	4.45
.....	.....	6671†	5	80	12 $\frac{3}{8}$ " 6 $\frac{1}{4}$ "	100-150-200	8.90

†Standard finish—clear glass.

*Standard finish—velvet finish glass.

†Use $\frac{7}{8}$ " socket extension with 100 watt lamp.

Add \$4.55 to list price of No. 671 for aluminum cover.

HOLOPHANE FIXTURES



CSE—CSI—75—100—200

Regularly furnished velvet finish.

It is imperative that the proper holders be used with these light directors.

Extensive: Use where the spacing is not more than twice the mounting height above the working plane.

Intensive: Use where the spacing is not more than 1½ times the mounting height above the working plane.

Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions		Holder	Mazda Lamp	List Price Each
CSE-75	10	36	7½"	5½"	H-1	75-100	\$2.10
CSE-100	8	21	8½"	6"	H-1	100†-150	2.60
CSE-200	6	30	9¾"	7¾"	H-2	200	5.10
CSI-75	10	36	8"	5½"	H-1	75-100	2.10
CSI-100	8	21	8½"	6½"	H-1	100†-150	2.60
CSI-200	6	30	10½"	7¾"	H-2	200	5.10

No. 02470—02472—02476
For outdoor Railroad Platform useNo. 02470-S, 02472-S, 02476-S
For indoor use†No. 02470-BC, 02472-BC, 02476-BC
For indoor low ceiling use

Complete Unit	Fixture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions		Mazda Lamp	List Price Each
02470*	.....	.....	8	68	9 7/8"	10 1/2"	100†-150	\$13.50
.....	0234	.....	8	18	4 1/4"	3 1/8"	.....	5.10
.....	.....	2470	8	50	9 7/8"	8"	100†-150	8.40
02472*	.....	.....	8	68	9 7/8"	10"	100†-150	13.50
.....	0234	.....	8	18	4 1/4"	3 1/8"	.....	5.10
.....	.....	2472	8	50	9 7/8"	8"	100†-150	8.40
02476*	.....	.....	8	68	9 7/8"	9 7/8"	100†-150	12.60
.....	0234	.....	8	18	4 1/4"	3 1/8"	.....	5.10
.....	.....	2476	8	50	9 7/8"	7 1/8"	100†-150	7.50
02470-S	.....	.....	8	70	9 7/8"	10 3/4"	100†-150	11.40
.....	0362	.....	8	20	4 1/8"	3 5/8"	.....	3.00
.....	.....	2470	8	50	9 7/8"	8"	100†-150	8.40
02472-S	.....	.....	8	70	9 7/8"	10"	100†-150	11.40
.....	0362	.....	8	20	4 1/8"	3 5/8"	.....	3.00
.....	.....	2472	8	50	9 7/8"	8"	100†-150	8.40
02476-S	.....	.....	8	70	9 7/8"	9 1/2"	100†-150	10.50
.....	0362	.....	8	20	4 1/8"	3 5/8"	.....	3.00
.....	.....	2476	8	50	9 7/8"	7 1/8"	100†-150	7.50
02470-BC	.....	.....	8	65	9 7/8"	8 1/4"	100†-150	11.10
.....	0363-BC	.....	8	15	4 1/4"	1 1/8"	.....	2.70
02472-BC	.....	.....	8	50	9 7/8"	8"	100†-150	8.40
.....	0363-BC	.....	8	15	4 1/4"	1 1/8"	.....	2.70
.....	.....	2472	8	50	9 7/8"	8"	100†-150	8.40
02476-BC	.....	.....	8	65	9 7/8"	7 3/8"	100†-150	10.20
.....	0363-BC	.....	8	15	4 1/4"	1 1/8"	.....	2.70
.....	.....	2476	8	50	9 7/8"	7 1/8"	100†-150	7.50

†Use 7/8" socket extension with 100 watt lamp

*Vapor proof fittings.

†These units with box cover fitters are for use indoors where the head room is limited as in parking garages.

HOLOPHANE FIXTURES



No 02208



No. 02328



No. 02338

These globes provide a gas proof chamber for the lamp as well as serving as an extremely efficient lighting unit. The complete light director consists of a one piece heavy duty prismatic glass globe with threaded glass fitter which engages a cast aluminum holder for mounting on ½" conduit.

For Acid Rooms, Paint Shops, Electro-Plating and Pickling Departments, Oil Refineries, Powder Houses, and Grain Elevators.

Complete Unit	Fixture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions		Mazda Lamp	List Price Each
02208	.....	.....	20	110	6 3/8"	8 3/4"	40†-50-60	\$8.20
.....	0231	.....	20	35	3 5/8"	2 7/8"	.....	4.30
.....	.....	2208	20	75	6 3/8"	6 3/4"	40†-50-60	3.90
02328	.....	.....	8	63	8 1/16"	10 3/4"	100†-150	10.50
.....	0232	.....	8	20	4 3/4"	2 7/8"	.....	4.65
.....	.....	2328	8	43	8 1/16"	8 3/4"	100†-150	5.85
02338	.....	.....	4	77	10 3/8"	12 3/8"	200	17.20
.....	0233	.....	4	25	4 3/4"	4 3/4"	.....	5.45
.....	.....	2338	4	52	10 3/8"	8 3/8"	200	11.75

†Use 7/8" socket extension.

Use No. 02208 with maximum 60 watt lamp on spacing not exceeding two times the mounting height.

Use No. 02328 with maximum 150 watt lamp on spacing not exceeding two and a half times the mounting height.

Use No. 02338 with maximum 200 watt lamp on spacings not exceeding the mounting height.

Aluminum covers spun permanently over the reflectors can be supplied on any of these numbers at \$4.55 list.



No. 02486-S



No. 02490-S

Complete Unit	Fixture Only	Glass Only	Std. Qt.	Ship. Weight. Std. Qt.	Dimensions		Mazda Lamp	List Price Each
02486-S	4	60	12 1/4"	12 1/2"	300	\$19.70
.....	0369-E	.....	4	10	6 7/8"	3 7/8"	.....	4.50
.....	2486	4	50	12 1/4"	9 1/4"	300	15.20
02490-S	4	60	12 1/4"	13 3/8"	300	19.70
.....	4	10	6 7/8"	3 7/8"	.....	4.50
.....	2490	4	50	12 1/4"	10 1/4"	300	15.20
02490-JDW*	4	60	12 1/4"	13 3/8"	300	28.20

Aluminum covers can be spun on the No. 02486-S and 02490-S. Prices on request.

*Note: This unit consists of glass No. 2490 with an aluminum cover spun over the upper glass member and a blue glass lower member.

Space No. 02486-S on 8 foot centres along the centre line of the aisles. Mount 9 feet from floor to bottom of unit. The word "Aisle" marked on the bottom of the unit should be parallel with the aisle.

Space No. 02490-S on centres not greater than 1½ times the mounting height. For Hosiery Mills, Cigar Factories and special applications.

HOLOPHANE FIXTURES



No. 830—No. 832

No. 831—No. 833

Use No. 830 and No. 832 with 100 to 200 watt lamps for outdoor locations where a wide spread of light is required. (times the mounting height above the ground).

Use No. 831 with 100 or 150 watt lamp outdoors for wide road lighting (Gasoline Stations). No. 831 is complete with receptacle and fits directly on 4" or 3 1/4" outlet boxes.

Use No. 833 with 200 watt lamp and in same locations as No. 831.

Complete Unit	Fixture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions Diam. Depth	Mazda Lamp	List Price Each
830	0891	4337	8	49	7 1/2" 9 7/8"	100†-150	\$10.05
			8	22	7 1/2" 5 5/8"		4.80
			8	27	6 1/2" 5"	100†-150	5.25
832	0890	4334	8	58	8 1/2" 11 3/8"	200	13.00
			8	18	8 1/2" 6"		5.50
			8	40	7 1/2" 6 1/4"	200	7.50
831	0892	4337	8	43	7 5/8" 7 5/8"	100†-150	8.45
			8	16	7 5/8" 3 3/8"		3.20
			8	27	6 1/2" 5"	100†-150	5.25
833	0897	4334	8	62	8 3/4" 9 1/4"	200	12.50
			8	22	8 3/4" 3 1/2"		5.00
			8	40	7 1/2" 6 1/4"	200	7.50

†Use 7/8" socket extension with 100 watt lamp.



No. 0878
Bracket for mounting Nos.
043384, 043774.

Nos. 043384, 043774
(Symmetrical)
(Asymmetrical)

Scientifically designed for the lighting of outdoor substations. The main light is delivered to the underside of the superstructure and at the same time an adequate ground illumination is provided through the lower diffusing bowl. Fixture is made of cast aluminum with a 1 1/2" female pipe threaded connection.

This unit gives the maximum illumination upward to the superstructure, an adequate ground illumination, and the best heat dissipation.

Schedule "R" Discounts

Complete Unit	Fixture Only	Ground Light Diffuser	Refractor Only	Outer Globe Only	Ship. Wght. Std. Qt.	Dimensions Diam. Depth	Mazda Lamp	List Price Each
884	0873	7184			82	15" 18 1/2"	200†	\$60.10
					10	15" 8 1/2"		30.00
					*	11 1/2" 3 3/4"	300	6.00
					36	8 1/2" 7 7/8"		12.25
					36	12 1/4" 11 1/4"	500	11.85
74	0873	7184			82	15" 18 1/2"	200†	61.60
					10	15" 8 1/2"		30.00
					*	11 1/2" 3 3/4"	300	6.00
					36	8 1/2" 7 7/8"		13.75
					1245	36 12 1/4" 11 1/4"	500	11.85
					15	24" Span		12.60

†Bracket standard quantity, 4.

With 200-watt lamp use Mogul to Medium Base Adapter. Fixture and glass will be packed together in a carton.

HOLOPHANE FIXTURES



No. 04338
(Symmetric Light
Distribution)



No. 04177 V.F.
(Fan-shaped Light
Distribution)

No. 04377
(Fan-shaped Light
Distribution)

No. 04333
(Symmetric Light
Distribution)

These Holophane Yard Lighting units are heavy duty, outdoor, cast metal fixtures and Holophane double refractor globes in symmetric and asymmetric distributions. The fixture is dust tight, with adjustable socket position for different sizes of lamps or for varying the spread, and terminates in 1 1/2" female pipe thread connection. All exposed glass surfaces are smooth and dirt resisting.

Write for special bulletin "Lighting Specific for Industrial Yards."

Complete Unit	Fixture Only	Glass Only	Std. Qt.	Ship. Wght. Std. Qt.	Dimensions Dia. Depth	Mazda Lamp	List Price Each
04177V.F.†	0882	4177V.F.†	4	133	15" 21 3/4"	500	\$55.75
			4	45	15" 12 1/8"		31.00
			4	88	11 3/4" 11"	500	24.75
04333	0882	4333	4	165	15" 20 5/8"	500	52.00
			4	45	15" 12 1/8"		31.00
			4	120	11 3/4" 10"	500	21.00
04338	0881	4338	4	68	11 5/8" 16"	200†-300	33.25
			4	33	11 5/8" 9"		21.00
			4	35	8 1/2" 7 7/8"	200†-300	12.25
04376*	0881	4376*	4	69	11 5/8" 16"	200†-300	33.75
			4	33	11 5/8" 9"		21.00
			4	36	8 1/2" 7 7/8"	200†-300	12.75
04377†	0881	4377†	4	69	11 5/8" 16"	200†-300	34.75
			4	33	11 5/8" 9"		21.00
			4	36	8 1/2" 7 7/8"	200†-300	13.75

*Two way distribution.

†Fan shaped distribution.

†Socket adapter required to change from mogul to medium base lamp.

Note: These items are sold for Industrial Lighting only. Write for special prices on Street Lighting applications.

HOLOPHANE HOSPITAL FIXTURES

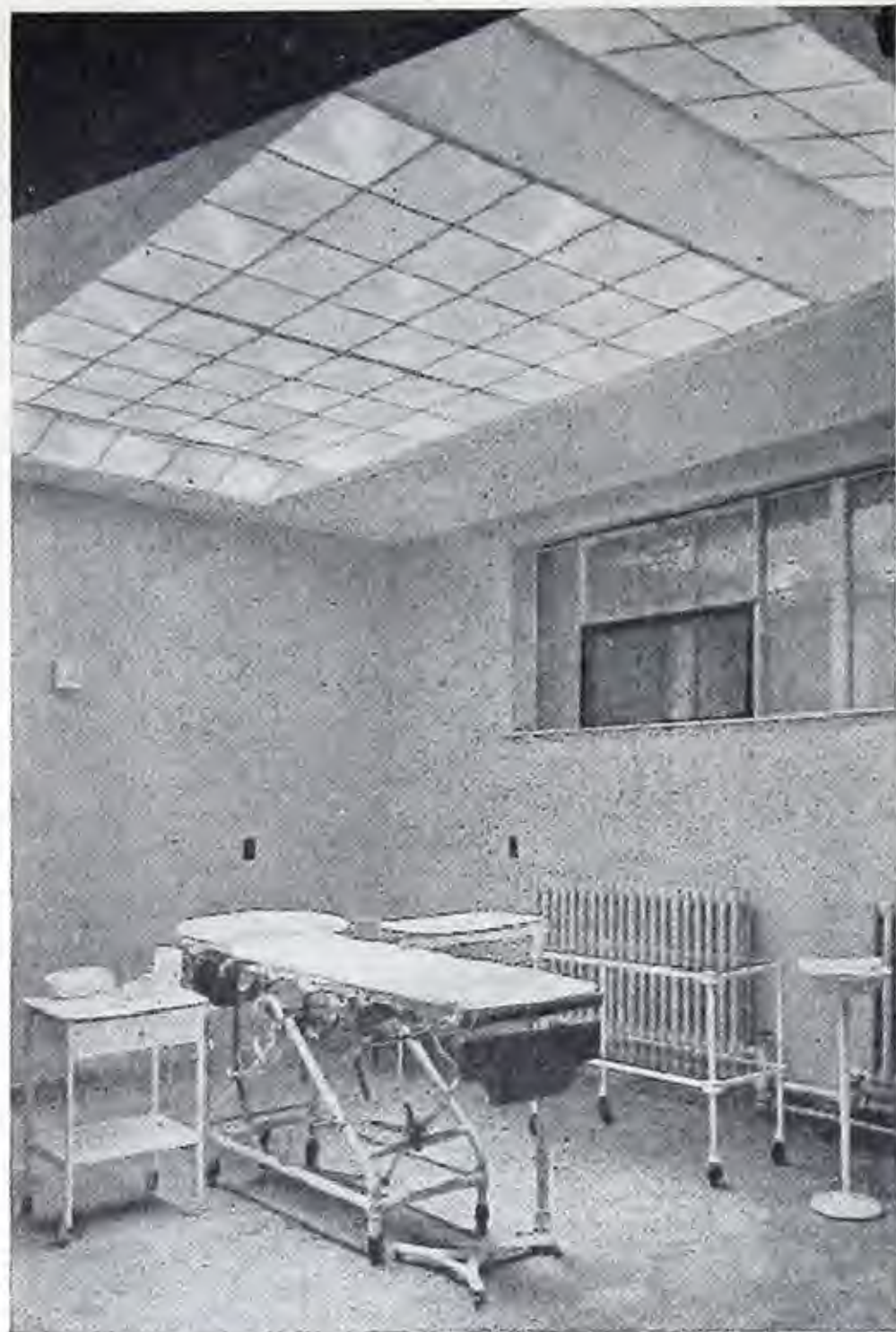


Illustration of Holophane No. 18M.C.L. System for Major Surgeries

Advantages:—

1. Horizontal illumination 1000 foot-candles average on operating area.
2. General illumination of the Operating Room so that the brightness of the surroundings is about the same as the interior of the incision (The seeing conditions in "looking up" do not change).
3. The direction of the light may be varied without moving the fixture.
4. Adequate diffusion and absence of harmful shadows.
5. High vertical illumination
6. Glareless, comfortable light.
7. Multiple lamping (some devices put only one lamp between life and death).
8. Reasonable cost of installation, operation and maintenance.
9. All enclosed and dirt resisting.
10. No mirrors that permit conscious patients to observe their operation.

MULTIPLE SPOT LENS SYSTEM



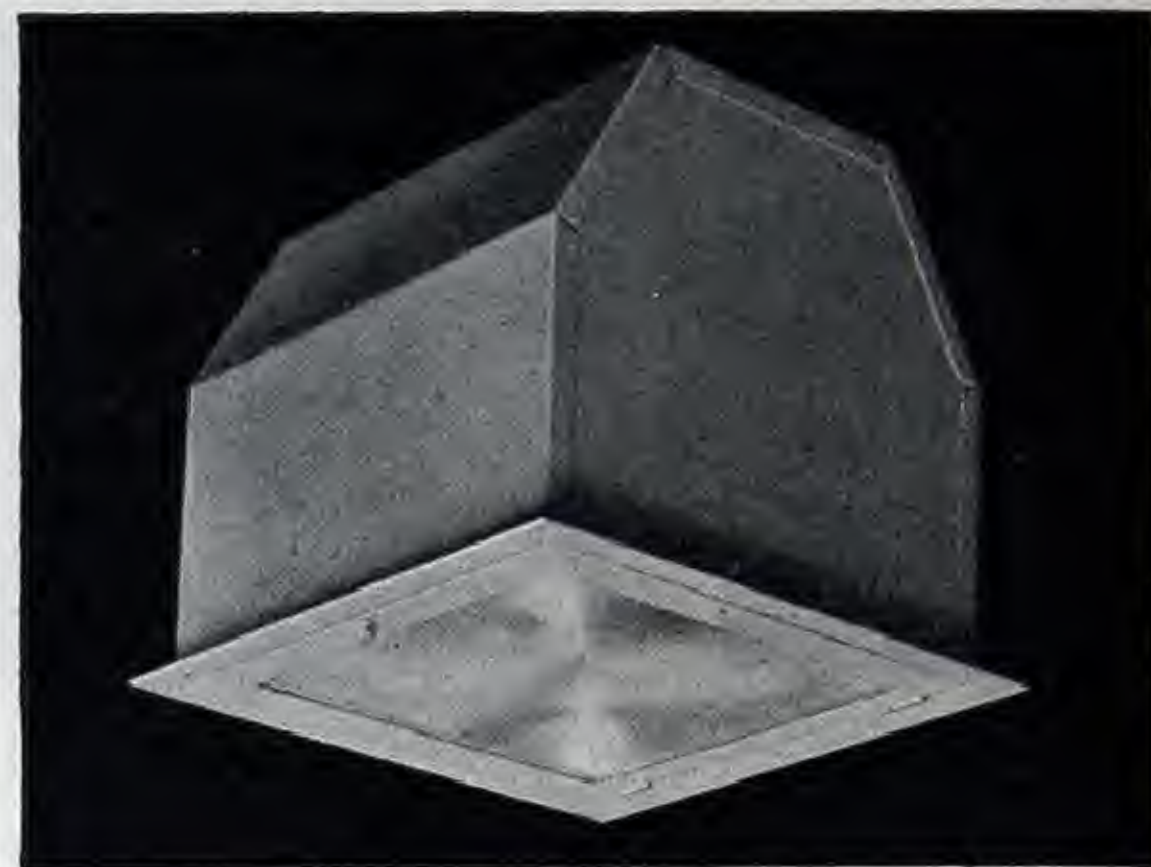
No. 5 Multiple Spot Lens System for Delivery Rooms. Consists of 1 non-tilted and 4 tilted lens boxes for either flush or exposed mounting. The installation illustrated is an exposed system.

Unit No.	Weight Installed	Length	Dimensions Width	Depth	Mazda Lamp*	List Price Each
15-M.C.L.	1000	11'-6 1/8"	6'-6 1/2"	1'-10 1/2"	15-150W.	Prices on Application
18-M.C.L.	1150	13'-7 3/8"	6'-6 1/2"	1'-10 1/2"	18-150W.	
21-M.C.L.	1300	15'-7 7/8"	6'-6 1/2"	1'-10 1/2"	21-150W.	

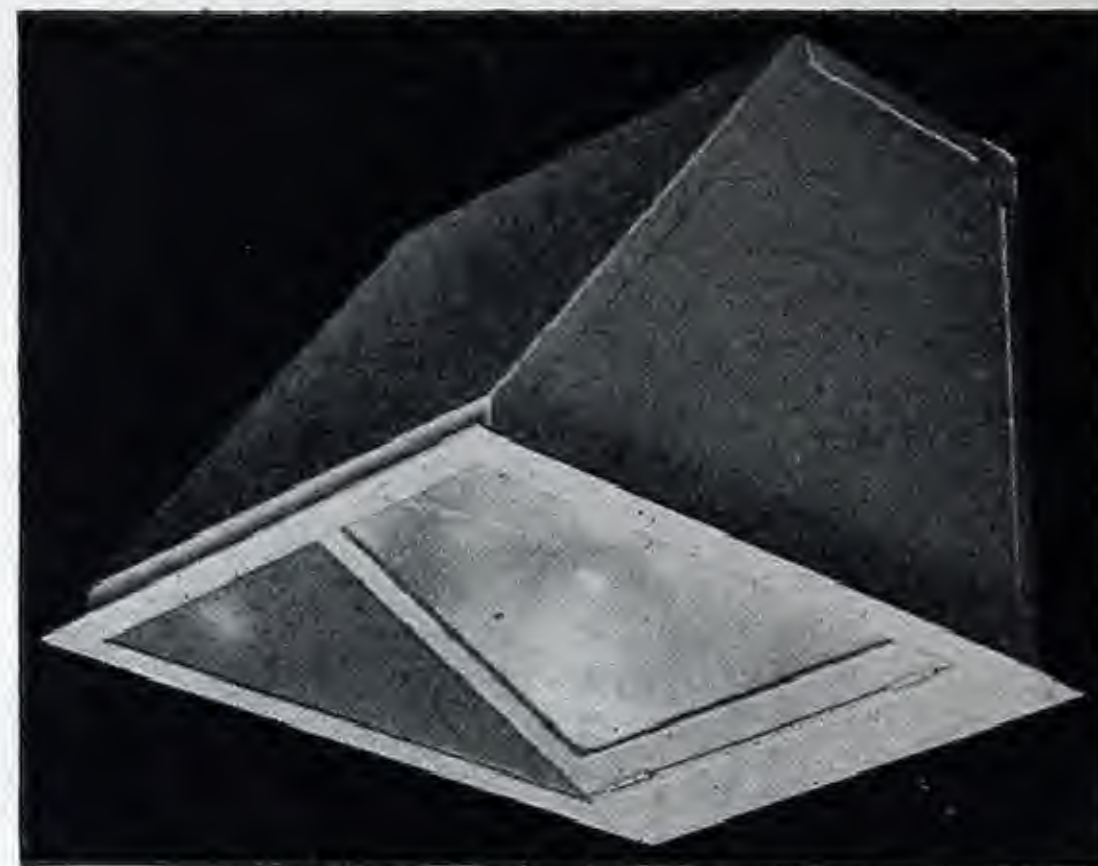
Standard quantity 1.

*200 watt lamps may be used over the tilted end lenses if higher vertical illumination is desired, but this must be so stated when ordering so that the necessary changes in socket positions may be made.

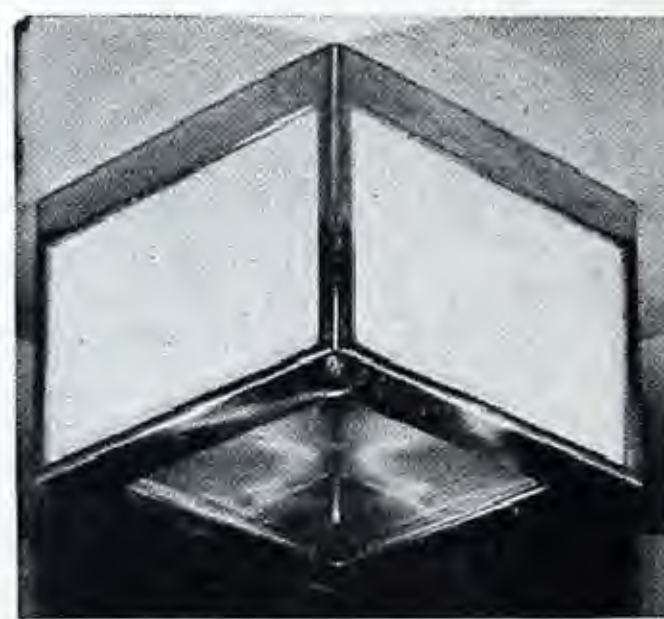
Important: When ordering state mounting height (distance from floor to bottom of sash).

HOLOPHANE FIXTURES
MULTIPLE SPOT LENS SYSTEM (Continued)

H-755-FL



H-755-TF



D-729-L



D-729-T

No. 5 Multiple Spot Lens System is for Minor Operating, Emergency, First Aid, and similar rooms.

The D-729-T and L units for exposed mounting are composed of a Holophane Controlens held in a cast aluminum frame, the outside of which is finished polished aluminum. The sides of the box are opal diffusing glass to permit pleasing ceiling illumination from the unit. The internal construction includes a chromium finish reflector and receptacle for 150 watt lamp.

For purposes where a narrow flood of light (25° spread) with an intense spot is desired.

When ordering give exact height of the ceiling on which the lights are to be mounted.

For further information ask for "Lighting Specific for Hospitals."

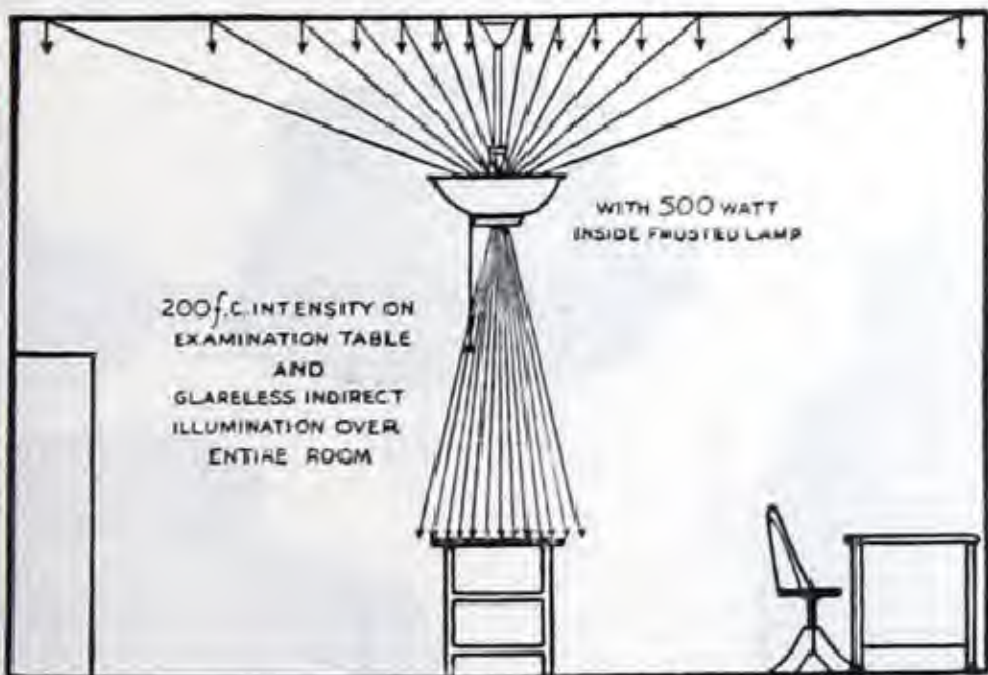
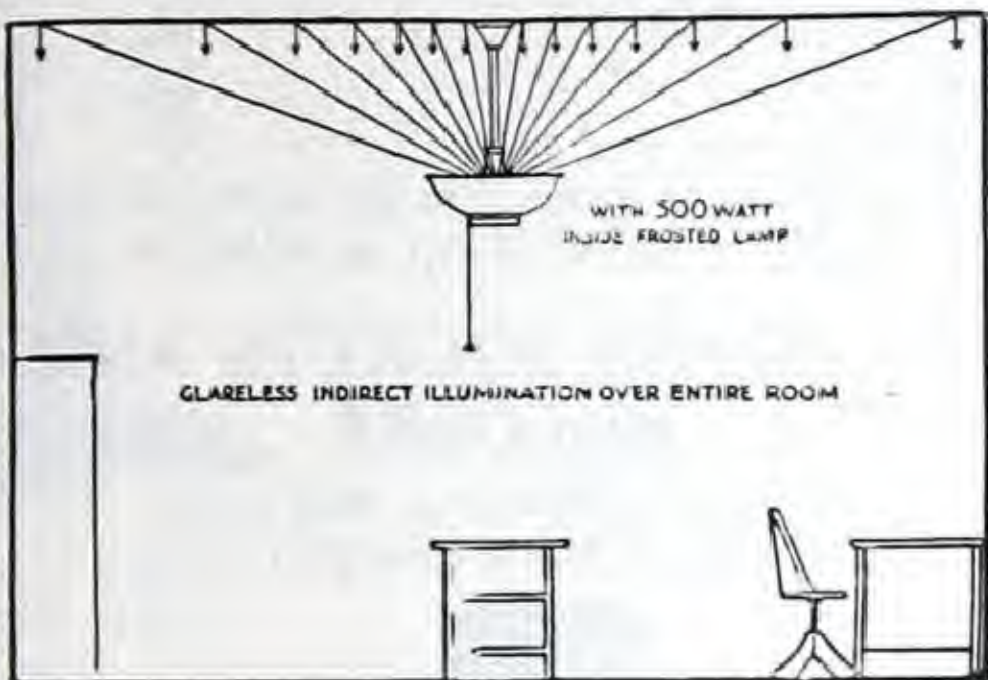
Schedule "I" Discounts

List No.	Standard Package Quantity	Ship. Wgt. Qt.	Length	Width	Depth	Mazda Lamp	List Price Each
H-755-L*	1	42	12 1/2"	12 1/2"	13 3/4"	150-200	\$25.00
H-755-T*	1	50	13 3/4"	12 1/2"	15"	150-200	27.00
H-755-FL*	1	42	14 1/2"	15 1/4"	12 1/2"	150-200	28.00
H-755-TF*	1	50	20 7/8"	15 1/8"	14 1/4"	150-200	34.00
D-729-L	1	18	11"	11"	7 1/2"	100†-150	30.00
D-729T	1	18	10 5/8"	9 3/8"	8 1/2"	100†-150	30.00

*When 200 watt lamps are to be used kindly advise when ordering.

†Use 7/8" socket extension with 100 watt lamp.

HOLOPHANE FIXTURES
MEDICAL EXAMINATION LIGHTS

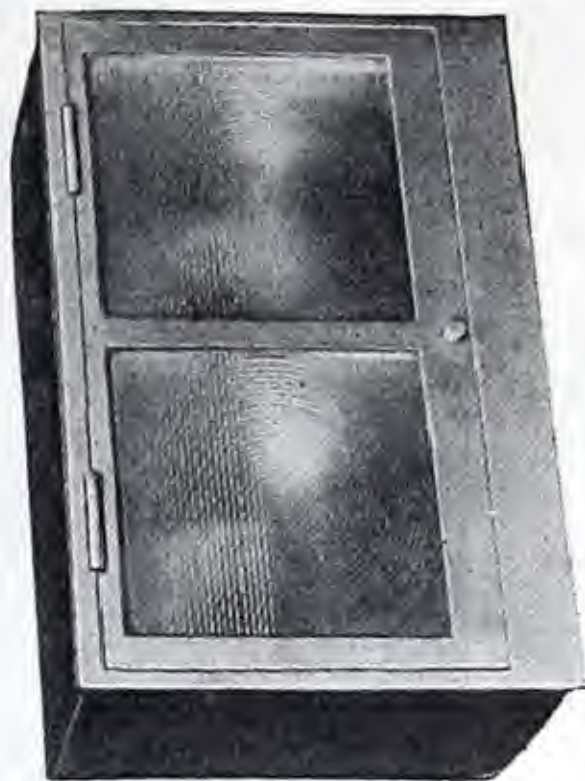
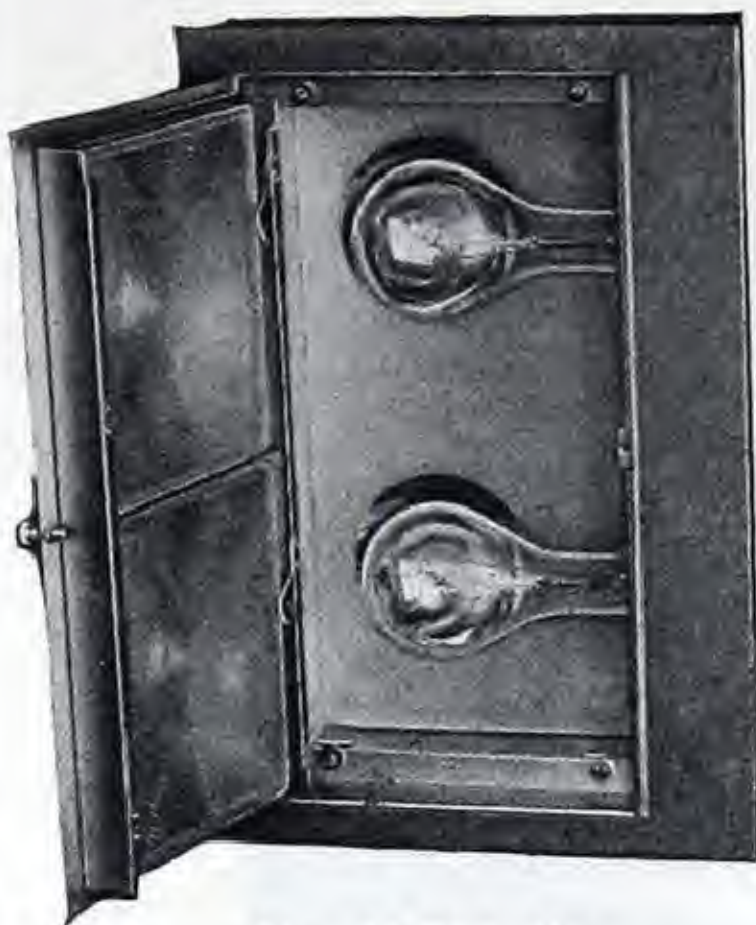


Schedule "R" Discounts

List No.	Std. Quant.	Ship. Weight	Dimensions	Overall Length	Mazda Lamp	List Price Each
742	1	15	20"	36"	500 watt I.F.	\$31.25

The Medical Examination Light has an impressive appearance and dual use. It provides from one unit, correct general illumination, also an intense concentrated beam when required. The indirect bowl and lens are easily removed for cleaning. By turning a small knob, easily reached, a diaphragm covers a Holophane Controlens which gives a beam approximating 200 foot candles intensity on the examining table.

HOLOPHANE FIXTURES
VERTICAL SURFACE LIGHTING UNITS



This side towards wall

No. H-790-2F
Unit With Flange

No. H-790-2
Unit Without Flange

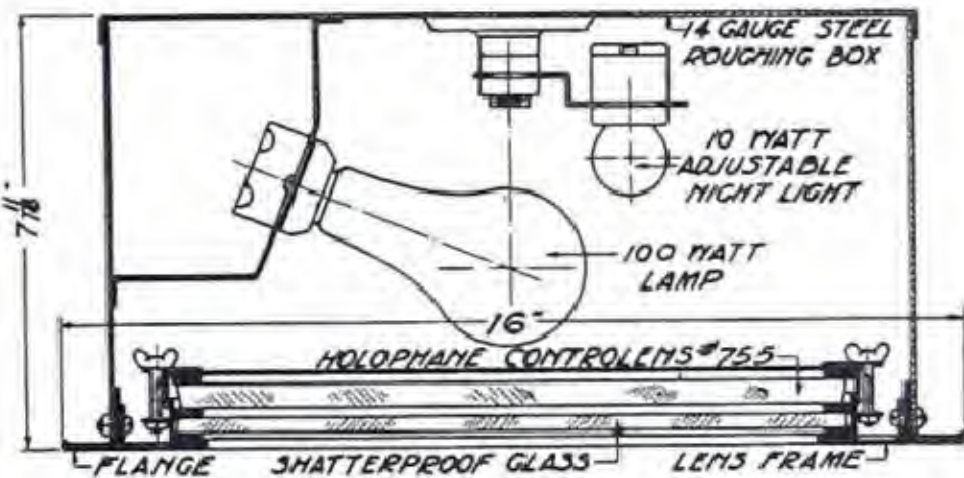
Schedule "I" Discounts

List No.	Std. Qt.	Ship. Wght.	Overall Dimensions	Lamp Wattage	List Price
			Length Width Depth		
H-790-2	1	30	14 5/8" 9 1/2" 5 3/4"	2-150 W.-CL.	\$28.50
H-790-2F	1	31	15 1/2" 10 1/16" 5 3/4"	2-150 W.-CL.	31.50

BUILT-IN WARD LIGHTING UNIT



No. A-755



Sectional Detail of No. A-755

The Holophane Unit No. A-755 is a complete unit consisting of—a black enameled steel roughing box; a separate bronze face flange to cover the plaster joint; a bronze lens holder frame which is fastened to lugs in the box by means of four safety screws, with an adjustment for proper alignment of the exposed parts; a Holophane Controlens, protected by shatter-proof glass; main socket, and auxiliary adjustable socket for 10 watt night light. The main light delivers a comfortable flood of illumination. The auxiliary light should be adjusted to throw the beam away from the bed. The intensity of this beam is too low to disturb the patient, but sufficient to permit visual inspection of the room. The construction of the unit is such as to prevent a patient injuring himself or the unit.

Schedule "I" Discounts

List No.	Standard Quantity	Ship. Wght.	Dimensions	Wattage	List Price
A-755	1	50	See Diagram Above	1-100 Watt In-side Frosted 1-10 Watt Intermediate	Prices on Application

BENJAMIN REFLECTORS

Quick Detachable

GLASSTEEL DIFFUSERS

Type "79"



Complete With Hood, Reflector and Globe
With Pendent Hood

Pendent Hoods are cast iron tapped $\frac{1}{2}$ inch, standard;
 $\frac{3}{4}$ inch, if specified.

Size of Lamp, Watts	With Opal Glass Globe			With Daylight Glass Globe		
	List No.	List Price	List No.	List No.	List Price	List No.
*150, 200.....	7201	\$9.30	26347	7226	\$9.80	26346
300, 500.....	7202	12.90	26349	7227	13.65	26348
750, 1000.....	7203	25.00	26351	7228	27.50	26358

List No.	Dim. in Inches		Ship. Wgt. Std. Pkg.
	Dia.	Height	
7201, 7226.....	18	13	59 $\frac{1}{2}$
7202, 7227.....	20	15 $\frac{5}{16}$	72 $\frac{1}{2}$
7203, 7228.....	24	18 $\frac{1}{16}$	65

Standard package is 4 on 18" and 20" units and 2 on 24".

With Ceiling Type Hood

Ceiling type hoods are of cast iron and fit 4-inch standard
Outlet Boxes.

Size of Lamp, Watts	With Opal Glass Globe			With Daylight Glass Globe		
	List No.	List Price	List No.	List No.	List Price	List No.
*150, 200.....	9201	\$9.30	26347	9226	\$9.80	26346
300, 500.....	9202	12.90	26349	9227	13.65	26348
750, 1000.....	9203	25.00	26351	9228	27.50	26358

List No.	Dim. in Inches		Ship. Wgt. Std. Pkg.
	Dia.	Height	
9201, 9226.....	18	12 $\frac{1}{2}$	61 $\frac{1}{2}$
9202, 9227.....	20	14 $\frac{1}{16}$	75
9203, 9228.....	24	17 $\frac{9}{16}$	67

Standard package is 4 on 18" and 20" units and 2 on 24".

Extra Reflectors for Easy Maintenance of System
Consisting of Reflector, Lamp Holder and Globe

Size of Lamp, Watts	With Opal Glass Globe			With Daylight Glass Globe		
	List No.	List Price	List No.	List No.	List Price	List No.
*150, 200.....	1201	\$8.50	26347	1226	\$9.00	26346
300, 500.....	1202	12.10	26349	1227	12.85	26348
750, 1000.....	1203	24.20	26351	1228	26.70	26358

List No.	Dim. in Inches		Ship. Wgt. Std. Pkg.
	Dia.	Height	
1201, 1226.....	18	11 $\frac{1}{16}$	54
1202, 1227.....	20	13 $\frac{3}{8}$	67
1203, 1228.....	24	16 $\frac{1}{8}$	61 $\frac{1}{2}$

Standard package is 4 on 18" and 20" units and 2 on 24".
Prices do not include wires or lamps.

BENJAMIN REFLECTORS

Quick Detachable

GLASSTEEL DIFFUSERS

Type "79"

With Shock Absorbing Lamp Holders

Shock absorbing lamp holders, an exclusive feature of Benjamin Equipment, lengthen lamp life by protecting the lamp filament against the jars and shocks present in every industry. Shock absorbing lamp holders are furnished in place of the regular rigid lamp holder at an advance of 10 cents in list price. Specify "with shock absorbing lamp holders" when ordering.

Globes Only for Replacement

Size of Lamp, Watts	Opal Glass		Daylight Glass	
	List No.	List Price	List No.	List Price
... 200.....	26347	\$2.30	26346	\$2.80
300, 500.....	26349	3.60	26348	4.35
750, 1000.....	26351	7.25	26358	12.00

List No.	Dimen. in Ins.		Std. Pkg.
	Dia.	Hgt.	
26347, 26346.....	10	5	4
26349, 26348.....	12	6	4
26351, 26358.....	16	9 $\frac{7}{8}$	2

*When using 150 watt lamp, Socket Extension No. 91 must
be used to correctly position lamp in reflector.

"BENCO" COPPER SOCKETS AND SHADE
HOLDERS

Keyless, 660 watts, 600 volts.
Pull Chain, 660 watts, 250 volts.



No. 4200



3 1/4" Holder

No. 4372



2 1/4" Form "O"



4" Holder

No. 4376

No. 4373

List No.	Description	Size	Wt. lbs. Std. Pkg.	List Price
4204	Copper Socket	$\frac{1}{2}$ " Bushing	17	\$0.70
4370	Form "O" holder	2 1/4"	8	.28
4372	Holder	3 1/4"	9	.42
4373	Holder	4"	10	.72
4371	P.H. For Porc. Socket or Holophane Shade	2 1/4"	8	.40

Standard package, 50.



No. 4712



No. 4751



No. 4753

List No.	Description	Size Tapped	Std. Pkg.	Wt. lbs. Std. Pkg.	List Price
4712	Keyless	$\frac{1}{2}$ "	10	5	.95
4706	Pull Chain For neck size	$\frac{1}{2}$ "	10	9	2.10
4751	2 1/4" holder		10	5 $\frac{5}{8}$	.30
4752	3 1/4" holder		10	1 $\frac{1}{4}$	.50
4753	4" holder		10	1 $\frac{5}{8}$	.80
4755	6" holder		10	5	1.50

BENJAMIN REFLECTORS

Quick Detachable, Porcelain Enamelled REFLECTORS "TYPE 79"

Pendent Hood



For 1/2-inch Pipe

Outlet Box Hood



For 4" Outlet Boxes

Style of Reflector



"Type 79"
RLM Dome



"Type 79"
Shallow Bowl



"Type 79"
Flat Cone



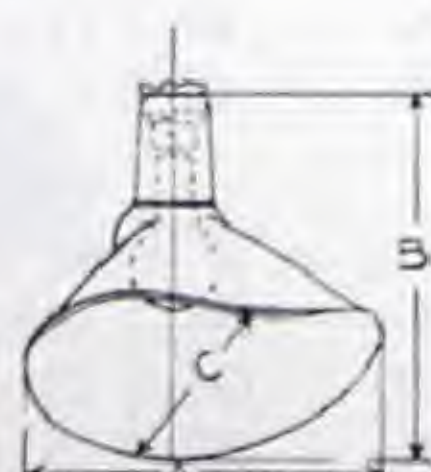
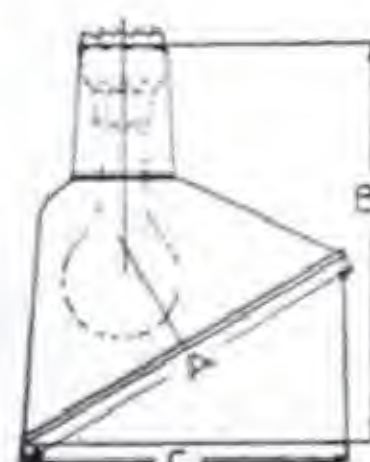
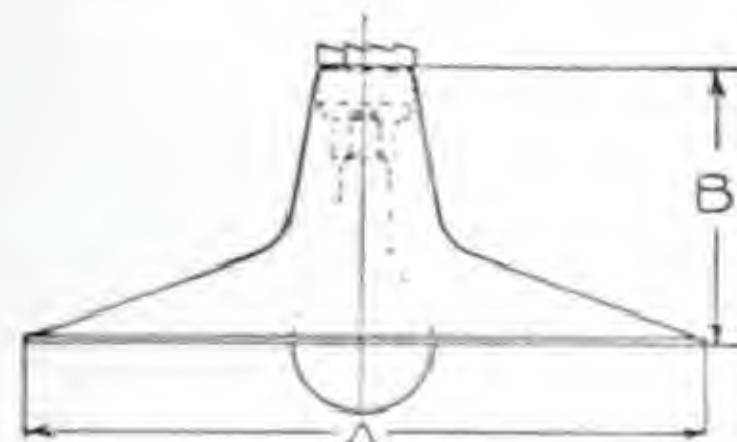
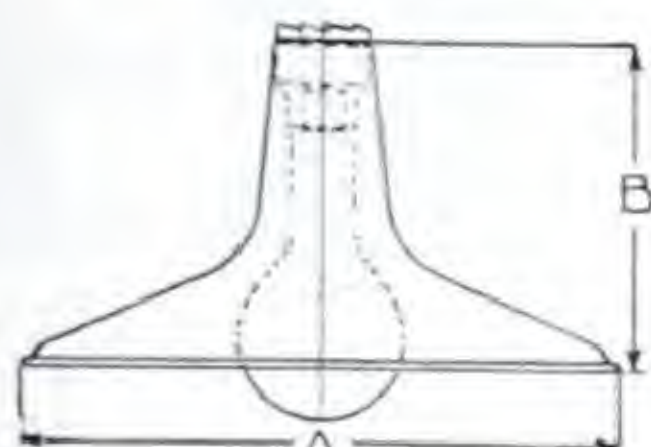
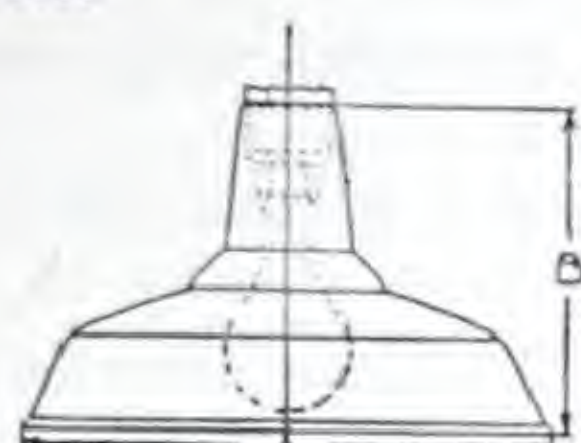
"Type 79"
Deep Bowl



"Type 79"
Symmetrical Angle



"Type 79"
Elliptical Angle



BENJAMIN REFLECTORS

Quick Detachable Porcelain Enamelled

REFLECTORS TYPE "79"

"Type 79" Reflectors are listed below in assemblies for conduit or outlet box mounting. List numbers are given for the complete units and for the hoods when ordered separately. Pendent hoods are ordinarily supplied tapped for 1/2" pipe, but will be supplied tapped for 3/4" pipe, if specified, at no extra charge.

				Pendent Hood For 1/2 inch Pipe		Outlet Box Hood For 4" Outlet Boxes	
Lamp Watts	Dimensions A. B.		Std. Pkg. 10	List No. No. 7	List Price \$.80	List No. No. 9	List Price \$.80
RLM Dome Reflector and Hood							
60-100	12	7 1/2	10	7641	3.60	9641	3.60
150	14	8 5/8	10	7642	3.80	9642	3.80
200	16	9 3/4	10	7643	4.40	9643	4.40
300-500	18	11 3/8	5	7644	5.70	9644	5.70
750-1000	20	14 3/8	5	7645	7.60	9645	7.60

Shallow Bowl Reflector and Hood						
50-60	12 6	10	7437	3.50	9437	3.50
75-100	12 7	10	7421	3.60	9421	3.60
150	14 8	10	7423	3.80	9423	3.80
200	16 9	10	7425	4.40	9425	4.40
300-500	18 10 5/8	5	7509	5.70	9509	5.70

Flat Cone Reflector and Hood						
50-60	14 5 3/8	10	7431	3.60	9431	3.60
75-100	14 6 3/8	10	7401	3.60	9401	3.60
150	16 7 1/4	10	7402	3.80	9402	3.80
200	18 8 1/8	10	7403	4.40	9403	4.40

Deep Bowl Reflector and Hood						
50-60	7 6 3/4	10	7166	3.20	9166	3.20
75-100	8 1/4 7 7/8	10	7161	3.40	9161	3.40
150	9 8 7/8	10	7189	3.80	9189	3.80
200	10 10	10	7169	3.80	9169	3.80
300-500	12 11 3/8	5	7173	5.60	9173	5.60
750-1000	15 14 3/4	5	7174	6.80	9174	6.80

Symmetrical Angle Reflector and Hood						
	A. B. C.					
50-100	8 8 1/2 7	10	7541	3.25	9541	3.25
150-200	10 11 3/8 8 5/8	10	7542	3.75	9542	3.75
300-500	12 14 1/2 10 1/2	5	7543	5.35	9543	5.35

Elliptical Angle Reflector and Hood						
	A. B. C.					
60-100	13 1/4 11 1/2 8 7/8	10	7522	3.80	9522	3.80
150	13 1/4 12 3/8 8 7/8	10	7525	4.50	9525	4.50
200	16 3/8 15 1/8 11 1/8	10	7526	5.10	9526	5.10
300-500	19 7/8 18 7/8 13 7/8	5	7537	9.10	9537	9.10
750-1000	19 7/8 20 1/8 13 7/8	5	7538	10.10	9538	10.10

Prices do not include Wire or Lamps. Note—Above list prices for keyless lamp holders only.

Shipping Weights							
List No.	Ship. Wgt. Lbs.	List No.	Ship. Wgt. Lbs.	List No.	Ship. Wgt. Lbs.	List No.	Ship. Wgt. Lbs.
7641	48	9641	53	7166	34	9166	39
7642	60	9642	65	7161	38	9161	43
7643	65	9643	70	7189	44	9189	50
7644	45	9644	50	7169	48	9169	53
7645	55	9645	60	7173	32	9173	35
7437	44	9437	49	7174	40	9174	45
7421	47	9421	52	7541	34	9541	39
7423	54	9423	59	7542	39	9542	44
7425	63	9425	68	7543	32	9543	35
7509	40	9509	44	7522	48	9522	53
7431	48	9431	53	7525	52	9525	57
7401	50	9401	55	7526	65	9526	70
7402	60	9402	65	7537	30	9537	30
7403	70	9403	75	7538	35	9538	35

BENJAMIN REFLECTORS

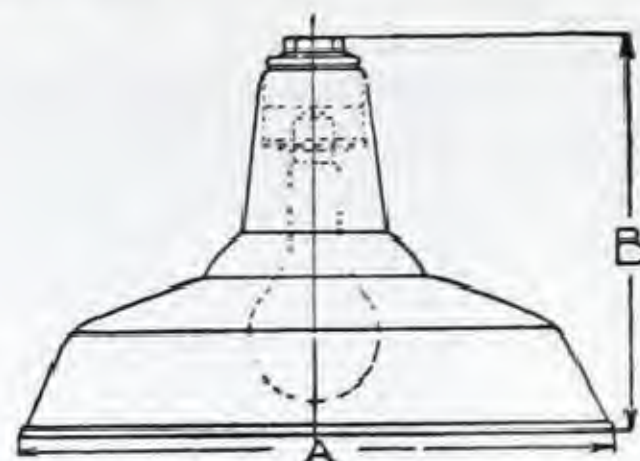
Porcelain Enamelled Reflectors

Style of Reflector



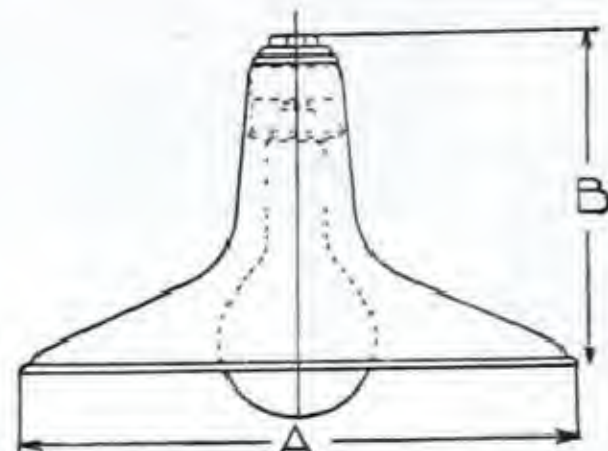
"X Type"
RLM Dome

5640-5645



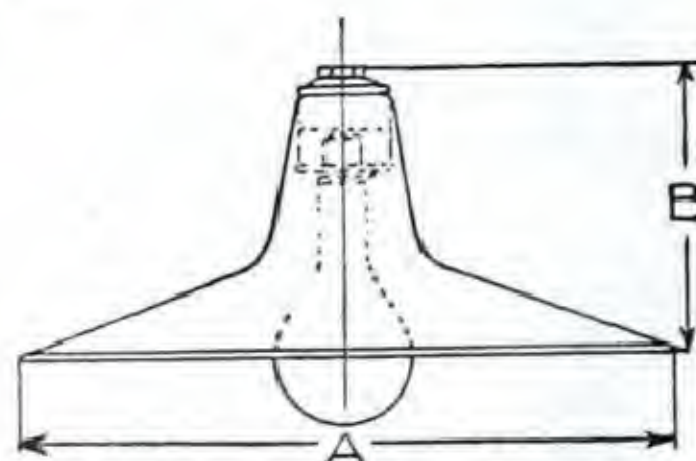
"X Type"
Shallow Bowl

5437-5509



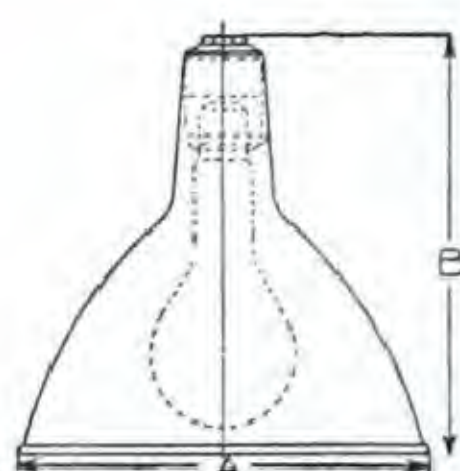
"X Type"
Flat Cone

5431-5403



"X Type"
Deep Bowl

6166-6174



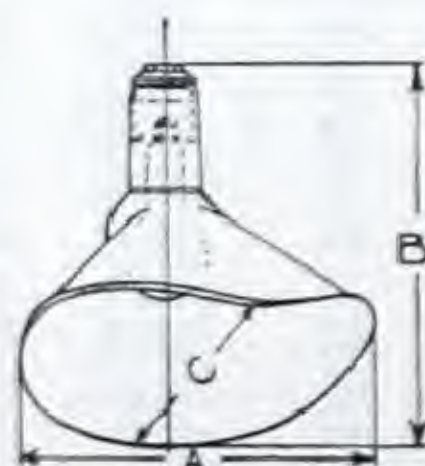
"X Type"
Symmetrical Angle

5541-5543



"X Type"
Elliptical Angle

5522-5538



Prices do not include wire or lamps.

BENJAMIN REFLECTORS

Porcelain Enamelled Reflectors

"X Type"

Benjamin "X Type" Porcelain Enamelled Reflectors

List prices given below are for reflectors with keyless sockets. The following are other types of sockets which can be supplied at the following advances in list prices:—

Shock-Absorbing Socket—medium or mogul base—10 cents advance list.

Self-Locking Socket—medium base only—50 cents advance list.

Shock-Absorbing Self-Locking Socket—medium base only—60 cents advance list.

Pull-Chain Socket—medium base only—80 cents advance list.

Lamp Watts	Dimensions A	Dimensions B	Std. Pkg.	List No.	Ship. Wgt. Lbs.	List Price
"X Type" R. L. M. Dome Reflector						
50-60	12	7½	10	5640	35	\$3.20
75-100	12	8¼	10	5641	35	3.30
150	14	9⅜	10	5642	45	3.50
200	16	10½	10	5643	50	4.10
300-500	18	12¼	5	5644	35	5.30
750-1000	20	15⅛	5	5645	45	7.20

"X Type" Shallow Bowl Reflector						
50-60	12	6¾	10	5437	35	3.20
75-100	12	7¾	10	5421	35	3.30
150	14	8¾	10	5423	40	3.50
200	16	9¾	10	5425	50	4.10
300-500	18	11⅜	5	5509	35	5.30

"X Type" Flat Cone Reflector						
50-60	14	6	10	5431	40	3.30
75-100	14	7	10	5401	45	3.30
150	16	8	10	5402	50	3.50
200	18	8⅞	10	5403	55	4.10

"X Type" Deep Bowl Reflector						
50-60	7	7½	10	6166	25	2.90
75-100	8¼	8⅝	10	6161	30	3.10
150	9	9⅝	10	6189	30	3.50
200	10	10¾	10	6169	35	3.50
300-500	12	12⅞	5	6173	30	5.20
750-1000	15	15½	5	6174	40	6.40

"X Type" Symmetrical Angle Reflector						
	A.	B.	C.			
50-60-100	8	9¼	7	10	5541	25 2.95
150-200	10	12⅞	8⅝	10	5542	35 3.45
300-500	12	15¼	10½	5	5543	30 4.95

"X Type" Elliptical Angle Reflector						
60-100	13¼	12¼	8⅞	10	5522	35 3.50
150	13¼	13⅞	8⅞	10	5525	40 4.20
200	16⅜	15⅞	11⅞	10	5526	55 4.80
300-500	19⅞	19⅝	13⅞	5	5537	45 8.70
750-1000	19⅞	20⅞	13⅞	5	5538	55 9.70

BENJAMIN REFLECTORS

Two-Piece Heavy Duty

PORCELAIN ENAMELLED REFLECTORS

"Sturdox Type"

Complete units consist of combinations of the hoods and sockets.

Keyless, Easy-to-Wire, Two-Piece Sockets are Standard. The following sockets will be furnished, when specified, at advance in list price:

Shock Absorbing Socket. Keyless, medium or mogul base, add 10 cents to list. Medium base Shock-Absorbing, Self-Locking Socket, add 60 cents to list.

Key for Self-Locking Socket, \$1.00 additional.

Self-Locking Socket, medium base only, add 50 cents to list. For releasing lamp, add \$1.00.

Full Chain Socket, medium base only, add 80 cents to list.

Pendent hoods tapped for 3/4" conduit supplied, when specified, without increase in list price.

Outlet Box
Steel Hood



Pendent Cast
Hood



Outlet Box
Cast Hood



4-inch Outlet
Boxes

Tapped for 1/2-inch
Pipe

For 4" or 3 1/4"
Outlet Boxes



"Sturdox Type" RLM Dome



"Sturdox Type" Shallow Bowl



"Sturdox Type" Deep Bowl



"Sturdox Type" Symmetrical Angle

BENJAMIN REFLECTORS

Two-Piece Heavy Duty

PORCELAIN ENAMELLED REFLECTORS

"Sturdox Type"

Outlet Box Steel Hood For 4" Outlet Boxes	Pendent Cast Hood Tapped for 1/2" pipe	Outlet Box Cast Hood For 4" or 3 3/4" Outlet Boxes
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	Std. Pkg.	List No.	List Price	List No.	List Price	List No.	List Price
Med. B.	10	9230	\$1.10	9200	\$1.30	9220	\$1.50
Mogul B.	5	9235	1.60	9205	1.80	9225	2.00

Lamp
Watts

	Std. Pkg.	List No.	List Price	List No.	List Price	List No.	List Price
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R. L. M. Dome Reflector and Hood

100	10	9316	\$3.30	9301	\$3.50	9311	\$3.70
150	10	9317	3.50	9302	3.70	9312	3.90
200	10	9318	4.10	9303	4.30	9313	4.50
300-500	5	9319	5.30	9304	5.50	9314	5.70
750-1000	5	9320	7.20	9305	7.40	9315	7.60

Shallow Bowl Reflector and Hood

100-150	10	9330	3.50	9321	3.70	9327	3.90
200	10	9331	4.10	9322	4.30	9328	4.50
300-500	5	9332	5.30	9323	5.50	9329	5.70

Deep Bowl Reflector and Hood

100	10	9345	3.10	9333	3.30	9341	3.50
150	10	9346	3.50	9334	3.70	9342	3.90
200	10	9347	3.50	9335	3.70	9343	3.90
300-500	5	9348	5.20	9336	5.40	9344	5.60
750-1000	5	9362	6.00	9363	6.20	9364	6.40

Angle Reflector and Hood

150-200	10	9358	3.45	9349	3.65	9355	3.85
300-500	5	9359	4.95	9350	5.15	9356	5.35
750-1000	5	9360	7.60	9351	7.80	9357	8.00

Prices Do Not Include Wires or Lamps.

SHIPPING WEIGHTS

List No.	Ship Wgt. lbs.	List No.	Ship Wgt. lbs.
9230	17	9321	60
9235	10	9322	65
9200	33	9323	45
9205	19	9333	50
9220	30	9334	50
9225	18	9335	60
9316	40	9336	35
9317	45	9363	50
9318	50	9349	55
9319	40	9350	40
9320	45	9351	45
9330	40	9311	55
9331	45	9312	60
9332	35	9313	65
9345	30	9314	50
9346	30	9315	55
9347	40	9327	55
9348	25	9328	60
9362	40	9329	45
9358	40	9341	45
9359	30	9342	45
9360	35	9343	55
9301	60	9344	35
9302	65	9364	50
9303	70	9355	50
9304	50	9356	40
9305	55	9357	45

BENJAMIN REFLECTORS

Two-Piece Heavy Duty

PORCELAIN ENAMELLED REFLECTORS

"Sturdex Type"

PENDENT STEEL HOOD



Tapped for 1/2-inch Pipe

	List No.	Ship. Wgt.	Std. Pkg.	List Price
Medium Base	9210	17	10	\$1.10
Mogul Base	9215	10	5	1.60



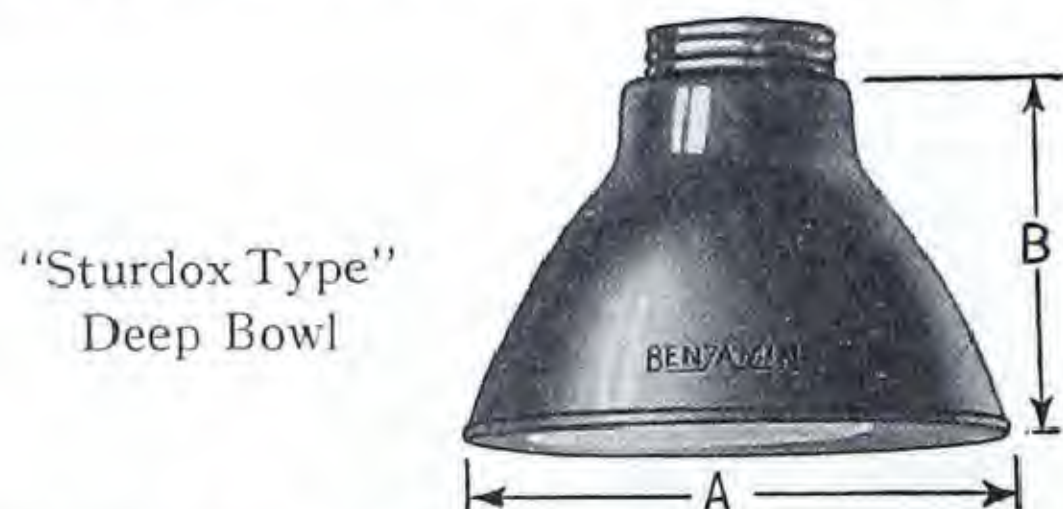
"Sturdex Type" RLM Dome

No. 26012, 26014, 26016, 26018, 26020, 9306, 9307, 9308, 9309 and 9310.

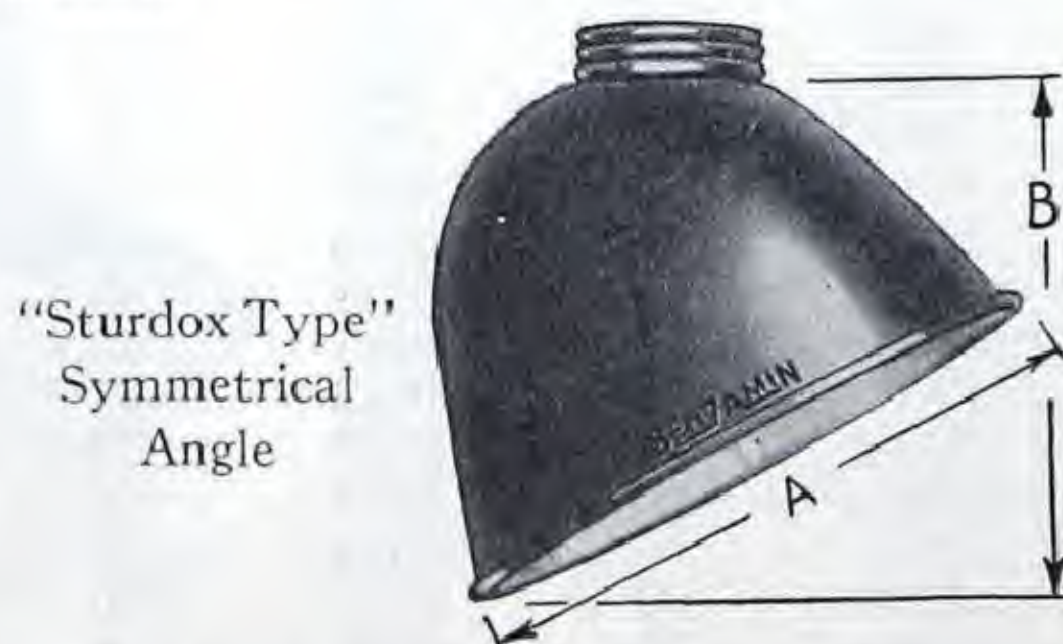


"Sturdex Type" Shallow Bowl

No. 26414, 26416, 26418, 9324, 9325 and 9326.

"Sturdex Type"
Deep Bowl

No. 26108, 26109, 26110, 26112, 26115, 9337, 9338, 9339, 9340 and 9361.

"Sturdex Type"
Symmetrical
Angle

No. 26210, 26212, 26214, 9352, 9353 and 9354.

BENJAMIN REFLECTORS

Two-Piece Heavy Duty

PORCELAIN ENAMELLED REFLECTORS

"Sturdex Type"

"Sturdex Type" Reflectors are for conduit or outlet box mounting. List numbers are given for the complete units and for the hoods and reflectors when ordered separately.

Keyless, Easy-to-Wire, Two-Piece Sockets are standard. The following sockets will be furnished at an advance in list price:

Shock-Absorbing Socket.—Keyless, medium or mogul base add 10 cents to list. Medium base Shock-Absorbing, Self Locking Socket, add 60 cents to list. Key for Self-Locking Socket, \$1.00 list additional.

Self-Locking Socket, medium base only, add 50 cents to list.

Pull-Chain Socket, medium base only, add 80 cents to list. Pendent hoods tapped for 3/4" conduit supplied, when specified at no increase in list price.

Lamp Watts	Reflectors Only		Ref'l'ct'r and Hood	
	Dimensions A	Dimensions B	List No.	List Price

RLM Dome Reflector and Hood

100	12	4 1/2	26012	\$2.20	9306	\$3.30	1
150	14	5 3/4	26014	2.40	9307	3.50	1
200	16	6 5/8	26016	3.00	9308	4.10	1
300- 500	18	9 5/8	26018	3.70	9309	5.30	
750-1000	20	11 1/8	26020	5.60	9310	7.20	

Shallow Bowl Reflector and Hood

100- 150	14	3 1/2	26414	2.40	9324	3.50	1
200	16	4 3/4	26416	3.00	9325	4.10	1
300- 500	18	6 1/8	26418	3.70	9326	5.30	

Deep Bowl Reflector and Hood

100	8 1/4	5 1/8	26108	2.00	9337	3.10	1
150	9	6	26109	2.40	9338	3.50	1
200	10	7	26110	2.40	9339	3.50	1
300- 500	12	7 7/8	26112	3.60	9340	5.20	
750-1000	15	11 1/2	26115	4.40	9361	6.00	

Angle Reflector and Hood

150- 200	10	9	26210	2.35	9352	3.45	1
300- 500	12	12	26212	3.35	9353	4.95	
750-1000	14	15 3/8	26214	6.00	9354	7.60	

Prices do not include wires or lamps.

Shipping Weights

List No.	Ship. Wgt. Lbs.	List No.	Ship. Wgt. Lbs.
26012	25	9306	40
26014	30	9307	45
26016	35	9308	50
26018	30	9309	40
26020	35	9310	45
26414	25	9324	40
26416	30	9325	45
26418	25	9326	35
26108	15	9337	30
26109	15	9338	30
26110	25	9339	40
26112	15	9340	25
26115	30	9361	40
26210	20	9352	40
26212	20	9353	30
26214	25	9354	35

BENJAMIN TENNIS COURT REFLECTORS

Aluminum



No. 7178

For 750-1000-1500 Watt Lamps

BENJAMIN REFLECTORS

Sign Reflectors

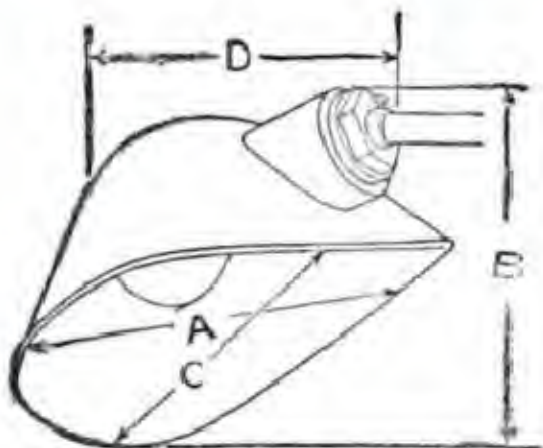
PORCELAIN ENAMELLED STEEL



Front View List No. 5570



Side View List No. 5570



ESPECIALLY DESIGNED FOR TENNIS COURTS

Designed to meet the specific problem of properly illuminating tennis courts for night play. Although of an exceptionally wide shape, to prevent direct glare by providing ample shield-off of the lamp filament, these reflectors are highly efficient in putting out and direct light into the most effective zones for this type of illumination.

These reflectors provide uniform illumination over the court without annoying shadows and troublesome glare. And, what is more important, they provide adequate light for highest visibility of the ball as well as the players in all positions on the court.

"TYPE 79" CONSTRUCTION

Reflector and lamp removable from hood as a unit, for easy hanging or storage indoors, by simple quarter turn of reflector. The rugged, weather-proof bayonet mechanism makes electrical and mechanical connection simultaneously. Pendant hoods are standard $\frac{1}{2}$ " standard; $\frac{3}{4}$ " when specified. Ceiling hoods fit 4" standard boxes.

LIGHTS BALL AND PLAYERS UNIFORMLY

The special wide spread distribution of these reflectors provides proper illumination on all faces of the ball at all angles and heights above the court. Distribution of light over the court is extremely uniform, preventing apparent changes of speed of the ball in flight which otherwise would occur if it were directed through light and dark areas.

ALUMINUM VISORS

For use where desired to cut off spill light in a given direction or to redirect light on the area to be illuminated. Visors attach easily and securely to reflectors by clamping the grooved band over reflector head and tightening screw. Finish: aluminum.



	Dia. Ins.	Hght. Ins.	Std. Pkg.	Wt. lbs. Std. Pkg.	List Price
Reflector.....	18	19 $\frac{11}{16}$	4	54	\$15.40
Visor.....	18	8 $\frac{1}{2}$	4	14	7.50

With Keyless Socket

List No.	Size of Lamp, Watts	Size Tapped	Std. Pkg.	Shpg. Wgt.	List Price
5570.....	100, 150	$\frac{1}{2}$ "	9	32	\$3.60
5571.....	150, 200	$\frac{1}{2}$ "	9	35	4.20

No. 5570 width "D" 9 $\frac{1}{4}$ ", diameter "A" 13 $\frac{1}{4}$ ", diameter "C" 9 $\frac{1}{8}$ ", height "B" 8 $\frac{5}{8}$ ".

No. 5571 width "D" 10", diameter "A" 13 $\frac{1}{4}$ ", diameter "C" 9 $\frac{1}{8}$ ", height "B" 9".

Prices do not include wires or lamps.

With Shock Absorbing Socket

Shock Absorbing Sockets which lengthen lamp life will be furnished, when specified, as follows: for Keyless add \$0.10 to list; for Self-Locking add \$0.60. Key only for Self-Locking Sockets, List No. 1399, lists at \$1.00.



With Self-Locking Socket

Self-Locking Sockets that prevent lamp theft and keep lamps where they belong will be supplied, when specified, at an advance of \$0.50 list. Key required to release lamp, List No. 1399, furnished at \$1.00 list.

Specifications

Reflector. Elliptical shape, of porcelain enamelled steel with side outlet.

Socket. Two-piece porcelain, Canadian Electrical Code and National Electrical Code Standard.

Fitting. Heavy separable type weatherproof fitting, with set screw.

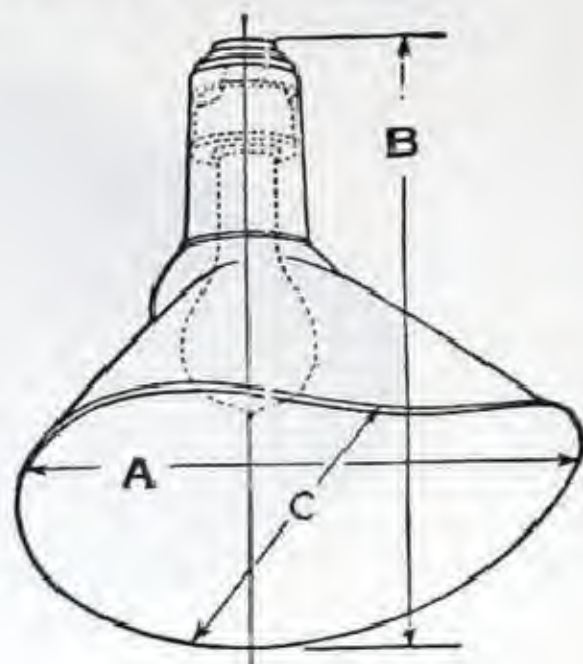
Finish. Porcelain enamelled; Benjamin Green outside, white inside. When specified, reflector finished white inside and outside can be supplied at an additional cost.

Distribution. Projects light in a long side lateral plane, as well as directing it to front. Ideal for sign illumination.

BENJAMIN REFLECTORS

Elliptical Angle Reflectors

PORCELAIN ENAMELLED STEEL



Side View List No. 5525

With Keyless Socket and Lamp Grip

List No.	Size of Lamp, Watts	Size Tapped Inches	Dimensions in Inches	List Price
			Dia. "A" Ht. "B" Dia. "C"	
5522	* 60, 100	1/2	13 1/4 12 1/4 8 7/8	\$3.50
5525	† 150	1/2	13 1/4 13 1/8 8 7/8	4.20
5526	200	1/2	16 3/8 15 7/8 11 1/8	4.80
5537	300, 500	3/4	19 7/8 19 5/8 13 7/8	8.70
5538	750, 1000	3/4	19 7/8 20 7/8 13 7/8	9.70
List No.			Std. Pkg. Ship. Wgt. Std. Pkg.	
5522			35 10	
5525			40 10	
5526			55 10	
5537			45 5	
5538			55 5	

Shock-Absorbing Socket

When specified, Medium or Mogul Base Fixtures will be furnished with Shock Absorbing Keyless Socket at \$0.10 each advance list.

Medium Base Fixtures can also be furnished with Shock-Absorbing Self-Locking Socket at \$0.60 each advance list.

Key for locking socket \$1.00 additional.



Self-Locking Socket

Self-Locking Socket, which prevents lamp theft, will be supplied with Medium Base Reflector Sockets when specified, at an advance of \$0.50 list. Key supplied at \$1.00 list.



Pull-Chain Socket

Pull-Chain Sockets, with the exclusive Benjamin Inner Pull Feature in which the pull chain comes straight down inside the reflector, will be supplied at an advance of \$0.80 list when specified.



Fitting. Extra heavy X type weather-proof separable fitting.

Distribution. This reflector is especially practical for illumination from the side. It distributes the light not only to the front but has a wide lateral distribution which builds the illumination between the units where otherwise it would be weak.

*Also takes 75 watt lamps.

†Also takes old 100 watt "PS" lamps and, if socket extension No. 91 is used, the 100 watt "A."

Prices do not include wires or lamps.

BENJAMIN REFLECTORS



VIADUCT FIXTURES

Symmetrical Angle Reflector

List No. 5560 and 5549 are designed for side installation. Because of their wide angle of light distribution, they are used extensively for the illumination of viaducts, subways, trestles, etc.

Construction—Symmetrical angle reflector of porcelain enamelled steel, X type separable fitting and two-piece easy-to-wire porcelain socket with Benjamin Lamp Grip. Fitting tapped 1/2 inch regularly furnished. Finish—green porcelain outside, white inside.

List No.	Size of Lamp, Watts	Dim., Inches	Std. Pkg.	Std. Pkg.	List Price
		Dia. Hgt.			
5560	60, 100, 150	11 5/8 10 5/8	35	10	\$3.95
5549	300, 500	16 1/4 17	40	5	7.00



No. 5566



No. 32613

WARNING SIGNAL LIGHTING FIXTURES

Symmetrical Angle Reflector With Bull's Eye

A combination warning signal and lighting unit. It has a red light for a warning signal and a white light to show the way. At viaducts or elevated railway crossings, it illuminates the substructure piers; at grade crossings it directs a flood of light upon the crossing sign and roadway. At the same time the light shining through the ruby glass lens in the back of the reflector warns drivers to approach cautiously.

Construction—Porcelain enamelled steel reflector with 3 1/2 inch corrugated ruby lens in back, X type fitting tapped 3/4 inch, and socket with lamp grip. Finish—green porcelain enamel outside, white inside.

List No.	Size of Lamp, Watts	Dim., Inches	Std. Pkg.	Std. Pkg.	List Price
		Dia. Hgt.			
5566	60, 100	12 13 3/4	30	5	\$5.50

Elliptical Angle Reflector With Bull's Eye

Another combination warning signal and lighting unit. Its uses are similar to those of the Symmetrical reflector listed above, but it gives a wider distribution of light.

32613	25, 40	9x13 1/4 9 1/2	25	5	\$5.50
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BENJAMIN REFLECTORS

Benjamin Shadeholder Reflectors

Benjamin Porcelain Enamelled Shadeholder Reflectors are supplied in the styles of reflectors listed below and with the types of shadeholders listed to the right.

The finish of reflectors is porcelain enamel outside, white porcelain enamel inside.

Type N
Neck



For 2 1/4-inch
Shadeholders

Type A
Holder



For Ben-ox
Sockets

Type B
Holder



For Brass
Shell Sockets

Type P
Holder



For Porcelain
Sockets

Type S
Holder



For Benco
Sockets

Style of
Reflector



RLM Dome



Shallow Bowl



Deep Bowl



Symmetrical Angle

		Dim.													
Lamp Watts	Ins. A.	Ship. B.	Std. Wgt. Pkg.	List No.	List Price	List No.	List Price	List No.	List Price	List No.	List Price	List No.	List Price		
*25- 40	10	3 3/8	15	10	14025N	\$1.25	14025A	\$1.40	14025B	\$1.40	14025P	\$1.40	14025S	\$1.40	
50- 60	12	4 7/8	20	10	14050N	1.80	14050A	1.95	14050B	1.95	14050P	1.95	14050S	1.95	
75- 100	12	5 1/2	25	10	14075N	1.90	14075A	2.05	14075B	2.05	14075P	2.05	14075S	2.05	
150	14	6 3/4	30	10	14100N	2.20	14100A	2.35	14100B	2.35	14100P	2.35	14100S	2.35	
200	16	7 3/4	35	10	14200N	2.60	14200A	2.75	14200B	2.75	14200P	2.75	14200S	2.75	
300- 500	18	7 3/4	25	5	14300N	3.60	Takes 3 1/4-inch shadeholder.								
750-1000	20	10 3/4	30	5	14750N	5.30									

25- 40	10	3 1/8	14	10	11050N	1.25	11050A	1.40	11050B	1.40	11050P	1.40	11050S	1.40
50- 60	12	4	18	10	11060N	1.45	11060A	1.60	11060B	1.60	11060P	1.60	11060S	1.60
75- 100	12	5	19	10	11075N	1.70	11075A	1.85	11075B	1.85	11075P	1.85	11075S	1.85
150	15	6 1/8	30	10	11100N	1.90	11100A	2.05	11100B	2.05	11100P	2.05	11100S	2.05

25- 40	5	3 3/8	7	10	12025N	.95	12025A	1.10	12025B	1.10	12025P	1.10	12025S	1.10
50- 60	7	4 3/4	10	10	12060N	1.50	12060A	1.65	12060B	1.65	12060P	1.65	12060S	1.65
75- 100	8 1/4	6 1/8	14	10	12075N	1.60	12075A	1.75	12075B	1.75	12075P	1.75	12075S	1.75
150	9	7	16	10	12100N	1.80	12100A	1.95	12100B	1.95	12100P	1.95	12100S	1.95
200	10	8 1/8	20	10	12200N	2.20	12200A	2.35	12200B	2.35	12200P	2.35	12200S	2.35

25- 40	7	5 1/2	10	10	15040N	1.15	15040A	1.30	15040B	1.30	15040P	1.30	15040S	1.30
50- 60	8	6 1/2	12	10	15060N	1.45	15060A	1.60	15060B	1.60	15060P	1.60	15060S	1.60
75- 100	8	7 1/4	13	10	15075N	1.45	15075A	1.60	15075B	1.60	15075P	1.60	15075S	1.60
150- 200	10	9 3/8	18	10	15100N	1.95	15100A	2.10	15100B	2.10	15100P	2.10	15100S	2.10

Does not take RLM Standard Label.

Prices are for reflectors only and do not include sockets or lamps.

BENJAMIN REFLECTORS **Ben-Ox Socket Reflector Combinations**

	Ben-ox Sockets	
	No. 4712	No. 4706
List Price	\$0.95	\$2.10

	Ben-ox Cast Outlet Box Fittings	
	No. 4980	No. 4975
	\$1.10	\$2.10

Note: The List Numbers and Prices in this Chart cover combinations of Benjamin PORCELAIN ENAMELED SHADE-HOLDER REFLECTORS below with the sockets on the right.

Standard Package is 10 Pieces of one List Number.

For Shipping Weights, add weight of reflector to weight of socket or outlet box fitting.







Keyless
Tapped 1/2"

Pull Chain
Tapped 1/2"

Keyless
Fits 4" Std. Box

Pull Chain
Fits 4" Std. Box

Style of Reflector	Size of Lamp	List Number and List Price of Ben-ox Socket or Outlet Box Fitting with Reflector			
 RLM Dome	25-40	No. 47150 \$2.35	No. 47151 \$3.50	No. 47152 \$2.50	No. 47153 \$3.50
	50-60	No. 47000 \$2.90	No. 47030 \$4.05	No. 47060 \$3.05	No. 47090 \$4.05
	75-100	No. 47001 \$3.00	No. 47031 \$4.15	No. 47061 \$3.15	No. 47091 \$4.15
	150	No. 47002 \$3.30	No. 47032 \$4.45	No. 47062 \$3.45	No. 47092 \$4.45
	200	No. 47003 \$3.70	No. 47033 \$4.85	No. 47063 \$3.85	No. 47093 \$4.85
	25-40	No. 47115 \$2.35	No. 47120 \$3.50	No. 47125 \$2.50	No. 47130 \$3.50
	50-60	No. 47116 \$2.55	No. 47121 \$3.70	No. 47126 \$2.70	No. 47131 \$3.70
	75-100	No. 47117 \$2.80	No. 47122 \$3.95	No. 47127 \$2.95	No. 47132 \$3.95
 Shallow Bowl	150-200	No. 47118 \$3.00	No. 47123 \$4.15	No. 47128 \$3.15	No. 47133 \$4.15
	25-40	No. 47155 \$2.05	No. 47156 \$3.20	No. 47157 \$2.20	No. 47158 \$3.20
	50-60	No. 47010 \$2.60	No. 47040 \$3.75	No. 47070 \$2.75	No. 47100 \$3.75
	75-100	No. 47011 \$2.70	No. 47041 \$3.85	No. 47071 \$2.85	No. 47101 \$3.85
	150	No. 47012 \$2.90	No. 47042 \$4.05	No. 47072 \$3.05	No. 47102 \$4.05
	200	No. 47013 \$3.30	No. 47043 \$4.45	No. 47073 \$3.45	No. 47103 \$4.45
	25-40	No. 47020 \$2.25	No. 47050 \$3.40	No. 47080 \$2.40	No. 47110 \$3.40
	50-60	No. 47021 \$2.55	No. 47051 \$3.70	No. 47081 \$2.70	No. 47111 \$3.70
 Deep Bowl	75-100	No. 47022 \$2.55	No. 47052 \$3.70	No. 47082 \$2.70	No. 47112 \$3.70
	150	No. 47024 \$3.05	No. 47054 \$4.20	No. 47084 \$3.20	No. 47114 \$4.20
	200				
 Symmetrical Angle	25-40				
	50-60				
	75-100				
	150-200				

Prices do not include wires or lamps.

BENJAMIN REFLECTORS

Benco Socket Reflector Combinations

BENCO SOCKETS


Note: The List Numbers and Prices in Chart cover combinations of Benjamin PORCELAIN ENAMELLED SHADE-REFLECTORS below, with sockets and fittings on the right.

Standard Package is 10 Pieces of one Number.

For Shipping Weights, add weight of reflector to weight of socket.



No. 4204
Keyless
Tapped 1/2"

Reflectors with Type "S" Holders	Size of Lamp	List Number	List Price
	25-40	47500	\$2.10
	50-60	47501	2.65
	75-100	47502	2.75
	150	47503	3.05
	200	47504	3.45

RLM Dome



Shallow Bowl



Deep Bowl



Symmetrical Angle

List Numbers include sockets with copper casings. Prices do not include wires or lamps.

Porcelain Enamelled Reflectors

"H" TYPE

Shallow Bowl Reflector



No. H410

With Neck to Fit Standard Shade Holders

	Size Reflector	Size Holder	Std. Pkg. Wgt.	Std. Pkg.	List Price
10	10"	2 1/4"	12 lbs.	10	\$0.95
12	12"	2 1/4"	18 lbs.	10	1.15
14	14"	2 1/4"	25 lbs.	10	1.50
16	16"	2 1/4"	30 lbs.	10	1.90

BENJAMIN REFLECTORS

Porcelain Enamelled Reflectors

"H" TYPE

Flat Cone Reflector



No. H515

With Neck to Fit Standard Shade Holders

List No.	Size Reflector	Size Holder	Std. Pkg. Wgt.	Std. Pkg.	List Price
H510	10"	2 1/4"	11 lbs.	10	\$0.90
H512	12"	2 1/4"	15 lbs.	10	1.15
H515	15"	2 1/4"	30 lbs.	10	1.65

PAINT ENAMELED TIN REFLECTORS

Finished Green Outside, Reflecting Surface White
Schedule A

FLAT CONE FOR WIDE LIGHT DISTRIBUTION



For use on railroad platforms, mills, machine shops and warehouses.

These reflectors are coated with a hard superior enamel that is very lasting. The reflecting qualities are efficient. The enamel can be easily cleaned with soap and water.

Made with collars for standard holder as specified below.

List No.	Diam. Inches	For Holder Inches	Std. Pkg.	Approx. Wt. Lbs. Std. Pkg.	Size of Lamp, Watts	List Price per 100
508	8	2 1/4	25	7	20-25	\$18.00
508A	10	2 1/4	25	10	25-40	23.00
508B	12	2 1/4	25	15	40-60	43.00
508C	14	2 1/4	25	22	100	50.00
508D	16	3 1/4	25	30	150-200	70.00

SHALLOW CONE FOR DISTRIBUTION BELOW THE HORIZONTAL



Made with collars for standard 2 1/4-inch shade rollers.

List No.	Diam. Inches	Std. Pkg.	Approx. Wt. Lbs. Std. Pkg.	Size of Lamps, Watts	List Price per 100
507C	12	25	18	40-60	\$48.00

DEEP CONE FOR EXTENSIVE DISTRIBUTION



For local light distribution over machines, work benches, tables, office use, etc.

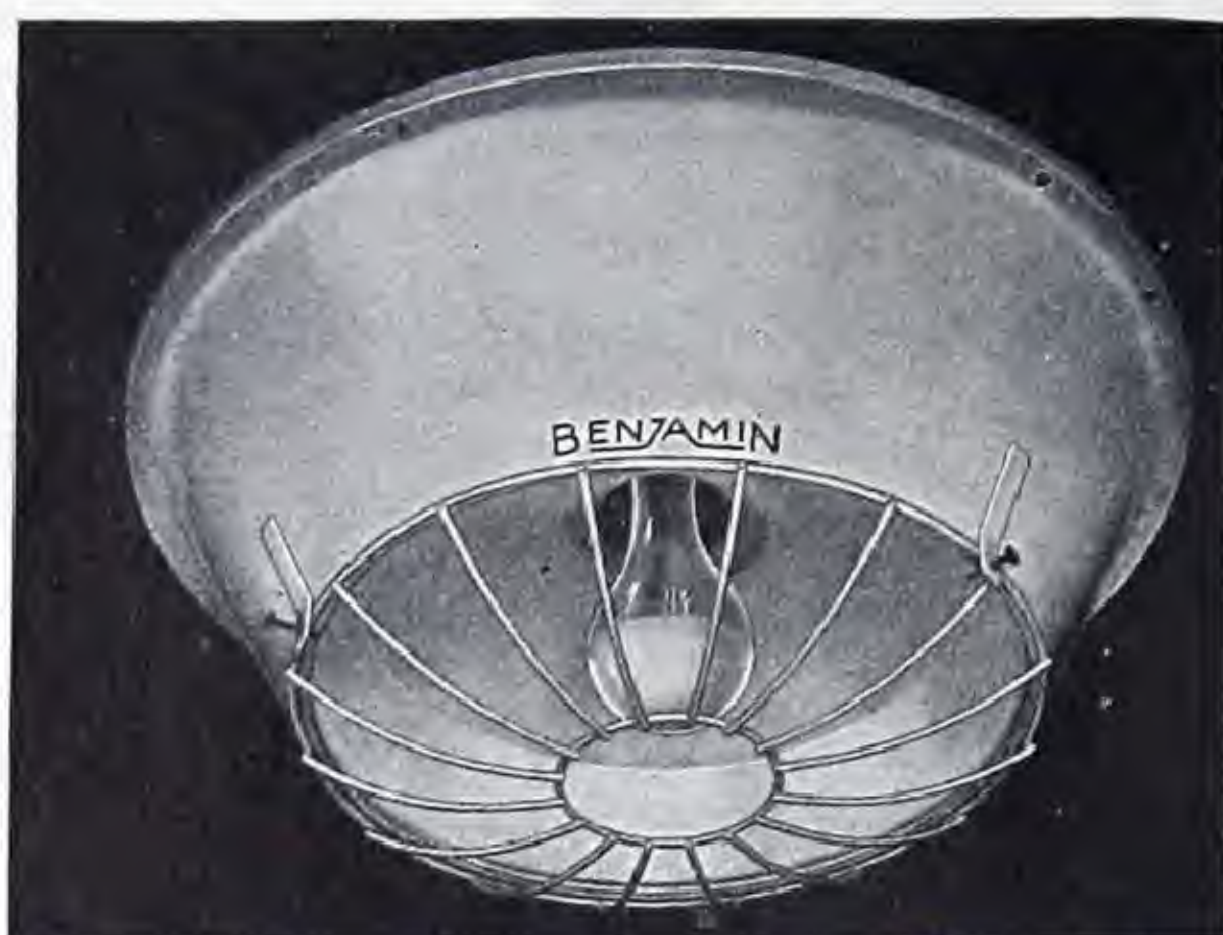
Made with collars for standard 2 1/4-inch shade holders.

List No.	Diam. Inches	Std. Pkg.	Approx. Wt. Lbs. Std. Pkg.	Size of Lamp, Watts	List Price per 100
547A	8	25	9	25	\$23.30
547B	10	25	12	25-40	27.20
547C	12	25	17	40-60	50.00

BENJAMIN REFLECTORS

Benjamin Gymnasium Fixture

With R.L.M. Dome Reflector



No. 6300

A completely guarded RLM dome fixture of good appearance, for locations where the lighting fixtures are subjected to frequent jars and hard knocks.

This fixture is particularly suitable for gymnasiums, indoor baseball courts, volley ball courts, indoor sport arenas and similar locations.

Special features of this fixture are:

1. Longer life for reflector and lamp, as they are completely enclosed by a heavy gauge metal canopy and a heavy basket type wire guard.
2. Good illumination. Standard RLM Dome Reflector assures good illumination over horizontal and vertical surfaces.
3. Easy lamp removal. It is not necessary to remove guard for lamp replacement. A large opening in the bottom of the guard permits passage of lamp.
4. Easy cleaning. The loosening of three thumb set screws allows complete removal of guard and gives free access to reflector.
5. Attractive appearance. Canopy and guard are finished in white paint enamel.

Construction. Each unit consists of heavy gauge steel canopy and wire guard, medium or mogul base keyless socket, standard RLM dome reflector, and four steel straps for attaching to the ceiling. The canopy attaches to the straps by means of 4 large machine screws which are furnished.

Finish. Steel canopy and wire guard are white paint enamelled. Reflector is white porcelain enamelled steel.

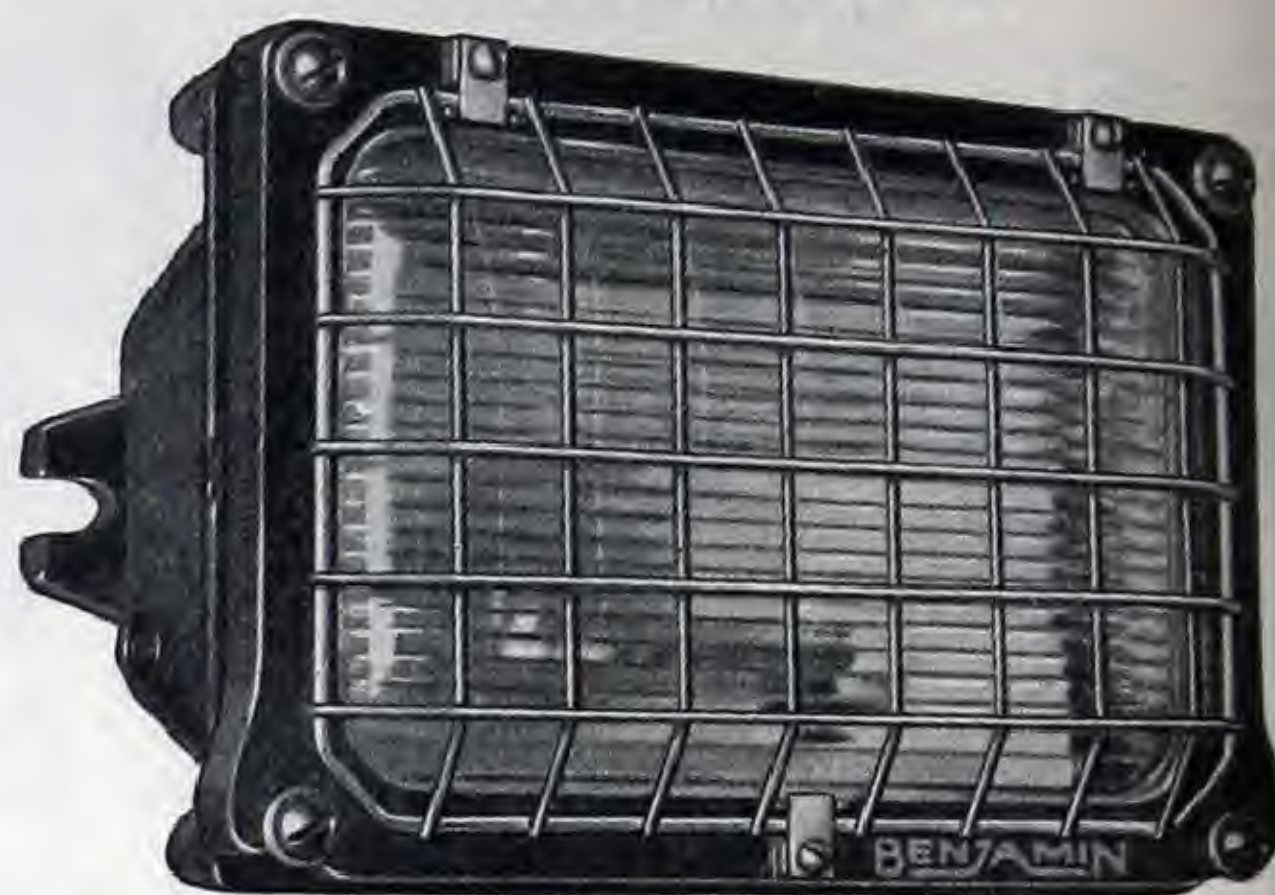
List No.	Size of Lamps, Watts	Description	Std. Pkg.	Std. Shpg. Pkg. Wgt.	List Price
6300	200	With Medium Base Receptacle	4	85	\$13.00
6301	300-500	With Mogul Base Receptacle	2	55	19.00

No. 6300 diameter 24", depth 9 $\frac{3}{16}$ ", reflector diameter 16".
No. 6301 diameter 24", depth 13 $\frac{1}{2}$ ", reflector diameter 18".

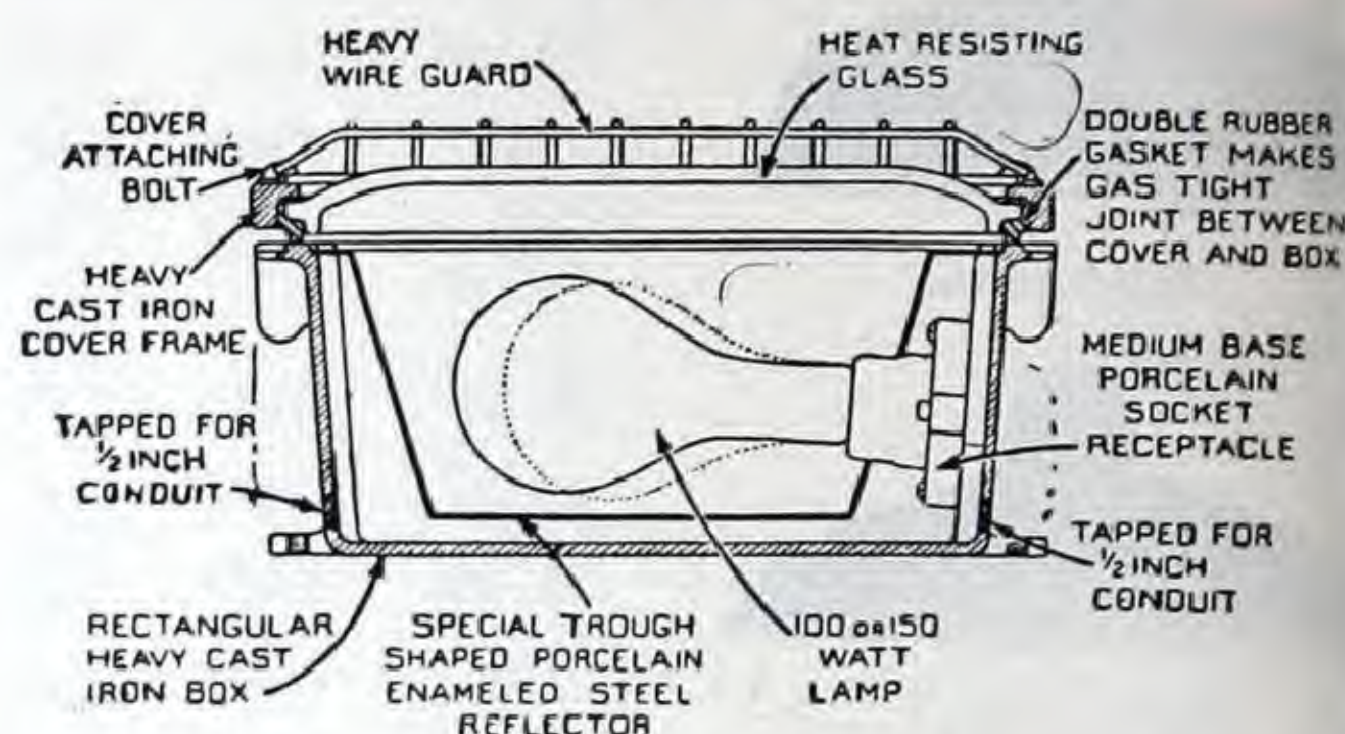
Prices do not include wires or lamps.

BENJAMIN REFLECTORS

Pit Lighting Fixtures



No. 5715



For lighting railroad pits, electric and bus line service pits, automobile service pits, hydraulic car greasing lifts, washing racks, viaducts, tunnels and similar locations. Suitable for built-in or surface installations.

The Benjamin Pit Light does an unusually effective lighting job. When installed according to recommendations, the unit will uniformly illuminate both the entire pit area and the under chassis of the vehicle to be serviced.

Designed for the severest service, either in or out-of-doors the Pit Lighting Unit can be relied upon to stand up indefinitely under more than normal abuse. Special Benjamin features permit proper maintenance at a low cost.

In pits without side walls, units can be suspended by means of lugs, provided with the fixture.

Gas-Proof and Water-Tight

The Benjamin Pit Lighting Fixture is entirely water-tight and gas-proof. All joints of the fixture are effectively sealed against gas, vapor, water and moisture. A heavy duty, molded rubber gasket is used to seal the joint between the cover frame and the body of the fixture.

Unusually Sturdy Construction

Outer rectangular box is of cast iron and cover frame is of the same material. Heat-resisting glass lens, mounted in cover frame, is protected from mechanical injury by heavy wire guard.

Easy to Maintain

The taking out of one screw allows wire guard to be swung back for easy cleaning of smooth outer surface of cover glass. The removal of two screws and the loosening of two others allow the removal of the cover, including cover glass and guard, for relamping of fixture.

Tapping and Finish

Boxes are tapped at both ends for 1/2 inch conduit standard — 3/4 inch if specified.

Finish—Reflecting surface is white porcelain; box and cover are dead black; wire guard is tinned dipped.

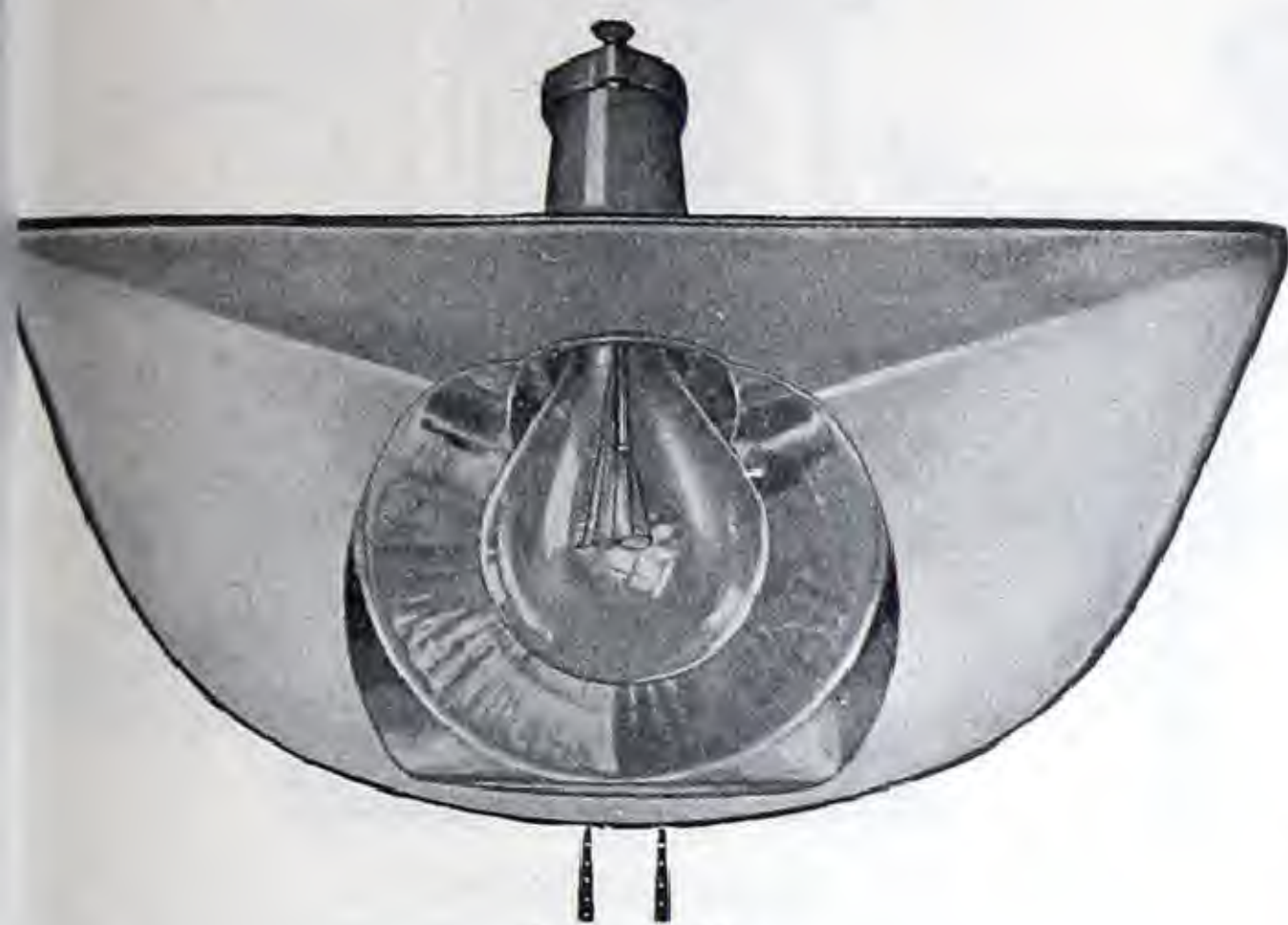
List No.	Size of Lamp, Watts	Dimensions in Inches	Ship. Lbs. Each	List Price
5715	100, 150	6 $\frac{1}{4}$ 12 $\frac{1}{2}$ 8 $\frac{3}{8}$	31	\$13.75

Prices do not include Wires or Lamps

BENJAMIN REFLECTORS

Duo-Service Floodlight

A Combination Floodlighting Projector and Diffusing Reflector



No. 5763

RECOMMENDED FOR LIGHTING OF

Gasoline Service Stations

Floodlighting the building and simultaneous general lighting of the service areas and driveways.

Gardens and Parks

Floodlighting statues or monuments while providing at the same time general illumination for adjacent surroundings.

Amusement Parks

General lighting of the board walk and the front of stand while at the same time floodlighting racks or objects at the back of stand.

Used Car Lots

General illumination of the lot and simultaneous floodlighting of groups of cars to which particular attention is to be directed.

Barbecue Stands

General lighting of the parking area and floodlighting the building.

Beaches

General lighting of a beach and floodlighting the diving board or float.

Golf Practice Courses

General lighting of the tees and adjacent areas while at the same time floodlighting the fairway.

Coal and Material Handling Yards

General lighting with the beam centered on the weighing scale, or to call attention to some particular hazard.

The Benjamin Duo-Service Floodlight gives an opportunity to meet the modern requirements of illuminating and floodlighting outdoor areas by providing:

A. Uniform general illumination of a ground area, with the simultaneous floodlighting, to a higher intensity, of a vertical surface within or close to the ground area, as shown below.

B. Uniform general illumination of a ground area, while at the same time floodlighting, to a higher intensity, an area or horizontal surface within or close to the area of general illumination.

C. Uniform general illumination of a ground area, while at the same time floodlighting a horizontal surface at some distance from the general area.

High Intensity Floodlighting Beam

A special highly-polished metal projector of high reflecting value, utilizing a portion of the light from a 1000 watt standard clear Mazda lamp, produces a floodlighting beam of about 1000 candles that will centre immediate attention upon the object or area to be emphasized. The balance of the light from the lamp is used for general illumination of the surrounding area by the diffusing reflector.

BENJAMIN REFLECTORS

Duo-Service Floodlight

A Combination Floodlighting Projector and Diffusing Reflector

DUO-SERVICE FLOODLIGHT

No. 5763

Reflector—Specially shaped heavy-gauge metal reflector is finished inside and out in Benjamin porcelain enamel.

Projector—Highly polished chromium-plated projector is permanently positioned behind lamp in the reflector.

Hood—Heavy cast aluminum hood encloses the easy-to-wire porcelain socket. Hood cover has thumb-screw adjustment for focusing lamp to projector.

Bracket Arm—Universally adjustable bracket arm of cast aluminum is supplied with cast iron ball-type ornament. Bracket fits over standard 1½-inch iron pipe and is held in position by two set screws.

Finish—Reflector is finished green outside, white inside; projector is highly polished chromium finish; all metal fittings not cast aluminum are cadmium plated.

BENJAMIN DIFFUSING FLOODLIGHT

No. 5765

Benjamin Diffusing Floodlight—the Duo-Service Floodlight without the chromium-plated projector—may be effectively utilized where additional general illumination of ground areas is required or where the concentrated floodlighting beam from the projector is not desired.

Duo-Service Floodlight

List No.	Size of Lamp Watts	Std. Pkg.	Shipping Wgt., Lbs. Std. Pkg.	List Price
5763	750-1000-1500	1	34	\$40.00

Diffusing Floodlight

List No.	Size of Lamp Watts	Std. Pkg.	Shipping Wgt., Lbs. Std. Pkg.	List Price
5765	750-1000-1500	1	32	\$32.50

DUO-SERVICE FLOODLIGHT SPREAD BEAM TYPE

(No. 5764)

With Inner Reflector of Oxidized Aluminum

The application of this Benjamin Duo-Service Floodlight is the floodlighting of a building or other vertical surface and the simultaneous general lighting of the surrounding ground area.

In many cases the Benjamin Duo-Service Floodlight, Number 5763, cannot be mounted a sufficient distance back from the building or vertical surface to be floodlighted to permit the effective utilization of the high candle power, concentrated, floodlighting beam. As a solution to the floodlighting problem in such instances, the New Spread Beam Duo-Service Floodlight, Number 5764, is recommended. It is identical in construction with Number 5763, previously described, except that an aluminum spread type inner reflector, finished in a special aluminum oxide, is provided in place of the chromium finished inner projector.

Area Effectively Lighted By One Unit

Mounting Height of Unit	†A	†B	†C
20'	50'	83'	70'
22'	55'	92'	77'
24'	60'	100'	84'
26'	65'	108'	91'
28'	70'	117'	98'
30'	75'	127'	105'

List No.	Size of Lamp Watts	Std. Pkg.	Shipping Wgt., Lbs. Std. Pkg.	List Price
5764	750, 1000, 1500	1	33	\$35.00

†For explanation of A, B, C, see introduction to this unit in previous column.

BENJAMIN REFLECTORS

"Play Area" Floodlights



No. 5752

The Benjamin Play Area Floodlight, List No. 5752, is an open-type, wide angle, diffusing floodlight with a reflecting surface of special diffusing porcelain enamel in combination with an inner reflector of oxidized aluminum.

This distinctive design results in high initial efficiency and improved control of the light. As both the porcelain enamel and oxidized aluminum reflecting surfaces are impervious to the deterioration of weather and other atmospheric conditions, their high efficiency is maintained over a long period.

The Benjamin Play-Area Floodlight meets the following modern requirements of lighting for outdoor sports and recreation:

- A. Provides uniform and strong illumination on the ground to the front and sides of the unit.
- B. Directs adequate light on vertical surfaces to be illuminated, such as players, apparatus and other objects.
- C. Directs part of the light into the upper areas, permitting players and spectators to follow an object in flight, such as a baseball or football.
- D. Minimizes annoying glare by shielding the lamp, and prevents it from interfering with the vision of players or spectators.

For Lighting:

Football and athletic fields, baseball diamonds, miniature golf courses, race tracks, horseshoe pitching courts playgrounds, swimming pools, tennis courts, golf practice greens, bathing beaches, croquet courts, pitch and putt golf courses, parking lots, barbecue stands, industrial yard areas.

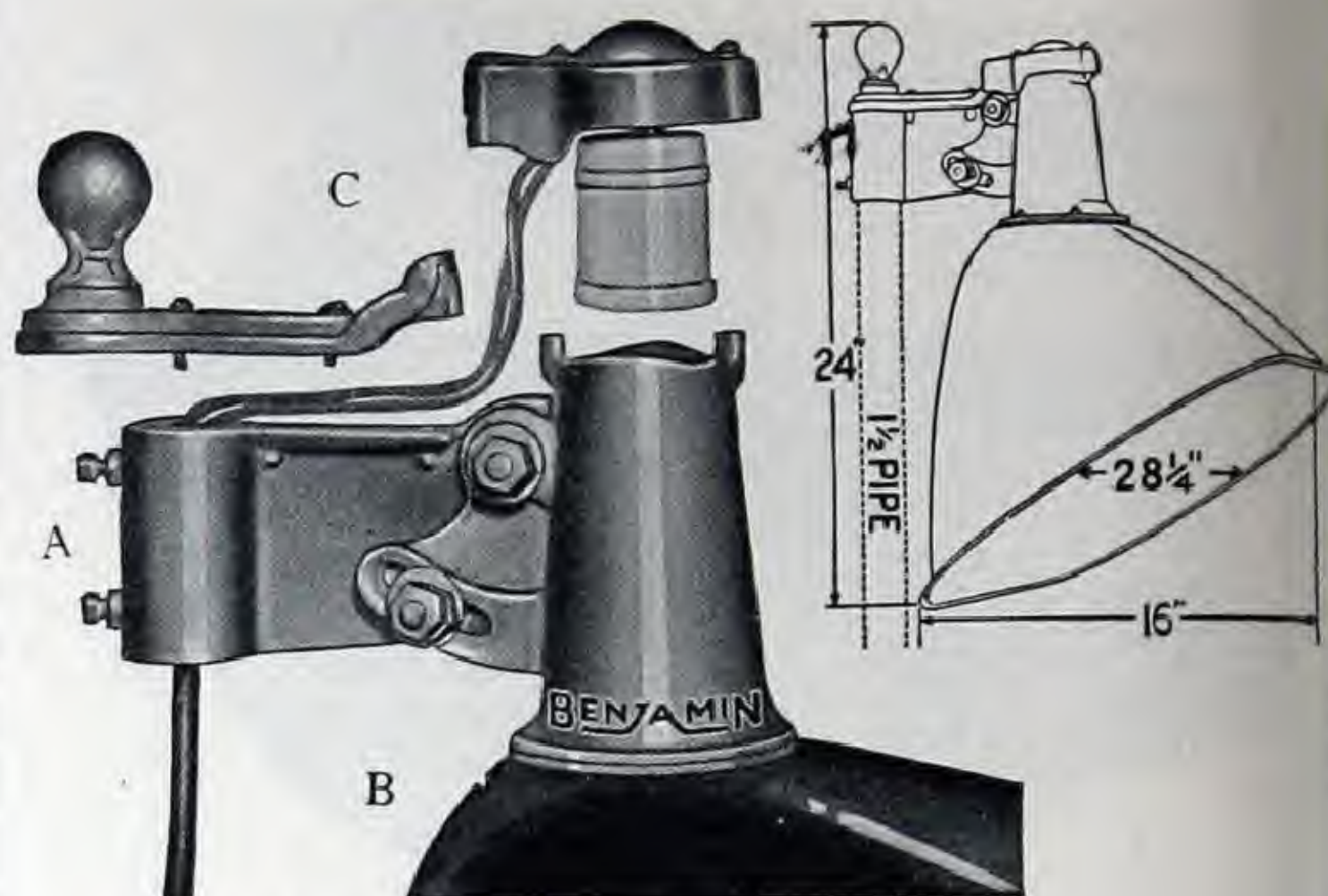
In addition to its particular suitability for lighting sport and recreational areas, this floodlight also has many commercial and industrial applications, such as lighting certain types of gasoline service stations and industrial yards.

Fully Adjustable

A wide range of adjustment, both horizontally and vertically, is provided by the rugged mounting bracket of the Benjamin Play-Area Floodlight. The light cut-off of the reflector, at the front, can be raised or lowered over an angle of 30 degrees; a positive clamping mechanism in the bracket locks the fixture at any desired position throughout this range.

BENJAMIN REFLECTORS

"Play Area" Floodlights



- A—Lateral Positioning Set Screws
- B—Vertical Positioning Adjustments
- C—Bracket Arm Cover

Strong and Weatherproof

The Benjamin Play-Area Floodlight is ruggedly and durably constructed for outdoor service and is absolutely weatherproof. The reflector is porcelain enamelled inside and out—it never requires painting or refinishing and is easily cleaned with soap and water. The inner reflector, of aluminum oxide finish, is non-corrosive. Hood and mounting bracket are durable aluminum castings.

Easy to Wire and Install

Unique design of the hood and bracket assembly reduces time in wiring and assures a neat, workmanlike job with all leads enclosed. Loosening of four screws, two in the hood cap and two in the bracket cover, permits quick removal of these parts for access to the leads and wiring connections.

The easy-to-wire, Mogul base porcelain socket is removable with the hood cap. The bracket arm cover is grooved to receive the wire leads so that when cover and hood cap are assembled in position the wiring is completely enclosed and protected.

Reflector—A specially designed floodlighting shape with a reflecting surface of highly efficient, special diffusing porcelain enamel which minimizes glare from specular reflection.

Inner Reflector—Of aluminum oxide finish is permanently positioned behind the lamp.

Bracket Arm—Bracket arm is a rugged aluminum casting with a ball ornament of cast iron. Bracket mounts directly over a 1 1/2 inch iron pipe mast and is locked in position by two set screws.

Hood—Rugged cast aluminum hood assembly carries the porcelain socket.

Socket—Easy-to-wire Mogul base porcelain socket—National Electrical Code and Canadian Electrical Code standard.

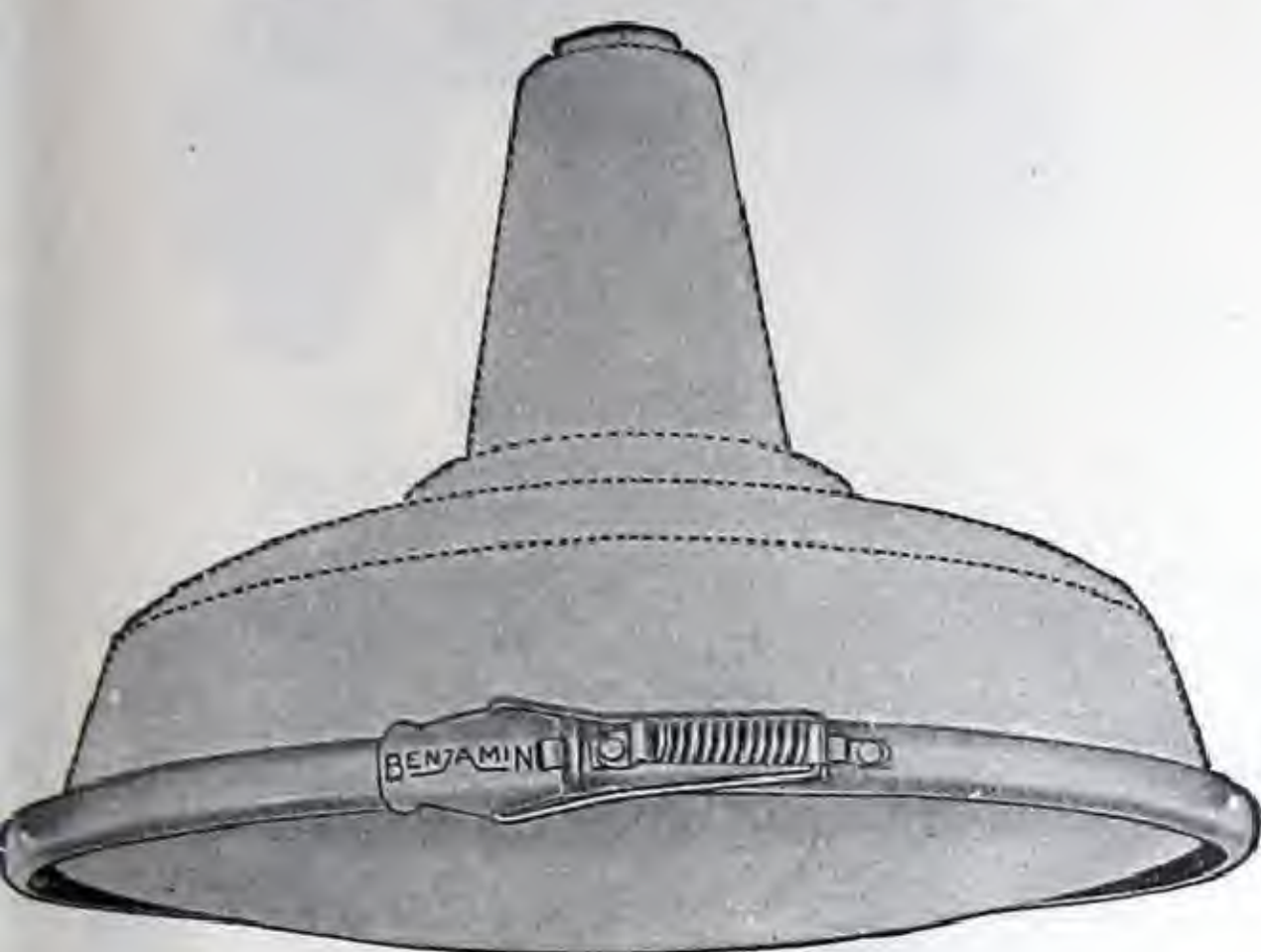
Finish—Reflector is finished in porcelain enamel—green outside, white inside. Inner reflector is non-corrosive aluminum oxide. All metal fittings are aluminum castings or finished in cadmium plate to resist corrosion.

List No.	Size of Lamp in Watts	Standard Package	Approx. Ship. Wgt. Lbs., Stand. Pkg.	List Price
5752	750, 1000, 1500	1	33	\$32.50

Prices do not include Wires or Lamps

BENJAMIN REFLECTORS

Dust Tight Glass Covers



No. 6412

The efficiency of any lighting system, especially in those locations where excessive dust and dirt is present, is dependent on thorough and frequent cleaning of the lighting equipment. The Benjamin Dust Tight Glass Cover readily attaches to Benjamin Reflector Equipment and affords an economical method of keeping the reflectors clean. With the Dust Tight Cover, it is necessary only to wipe off the smooth outer surface of the glass disc, as compared with cleaning the lamp and reflecting surfaces of open reflector equipment. Where combustible fibres or materials producing combustible flyings are handled or manufactured, the Benjamin Dust Tight Cover attached to the bottom of Benjamin reflectors will keep particles from collecting on hot lamps, as required by the Canadian and National Electrical Code. These hazardous locations include textile mills, cotton gins, sawworking plants and similar establishments. This cover attached to Benjamin one piece lighting equipment will provide the best general illumination, while sealing the lamp and reflecting surfaces against quantities of dust collecting.

Ease of Attachment

The cover is put on by first releasing the locking lever, which expands the band to its greatest diameter. Then the band is hooked over the reflector bead, and the cover is pushed up until the band engages the reflector bead on all sides. With cover in proper position for gripping reflector, the locking lever is snapped into closed position.

Light Weight

The cover in most cases weighs less than the reflector, and is easily handled.

Dependable Service at all Times

The ingenious locking lever with compression spring gives positive tension on the band of the cover at all times. It is practically impossible for the cover to work loose from the reflector, for, with the compression spring principle, the band will never be released, even if the spring breaks.

RLM Dome, Shallow Bowl, Deep Bowl, and Symmetrical Angle Reflectors

COMPLETE COVER WITH BAND, GLASS DISC AND GASKET

For Reflector	List No.	List No.	Ship. Wgt. Lbs.	Standard Package	List Price
12"	6462	6482	12	5	\$3.75
14"	6464	6484	16	5	4.25
16"	6466	6486	21	5	5.00
18"	6468	6488	24	5	5.75

GASKET ONLY

Size	Ship. Wt. Oz.	List Price	Standard Package	List No.	Ship. Wgt. Lbs.	List Price
12"	1 1/2	\$0.80	5	6462	13	\$1.00
14"	1 1/2	.90	5	6464	19 1/2	1.25
16"	2	1.00	5	6466	23	1.50
18"	2	1.20	5	6468	36	1.75

GLASS DISC ONLY

BENJAMIN GUARDS

Locking Lamp Guard

Attachable to Dome or Bowl Type Reflectors with Bead



No. 1388 Guard only

Construction. Heavy steel wire guard with welded joints and steel clamp for attaching to bead of reflector. No tools are required for attaching to reflector. Diameter given is that of the reflector which the guard fits. For padlock with two keys add 65 cents, list.

Finish. Bright tin applied after welding parts. Clamp is cadmium plated.

List No.	Size in Inches Dia.	Depth	Std. Pkg.	List Price
1383.....	10	2 3/4	10	\$1.20
1386.....	12	3 3/4	10	1.50
1388.....	14	5	10	1.80
1390.....	15	6 3/4	10	2.00
1392.....	16	4 3/4	10	2.10
1394.....	18	6 1/4	10	2.50
1396.....	20	4	10	3.00

Prices in every case are for the guard only.



No. 1415

No. 1400

No. 31002B

Guard for Fixture Globe

For Moisture and Dust Proof Fixture

Construction. Guard has a wide mesh of heavy tinned wire, and screws on outside of Moisture and Dustproof Fixtures, List Nos. 663-DT and 657-DT.

Finish. Bright tin applied after welding parts.

List No.	Description	Shpg. Wgt. Lbs.	Std. Pkg.	List Price
1415	For Fixtures List Nos. 663-DT and 657-DT.....	6	10	\$1.30

Prices in every case are for guard only.

Outlet Box Lamp Guard

This guard is to protect a lamp attached directly to outlet box, and is particularly adapted for use on low ceilings, side walls, foot lights, etc.

Construction. Guard base has supporting screw holes to correspond to those in outlet box cover, and is slotted to fit either 3 1/4 inch or 4 inch boxes. Will take 40 to 60 watt lamps.

Finish. Bright tin applied after welding parts.

1400	4	5 3/4	8	10	\$0.90
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Prices in every case are for guard only.

BENJAMIN FITTINGS



No. 3380
(Outlet Box and Conduit
not furnished)



No. 6030



No. 3366



No. 6202

45° Ball Fixture Aligner

Outlet Box Cover Type

List No. 3380 Ball Fixture Aligner, although permitting the fixture to hang plumb and protecting it against mechanical jars and shocks, is comparatively inexpensive, costing no more than an ordinary outlet box cover and fixture stud. It consists of a cast iron ball, which is mounted between two riveted steel plates. Ball, which is tapped for $\frac{1}{2}$ inch iron pipe, has hexagon neck, which affords a convenient means for gripping and holding ball when iron pipe is screwed in. Cover attaches directly to standard $3\frac{1}{4}$ or 4 inch outlet boxes by means of two screws. Finish is galvanized.

List No.	Description	For Box	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
3380	Aligner only, with steel cover	$3\frac{1}{4}$ and 4 inch	$\frac{1}{2}$ "	9	10	\$0.45

Aligner with Shock Absorber

Outlet Box Cover Type

Benjamin Aligner and Shock Absorber, List No. 3366, has shock absorbing feature and flexible knuckle, permitting fixture to hang plumb. Mounting screw holes are elongated. Fitting is supported by a steel cover, which fastens to standard 4 inch outlet boxes. Finish is galvanized.

List No.	Description	For Box	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
3366	Aligner with steel cover	4 inch	$\frac{1}{2}$ "	8	10	\$1.00

Shock Absorber Suspension Fitting

List No.	Description	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
6030	Galvanized Iron	$\frac{1}{2}$ "	11	10	\$0.90

Shock Absorber Cross Arm

List No.	Description	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
6202	With Shock Absorber	$\frac{1}{2}$ "	20	10	\$ 1.40
6200	Less Shock Absorber	$\frac{1}{2}$ "	19	10	1.30

BENJAMIN WEATHERPROOF FITTING



No. 6203

Cross Arm

With Porcelain Wire Openings

List No.	Bottom Thread	Top Tapped	Std. Pkg. Shpg. Wgt.	Std. Pkg.	List Price
6203	$\frac{3}{4}$ "	$\frac{3}{4}$ "	30	10	\$1.50
6205	$\frac{1}{2}$ "	$\frac{3}{4}$ "	28	10	1.50



No. 6037M



No. 6039M

Clamp Type Cable Suspension Fitting

With Cross Arm

This type of Benjamin Cable Suspension Fitting is equipped with a cross arm, having porcelain knobs at each end for supporting current carrying wires. A hook type clamp provided which accommodates $\frac{3}{16}$ inch to $\frac{1}{2}$ inch diameter messenger cable. Iron parts are galvanized finish.

List No.	Size Tapped	Std. Pkg. Shpg. Wgt.	Std. Pkg.	List Price
6036	$\frac{1}{2}$ "	22	10	\$1.50
6037M	$\frac{1}{2}$ " (Male)	22	10	1.50

Without Cross Arm

The Benjamin Cable Suspension Fitting without the Cross Arm is similar in other respects to the above type. Iron parts are galvanized finish.

6038	$\frac{1}{2}$ "	15	10	\$1.50
6039M	$\frac{1}{2}$ " (Male)	15	10	1.50

Prices in every case are for fittings only and do not include wires, reflectors or lamps.



No. 6029



No. 6028



No. 6031M



No. 6049

Suspension Fittings

Suspension Fittings

With Non-Insulated Wire Openings

List No.	Size Tapped	Std. Pkg. Shpg. Wgt.	Std. Pkg.	List Price
6029	$\frac{1}{2}$ "	9 $\frac{1}{2}$	10	\$0.90
6028	$\frac{1}{2}$ "	5 $\frac{1}{2}$	10	

With Porcelain Wire Openings

List No.	Size Tapped	Std. Pkg. Shpg. Wgt.	Std. Pkg.	List Price
6031	$\frac{1}{2}$ "	10 $\frac{1}{2}$	10	\$0.90
6031M	$\frac{1}{2}$ " (Male)	11	10	1.00
6049M	$\frac{1}{2}$ " (Male)	14 $\frac{1}{2}$	10	1.00
6049V	$\frac{3}{4}$ " (Male)	15	10	1.00

BENJAMIN WEATHERPROOF FITTINGS



No. 5025



No. 5026

Pole and Wall Fittings

st No. 5025 has curved back to fit pole, and both styles
wire entrance slots for internal wiring.

List No.	Kind of Fitting	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
5025	Pole	1/2"	10	10	\$0.35
5026	Wall	1/2"	8	10	.35



No. 5027



No. 5031

Wall Fittings

st	Description	Size Tapped	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
7	Without Wire openings.....	3/4"	15	10	\$0.65
8	Without Wire openings.....	1/2"	15	10	.65
1	With wire openings.....	3/4"	18	10	1.15
2	With wire openings.....	1/2"	19 1/2	10	1.15

Iron parts are galvanized



No. 5040

Iron Brackets

With Wall Fitting

st	Size Pipe	Std. Lgth	Description	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
0	3/4"	40"	With Brace...	10	83	\$4.00
6	3/4"x1/2"	....	Ball Fitting only.....	10	7	.55



No. 5036

Iron Goosenecks

Without Fitting

List No.	Size in Inches	List No. Fitting	Ship. Wgt., Lbs. Std. Pkg.	Std. Pkg.	List Price
5036	30 x 1/2	.....	23	10	\$1.00
5037	40 x 3/4	.....	55	10	1.50

BENJAMIN WEATHERPROOF FITTINGS



No. 6180

Iron Mast Arm

With Chains and 3/4" x 1/2" Fitting

List No.	Std. Length	Addit. Per Ft.	Size Pipe	Sh'p'g Wgt. Lbs. Std. Pkg.	Std. Pkg.	List Price
6180.....	36"	\$0.80	3/4"	105	10	\$3.50

Mast arms furnished up to 10 feet in length.

All iron parts are galvanized.

BENJAMIN REFLECTORS

Ben-ox (Interchangeable) Devices

Keyless, 660 watts, 600 volts; Pull Chain, 660 watts, 250 volts—Medium Base.



No. 4980



No. 4712 Socket



No. 4706 Socket



No. 4975

KEYLESS SOCKETS

With Clamping Ring—For Use Without Reflector

List No.	Finish	Size Tapped	Std. Wgt. Lbs. Pkg.	Std. Pkg.	List Price
4700	Nat. Copper.....	1/2"	4	10	\$1.10
4701	Nat. Copper.....	3/8"	4	10	1.10

Without Clamping Ring—For Use With Reflector

4712	Nat. Copper.....	1/2"	4	10	\$0.95
4713	Nat. Copper.....	3/8"	4	10	.95

PULL CHAIN SOCKETS

4706	Nat. Copper.....	1/2"	6	10	\$2.10
4707	Nat. Copper.....	3/8"	6	10	2.10

KEYLESS TYPE CAST OUTLET BOX FITTINGS

With Clamping Ring—For Use Without Reflector

List No.	For (Kind of Box)	Screw Hole Centers	Flange Dia.	Std. Wgt. Lbs. Pkg.	Std. Pkg.	List Price
4970	Regular 4"...	3 1/2"	4 1/2"	13	10	\$1.25

Without Clamping Ring—For Use With Reflector

4980	Regular 4"...	3 1/2"	4 1/2"	13	10	\$1.10
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PULL CHAIN TYPE CAST OUTLET BOX FITTINGS

4975	Regular 4"...	3 1/2"	4 1/2"	15	10	\$2.10
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BENJAMIN REFLECTORS

Sockets for Reflectors

("X" Type and "Sturdox Type")

The sockets on this page are listed for replacement on Benjamin "X Type" and "Sturdox Type" Lighting Equipment. The styles of equipment on which they are used are shown by the group headings.



No. 4651

Keyless Socket

Medium Base—660 watts, 600 volts. Mogul Base—1500 watts, 600 volts.

This socket is of two-piece porcelain and is supplied with Benjamin Lamp Grip.

For "X Type" Reflectors

List No.	Size Tapped Ins.	Description	Std. Shipping Wgt.	Pkg.	List Price
4651	1/2	Medium Base Socket and X Type Fitting.....	7 1/2	10	\$1.05
88	..	Medium Base Socket without X Type Fitting....	8	10	.60
4657	1/2	Mogul Base Socket and X Type Fitting.....	12 1/2	10	1.50
698	..	Mogul Base Socket without X Type Fitting....	10	10	1.05
For "Sturdox Type" Reflectors					
4505	1/2	Medium Base Socket with XR Type Fitting.....	10 1/2	10	\$1.05
4511	..	Medium Base Socket without XR Type Fitting..	8	10	.60
4506	1/2	Mogul Base Socket, XR Type Fitting.....	12 1/2	10	1.50
4515	..	Mogul Base Socket less XR Type Fitting.....	10	10	1.05



No. 4676

Shock Absorbing Keyless Socket

For "X Type" and "Sturdox Type" Reflectors

List No.	Size Tapped Ins.	Description	Std. Shipping Wgt.	Pkg.	List Price
4767	1/2	Medium Base Socket and X Type Fitting.....	9 1/2	10	\$1.15
4670	1/2	Mogul Base Socket and X Type Fitting.....	12 1/2	10	1.60

Standard tapping for sockets is 1/2 inch iron pipe size. Sockets will be supplied tapped for 3/4 or 3/8 inch pipe at no extra charge when specified on order.

BENJAMIN REFLECTORS

Sockets for Reflectors



No. 4528

Self-Locking—Medium Base Socket

660 Watts, 600 Volts

This socket locks automatically when a lamp is screwed in. The key must be used to remove the lamp.

The body only, List No. 586, which contains the self-locking feature, may be substituted for the body of Socket No. 88 in fixtures now in use. This can be accomplished without touching the wiring.

Key, List No. 1399, is furnished only with an original installation of Benjamin Self-Locking Sockets. Additional keys may be purchased only on order of an executive officer or member of a firm having such an installation.

For "X Type" and "Sturdox Type" Reflectors

List No.	Size Tapped Ins.	Description	Std. Shipping Wgt.	Pkg.	List Price
4528	1/2	Socket and X Type Fitting	9 1/2	10	\$1.50
86	..	Socket without X Type Fitting.....	8	10	1.10
586	..	Locking Body Element only.....	6	10	.90
1399	..	Key only.....	1/2	1	1.00
Self-Locking—Shock Absorbing Socket					
4548	1/2	Socket and X Type Fitting	10	10	1.60



No. 4661

Pull Chain—Medium Base Socket

660 Watts, 250 Volts

This socket has two-piece molded composition body. The pull chain, as well as all other interior parts, is thoroughly insulated and, when installed in Benjamin Reflector Equipment, it can be used outdoors. Regularly supplied with Benjamin Lamp Grip.

For "X Type" and "Sturdox Type" Reflectors

List No.	Size Tapped Ins.	Description	Std. Shipping Wgt.	Pkg.	List Price
4661	1/2	Socket, stirrup, X Type Fitting.....	8	10	\$1.80

Standard tapping for sockets is 1/2 inch iron pipe size. Sockets will be supplied tapped for 3/4 or 3/8 inch pipe at no extra charge when specified on order.

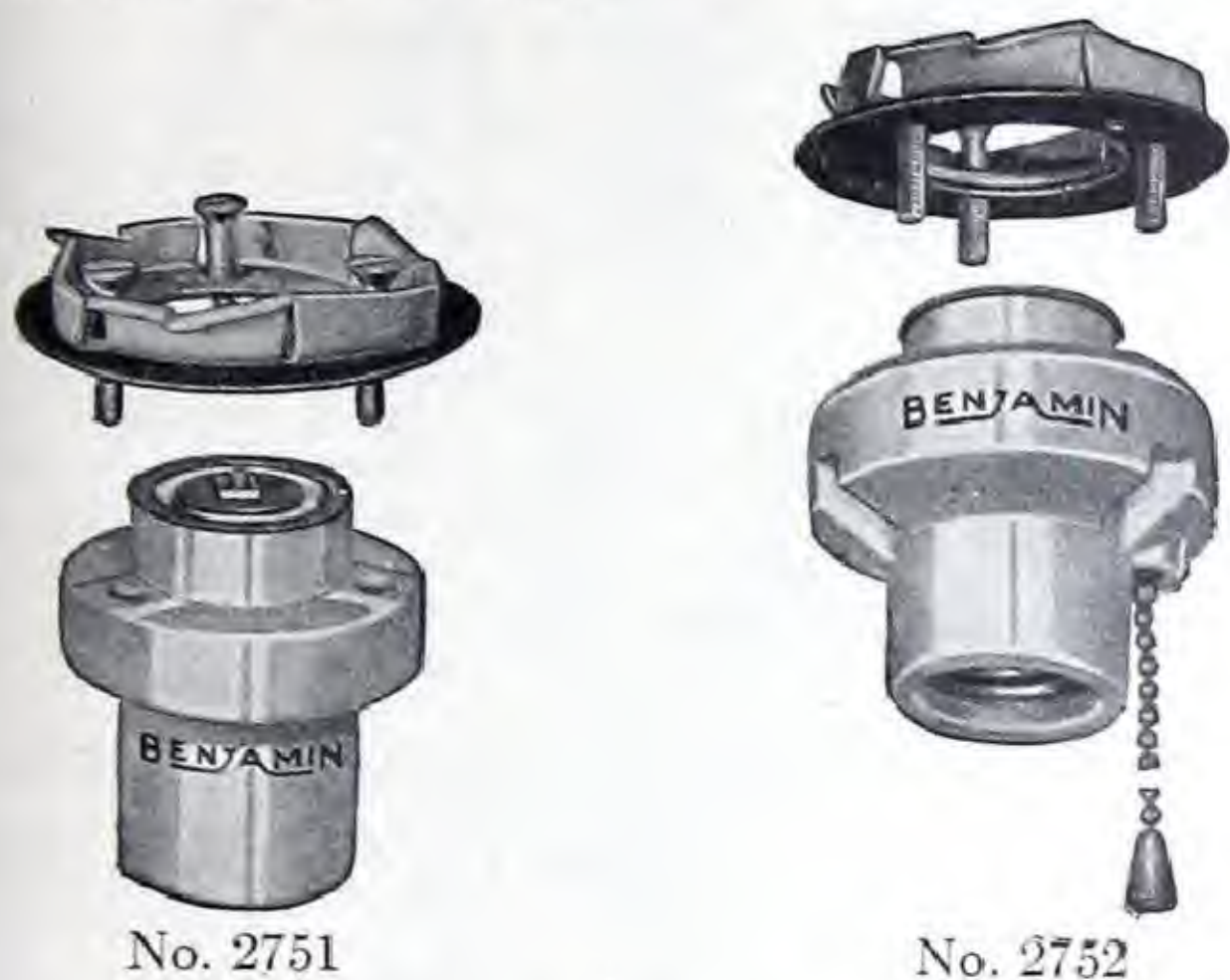
BENJAMIN REFLECTORS

"Type 79"

LAMP HOLDERS AND FITTINGS

The lamp holder assemblies shown are for use in Benjamin "Type 79" Reflector Equipment.

These assemblies can be assembled to the reflector in a few simple operations. First, the lamp holder only is slipped through the reflector neck into notches provided in the top of the reflector. Then, the bayonet plate, with attaching screws and gasket, is set on top of the reflector with the screws lined up with the openings pierced in the reflector top. These screws are then turned down until they engage the threaded openings provided in the lamp holder base. In this manner the reflector is rigidly supported between the lamp holder top and the bayonet plate of the assembly.



KEYLESS LAMP HOLDER ASSEMBLY

Medium Base— 660 Watts, 600 Volts

Mogul Base—1500 Watts, 600 Volts

No. 2751 Assembly is standard equipment for Benjamin Medium Base, and the No. 2760 for Benjamin Mogul Base "Type 79" Reflector Equipment.

Assembly consists of a one-piece porcelain keyless medium or mogul base lamp holder and a "Type 79" bayonet attaching plate with composition gasket and attaching screws. Plate and screws are Cadmium plated.

List No.	Description	Ship.		Std. Pkg.	List Price
		Wgt., Lbs.	Std. Pkg.		
1	Medium Base Complete Assembly	8½	10		\$0.55
0	Mogul Base Complete Assembly.....	13½	10		1.10

Pull Chain Medium Base Lamp Holder Assembly

660 Watts, 250 Volts

No. 2752 Pull Chain Lamp Holder Assembly, with the exclusive "Benjamin Inner Pull Feature," provides a reliable method of individually controlling Benjamin Medium Base "Type 79" Reflector Equipment.

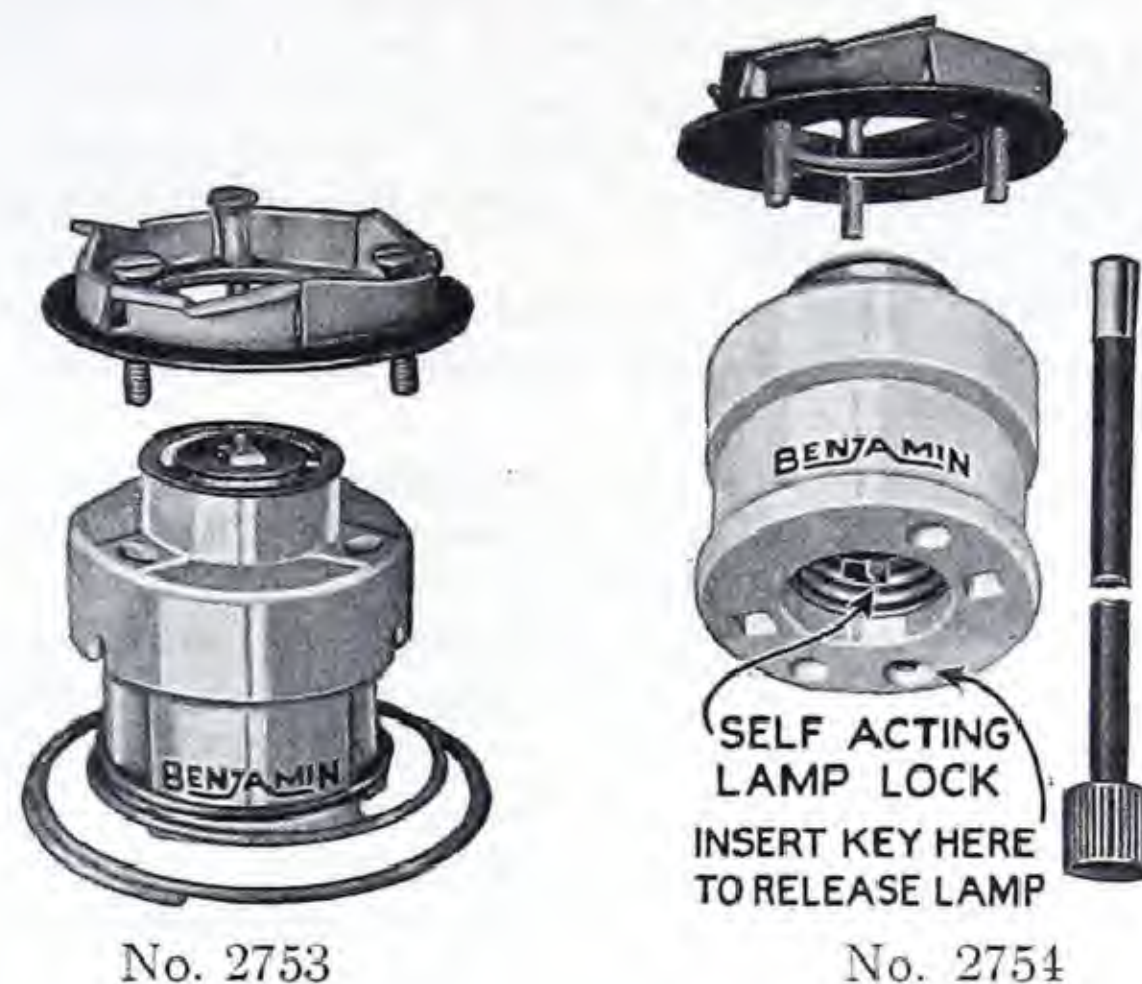
Assembly consists of a one-piece medium base porcelain lamp holder and a "Type 79" bayonet attaching plate with composition gasket and attaching screws. Attaching plate and screws are Cadmium plated.

List No.	Description	Ship.		Std. Pkg.	List Price
		Wgt., Lbs.	Std. Pkg.		
2	Complete Assembly.....	8½	10		\$1.35

BENJAMIN REFLECTORS

"Type 79"

LAMP HOLDERS AND FITTINGS (Continued)



SHOCK ABSORBING LAMP HOLDER ASSEMBLY

Medium Base, 660 watts, 600 volts. Mogul Base, 1500 watts, 600 volts.

Benjamin Shock Absorbing Lamp Holders, List No. 2753 and List No. 2762, lengthen lamp life by guarding the lamp filament against the vibration, jars and shocks encountered in every location. They are suitable for use in all Benjamin "Type 79" Reflector Equipment.

Assembly consists of a one-piece porcelain medium or mogul base keyless lamp holder, with shock absorbing spring, and a "Type 79" bayonet attaching plate with composition gasket and attaching screws. Plate and screws are cadmium plated.

List No.	Description	Std. Pkg.		List Price
		Shpg. Wgt.	Std. Pkg.	
2753	Medium Base, Complete Assembly.....	10	10	\$0.65
2762	Mogul Base, Complete Assembly.....	13½	10	1.20

SELF-LOCKING MEDIUM BASE LAMP HOLDER ASSEMBLY

660 watts, 600 volts

Self-Locking Lamp Holders prevent unauthorized removal of lamps. The socket locks automatically as the lamp is screwed in, but Key List No. 1399 is required for removal.

List No. 2754 Self-Locking Lamp Holder Assembly may be used in all Medium Base Benjamin "Type 79" Reflector Equipment.

Assembly consists of a medium base porcelain lamp holder with self-locking feature, and a "Type 79" bayonet attaching plate with composition gasket and attaching screws. Attaching plate and screws are cadmium plated.

List No.	Description	Std. Pkg.		List Price
		Shpg. Wgt.	Std. Pkg.	
2754	Complete Assembly.....	11½	10	\$1.05
1399	Key only, for releasing lamp	½	1	1.00

BENJAMIN "HEAVY DUTY" VAPOR PROOF LIGHTING FIXTURES

These fixtures are ruggedly constructed, weather and vapor proof lighting units. Asbestos gaskets effectually seal the hood, globe and reflector against the entrance of vapors, and a stuffing gland in the hood seals the wire entrance. Hoods are rugged iron castings designed to accommodate threaded copper neck of heavy gauge steel reflectors. Lower portion of two-piece hood can be unscrewed, providing easy access to the sturdy porcelain socket.

Finish. Reflectors are finished in acid-resisting porcelain enamel, white inside, green outside, and hoods are green lacquered.

Pendent Fixtures. Regularly supplied with hoods tapped $\frac{1}{2}$ inch I.P.S., but $\frac{3}{4}$ inch tapping will be supplied at no advance in list price if specified on order.

Ceiling Fixtures. Regularly supplied with four slip holes for direct attachment to $4\frac{1}{2}$ inch vapor proof outlet boxes. If specified on order, hoods will be drilled to fit standard 4 inch outlet boxes.

Wire Guards. Prices on request.

Aluminum Hoods. Prices on fixtures with aluminum hoods can be furnished on request.

Gaskets. No. 6535 gasket for use with No. 1062 globe—10 cents list price. No. 6537 gasket for use with No. 1063 globe—15 cents list price.



No. 6501



No. 6513

WITH DOME REFLECTOR

Pendent Type	Ceiling Type	Ship.	Globe
List	List	Wgt.	List
No.	Price	Lbs.	No.
6500	\$6.00	87	1062
6501	6.75	92	1062
6502	8.25	98	1062
6503	10.75	102½	1063

Dimensions, Ins.

List	Lamp	Refl.	Hgt.	Hgt.	Std.
Nos.	Watts	Dia.	Pend.	Ceil.	Pkg.
			Type	Type	
6500	6550	12	11¾	11	10
6501	6551	14	11¾	11	10
6502	6552	16	11¾	11	10
6503	6553	18	15¼	14½	5

WITH FLAT CONE REFLECTOR

Pendent Type	Ceiling Type	Ship.	Globe
List	List	Wgt.	List
No.	Price	Lbs.	No.
6513	\$6.00	92	1062
6514	6.75	99	1062
6515	8.25	106½	1062

Dimensions, Ins.

List	Lamp	Refl.	Hgt.	Hgt.	Std.
Nos.	Watts	Dia.	Pend.	Ceil.	Pkg.
			Type	Type	
6513	6563	14	11¾	11	10
6514	6564	16	11¾	11	10
6515	6565	18	11¾	11	10

Prices do not include wires or lamps.

BENJAMIN "HEAVY DUTY" VAPOR PROOF LIGHTING FIXTURES



No. 6556



No. 6518

WITH BOWL REFLECTOR

Pendent Type	Ceiling Type	Ship.	Globe
List	List	Wgt.	List
No.	Price	Lbs.	No.
6506	\$6.40	86	1062
6507	7.00	91	1062
6508	9.05	92	1063

Dimensions

List	List	Lamp	Refl.	Height	Height	Std.
No.	No.	Watts	Dia.	Pend.	Ceil.	Pkg.
				Type	Type	
6506	6556	150	9	11¾	11	10
6507	6557	200	10	11¾	11	10
6508	6558	300-500	12	15¼	14½	5

WITH SYMMETRICAL ANGLE REFLECTOR

Pendent Type	Ceiling Type	Ship.	Globe
List	List	Wgt.	List
No.	Price	Lbs.	No.
6517	\$6.50	91	1062
6518	7.25	97	1062
6519	10.00	97	1063

Dimensions

List	List	Lamp	Refl.	Height	Height	Std.
No.	No.	Watts	Dia.	Pend.	Ceil.	Pkg.
				Type	Type	
6517	6567	75-100	10	12¾	12½	10
6518	6568	150-200	12	15½	14½	10
6519	6569	300-500	14	18¾	17¾	5



No. 6527



No. 6577

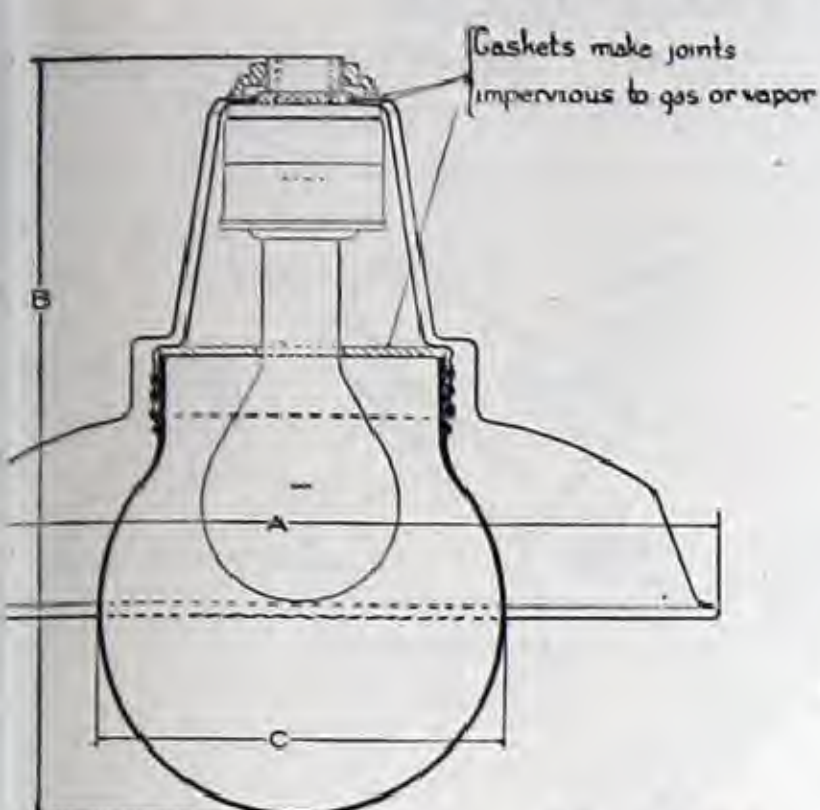
WITHOUT REFLECTOR

Pendent Type	Ceiling Type	Ship.	Globe
List	List	Wgt.	List
No.	Price	Lbs.	No.
6526	\$3.75	59	1062
6527	4.20	71	1062
6528	5.60	75	1063

Dimensions

List	List	Lamp	Globe	Height	Height	Std.
No.	No.	Watts	Dia.	Pend.	Ceil.	Pkg.
				Type	Type	
6526	6576	50-100	6	20¾	10	10
6527	6577	150-200	6	11½	10¾	10
6528	6578	300-500	8¼	15½	14¾	5

BENJAMIN "1500 SERIES" VAPOR PROOF FIXTURES



No. 1545



Fixtures with Reflector

These fixtures have a heavy clear glass globe by which the lamp is tightly enclosed as a protective measure. A single asbestos gasket provides a tight vapor proof joint between the screw type glass enclosing globe and the copper holder mounted in the reflector neck.

The heavy gauge reflectors of the Benjamin "1500 Series" fixtures are protected against the deteriorating effects of gases, fumes and vapors by the complete coverage of all surface with acid resisting porcelain enamel.

Fixtures are designed for conduit suspension and are furnished with easy-to-wire keyless sockets with lamp grips. The "Type" flange and nut fitting is sealed at the top of the reflector by means of a composition gasket on the inside of the reflector and an impregnated asbestos gasket on the outside. Fitting is regularly supplied tapped for 1/2 inch conduit, but can be supplied with 3/4 inch tapping at no extra charge if specified on order.

Finish—Acid Resisting Porcelain Enamel, white inside and green outside.

Fixtures for Outlet Box Mounting can be supplied at 70 cents additional list price if type of outlet box for use with, specified on order.



No. 1555



No. 1523



No. 1538

WITH DOME REFLECTOR

Angle of cut-off 17 1/2 degrees

Size of Lamp, Watts	List No.	List Price	Dimensions in Inches	List No.	Ship. Wgt. Lbs.	Std. Pkg.
			Dia. "A"	Hgt. "B"	"C"	
0-100	1543†	\$ 6.00	12	11 1/2	6	1062 68
150	1544†	6.75	14	11 1/2	6	1062 79
200	1545†	8.25	16	13 1/2	8 1/4	1063 113
300-500	1546†	10.75	18	14 1/2	8 1/4	1063 69
Std. Pkg. 10		† Std. Pkg. 5				

WITH FLAT CONE REFLECTOR

Size of Lamp, Watts	List No.	List Price	Dimensions in Inches	List No.	Ship. Wgt. Lbs.	Std. Pkg.
			Dia. "A"	Hgt. "B"	"C"	
0-100	1553	\$ 6.00	14	11 1/2	6	1062 68
150	1555	6.75	16	11 1/2	6	1062 79
200	1558	8.25	18	13 1/2	8 1/4	1063 93
Std. Pkg. 10.						

WITH SYMMETRICAL ANGLE REFLECTOR

Size of Lamp, Watts	List No.	List Price	Dimensions in Inches	List No.	Ship. Wgt. Lbs.	Std. Pkg.
			Dia. "A"	Hgt. "B"	"C"	
0-200	1523†	\$ 7.25	10	13 5/8	6	1062 60
0-500	1524†	10.00	14	16 1/4	8 1/4	1063 38
Std. Pkg. 10		† Std. Pkg. 5.				

WITH BOWL REFLECTOR

Size of Lamp, Watts	List No.	List Price	Dimensions in Inches	List No.	Ship. Wgt. Lbs.	Std. Pkg.
			Dia. "A"	Hgt. "B"	"C"	
0-200	1538	\$ 7.00	10	11 1/2	6	1062 60
Std. Pkg. 10.						

Prices on Wire Guards for these fixtures can be supplied on request.

Prices do not include wires or lamps.

BENJAMIN "1500 SERIES" VAPOR PROOF FIXTURES



No. 1568



No. 5020

FIXTURE WITHOUT REFLECTOR

Construction—Porcelain enamelled steel hood, with fitting tapped for 1/2 inch stem, two piece, easy-to-wire porcelain receptacle with Benjamin Lamp Grip, screw threaded enclosing globe and globe holder.

Finish—Hoods are green Acid Resisting Porcelain Enamel.

Fixtures for Outlet Box Mounting can be supplied at 70 cents additional list price if type of outlet box for use with, specified on order.

Size of Lamp, Watts	List No.	List Price	Dimensions in Inches	List No.	Ship. Wgt. Lbs.	Std. Pkg.
			Hgt.	Dia.	Globe	
60-100	1565	\$3.75	9	6	1062	38 10
150-200	1568	4.20	11 1/4	6	1062	49 10
300-500	1570	5.60	13 1/4	8 1/4	1063	42 5

Prices on Wire Guards for these fixtures can be supplied on request.

CAST IRON COVER AND GASKET

List No. 5020 is for use in suspending Benjamin Vapor Proof Units from standard four inch outlet boxes. It is tapped for 1/2 inch pipe and screw holes are on 3 1/2 inch centers. It has a gasket to seal the outlet box.

List No.	List Price	Description	Ship. Wgt. Lbs.	Std. Pkg.
5020	\$0.60	Flange and Gasket	13	10
5021	.10	Gasket only	1	10

GLOBES ONLY FOR REPLACEMENT

List No.	List Price	Dimensions in Inches			Ship.	Std.
		Diam.	Hgt.	Fitter	Wgt. Lbs.	
1059	\$0.45	3 $\frac{3}{8}$	4 $\frac{3}{8}$	3	7	10
1060	.75	3 $\frac{5}{8}$	5 $\frac{1}{4}$	4	13	10
1062	1.20	6	6 $\frac{3}{4}$	4 $\frac{1}{4}$	21 $\frac{1}{2}$	10
1063	1.60	8 $\frac{1}{4}$	8 $\frac{3}{8}$	5 $\frac{5}{8}$	50	5

BENJAMIN CARGO LIGHT



No. 3093

Construction—Heavy fitting, for suspending fixture by rope, is provided with water tight stuffing box for cable. One-piece bowl reflector, of copper, is fitted with Benjamin wireless cluster body. Strong galvanized wire guard is held in position by an adjustable cadmium plated steel band which fits over bead of reflector. Guard has wire loop to which a light rope may be attached for purpose of tipping fixture to throw light at any angle. Lamps are not furnished, but 25 to 60 watt lamps may be used.

Finish—Reflector is black outside, aluminum sprayed inside. Fittings and guard have a hot dipped protective metal finish and will not corrode.

List No.	List Price	No. of Lights	Kind of Reflector	Size of Reflector	Ship. Wt., Lbs.	Std. Pkg.
3093	\$14.50	4	Copper	16 3/8"	9	1
3094	14.80	5	Copper	16 3/8"	9	1
3095	15.10	6	Copper	16 3/8"	9	1

Prices do not include wires or Lamps.

BENJAMIN ALUMINUM VAPOR PROOF, "PROJECTOLITE"



For the Lighting of Horizontal and Vertical Surfaces from a
Grazing Angle

TYPICAL USES

Spraying and Finishing Departments:

Auto Body Plants

Furniture Factories.

Refinishing Shops.

Locomotive Roundhouses.

Inspection Frames of Textile Plants.

Printing Presses and Color Proofing Tables.

Automobile Laundries.

Close Work on Large Machines.

Locations Below Overhanging Machinery.

The "Projectolite" is a unit developed to meet those frequently encountered lighting problems which are not adequately met by the ordinary types of overhead or side lighting units.

The powerful beam of the "Projectolite" is broadened and flattened by a special ribbed cover glass which directs the greater part of the light to points farthest from the light source and a correspondingly smaller amount to points nearer the reflector. The result is even illumination over the entire surface.

SPECIAL FEATURES

Vapor, Dust and Weatherproof—There are no openings in the reflector and all wiring is inclosed. A gasketed, heat-resisting glass cover seals bottom of reflector.

Durable Aluminum Construction—The "Projectolite" is designed to successfully resist the corrosive effects of sulphurous smoke, fumes, dirt and moisture.

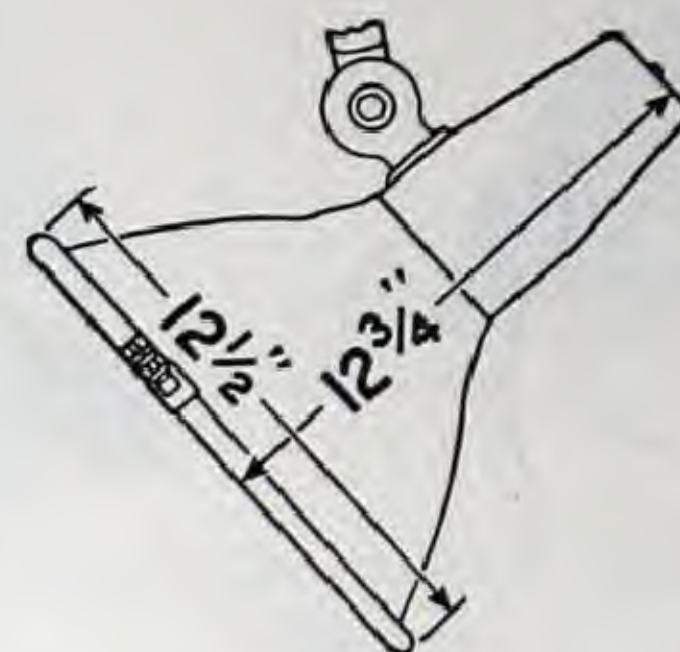
Efficient Reflector—The non-tarnishing, highly polished aluminum reflecting surface maintains its high initial lighting efficiency.

Easy to Clean—It is the work of a moment to wipe off the smooth outer surface of the glass cover.

Easily Detachable—Without necessitating repositioning, No. 5627 may be taken down for relamping, by unscrewing the swivel ring of the connector plug from the body.

Adjustability—Adjustable bracket permits positioning at any point through a 180-degree angle by loosening holding bolt. A set screw in the tapped end of the bracket provides a means for lateral positioning.

BENJAMIN ALUMINUM VAPOR PROOF "PROJECTOLITE"



SPECIFICATIONS AND LISTINGS

Construction—Non-corroding aluminum alloy body into which is spun a one-piece heavy aluminum neck, aluminum alloy cover band and cast adjustable bracket. The body interior is highly polished inside, assuring a non-corroding highly efficient reflecting surface. The heat-resisting molded cover glass is of special ribbed design, with a double gasket.

Socket—C. E. C. Standard keyless porcelain mogul base socket.

Wiring—No. 5613 is furnished with 10-foot leads of No. 16 B and S gauge asbestos covered stranded fixture wire. No. 5627 is without leads but is wired from the socket terminals to connector plug, using same wire supplied with No. 5613.

Connector and Tapping—No. 5627 only is supplied with a 2 pole, water-tight, 15 ampere, 125 volt polarized connector—tapped 1/2 inch iron pipe size. The bracket on No. 5613 is tapped 1/2 inch iron pipe size, standard; 3/4 inch, if specified, at same price.

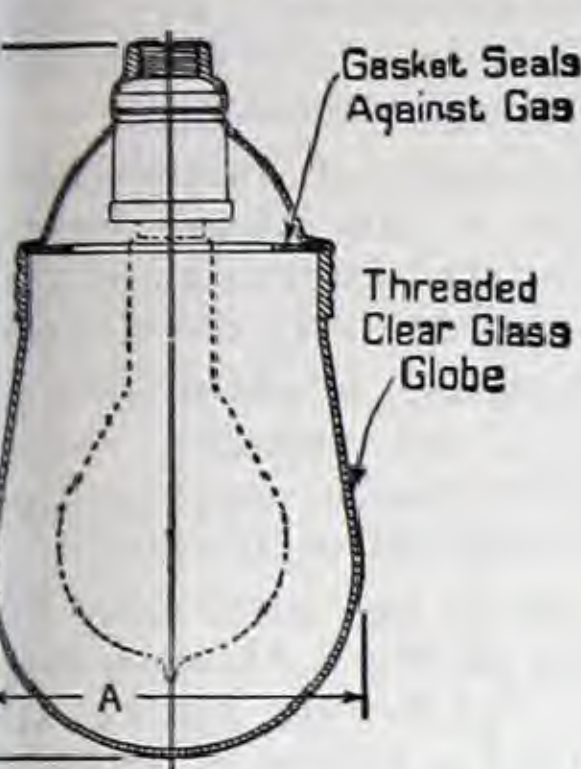
List No.	Size of Lamp, Watts	Description	List Price
5613	300	"Projectolite" with 10' leads.....	\$16.00
5627	300	"Projectolite" with Connector....	22.00
5622	...	Cover Glass Only.....	6.00

Prices do not include lamps and wiring only as specified.

List No.	Dimensions Inches Diam. Height	Ship. Wt. Lbs. Std. Pkg.	Standard Pkg.
5613	12 1/2 12 3/4	11	1
5627	12 1/2 12 3/4	11	1
5622	.....	7	1

JENAMIN MOISTURE PROOF AND DUST TIGHT FIXTURES

Recommended for Use in:
Refrigerating Plants, Laundries, Creameries, Turkish
baths, Engine Rooms and damp places.
They are also a safeguard in flour mills, elevators, starch
factories, etc., where the processes involved produce dust clouds
which, hanging in the air, form a highly explosive combination.



No. 665

MOISTURE AND DUST PROOF FIXTURES

Fixture Without Guard

Construction. Weatherproof hood of copper, regularly
piped for 1/2-inch stem, easy-to-wire porcelain socket with
Jenamin Lamp Grip and screw globe of heavy clear glass.
Gasket between globe and hood makes the fixture tight.

Finish. Natural copper.

List No.	Size of Lamp Watts	Dimensions in Inches		List No. of Globe	Ship. Wgt. Lbs.	List Price Each
		"A"	"B"			
663-DT	25- 60	3 1/2	7 3/4	1060	17	\$2.10
665-DT	75-100	6	9 3/4	1062	40	2.65

Hood is of copper. Standard package, 10.

Fixture With Guard

Guarded type fixture No. 657 has strong tinned wire guard
which screws on outside of hood and globe. In other respects,
this unit is like No. 663-DT.

657-DT	25- 60	†3 5/8	8 3/8	1060	20	\$2.75
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†Diameter of guard, 4 3/4 inches

Hood is of copper. Standard package, 10.

DUST TIGHT FIXTURE



No. 657

No. 659-DT is a dust-tight
fixture, especially for drop
cord work in mills, elevators,
granaries, etc. It affords a
high degree of protection
against the dust hazard, by
reason of the heavy screw
globe and copper hood which
enclose the lamp.

Construction. Hood is of
copper; screw globe is heavy
clear glass. Hard rubber
bushing for drop cord has 1 1/2-
inch opening. Ample space is
provided for knotting the
cord. The general construc-
tion is the same as No.
663-DT.

Finish. Natural copper.

List No.	Size of Lamp Watts	Dimensions in Inches		List No. of Globe	Ship. Wgt. Lbs.	List Price Each
		"A"	"B"			
659-DT	25- 40	3 3/8	7 3/8	1059	18	\$2.15

Hood is of copper. Standard package, 10.

Prices do not include wires or lamps.

GLOBES ONLY FOR REPLACEMENT

List No.	Dimensions in Inches			Ship. Wgt. Lbs.	Std. Pkg.	List Price Each
	Dia. "A"	Hgt. "B"	Fitter			
659	3 3/8	4 3/8	3	7	10	\$0.45
660	3 5/8	5 1/4	4	13	10	.75
662	6	6 3/4	4 1/4	21 1/2	10	1.20

R. & S. LIGHTING SPECIALITIES

Underwater Lighting for Swimming Pools



No. 2360—250 Watt
Swimming Pool Light

The proper and artistic lighting of swimming pools is a
highly specialized art. Safety of swimmers (especially at
night) and determination of water purity are some of the
important benefits obtained by the installation of the best
equipment.

Pioneers in watertight and marine lighting, through years
of practical experience in the lighting of pools, have developed
a perfect line of units for the proper lighting of any type of
pool.

Artistic and simple design, experienced engineering, highest
grades of material and skilled artisanship, assure easy instal-
lation, beauty without glare, simplified maintenance and
economical cost.

Application of these units can also be made to steel tank
pools. Complete information upon request.

Prices on application.

R. & S. WIRING DEVICES



No. 503

Deck Fixture

Heavy cast iron base, white enameled inside, black out-
side. Clear globe No. 383 is mounted in hinged rim, with or
without guard as listed. Can also be supplied in cast brass or
aluminum on request.

Maximum size lamp—100 watt.

Maximum conduit—3/4" four way. Specify size and loca-
tion of outlets when ordering.

Dimensions—11" diameter, 5" deep.

List No.	Description	Approx. Net Weight Lbs.	List Price on Request
503	Complete with Guard	10	

REELITE EXTENSION PORTABLES

MACHINE TOOL TYPE

250 Volt, 660 Watt



Black enameled reel-unit, 7 1/4 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 20 feet of extra heavy approved rubber covered cord and attachment plug connector body. Plural-spring reel insuring long life.

List No.	Description	Cord Feet	List Price Each
1523	Connector Body.....	20	\$12.50

PORTABLE TYPE

250 Volt, 250 Watt

Black enameled reel-unit, 7 1/4 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 25 feet of approved rubber covered cord. Rubber handle and heavy wire guard, keyless or Levolver socket.

List No.	Description	Cord Feet	List Price Each
1516	Keyless Socket.....	25	\$15.00
1517	Levolver Socket.....	25	15.00



PORTABLE TYPE

250 Volt, 250 Watt

Black enameled reel-unit, 7 1/4 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 20 feet of approved, rubber covered cord. With vapor-proof globe and guard. Will take 25 or 40-watt lamps.

List No.	Description	Cord Feet	List Price Each
1529	Vaporproof.....	20	\$16.50

AUTOMATIC TAKE-UP REELS

Black enameled reel unit, 10 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet boxes; 40 feet of approved rubber covered cord. Furnished without any wiring device to which socket, lamp guard or practically any wiring device may be attached.

List No.	Lgth. For Wiring Cord, Feet	Device not to Exceed	List Price Each
1519	40	1 1/4 lbs.	\$23.00



SUPPORTING BRACKET



Ordinarily the Reelite is used in ceilings, but frequently situations arise where it is quite necessary to have the Reelite mounted on side walls. The wall-supporting bracket can be furnished separately but we recommend, when necessary, the Reelites be ordered complete with the bracket at an additional \$1.50 to regular list prices.

List No.	Description	List Price Each
1537	For Portable Type Reelites.....	\$1.50
1538	For Drop-Cord Type Reelites.....	1.50
1539	For No. 1519 Reelite.....	1.50

REELITE EXTENSION PORTABLES

250 Volt, 250 Watt



Reelites keep the cords always out of the way—clean and unkinked—facilitating the movements of machinery and trucks—freeing the aisles of the snares that cause accidents and retard production. The lights are instantly available—within arm's reach—no time lost untangling cords or making extensions.

There are thousands of manufacturing operations where a specialized light is needed at intermittent intervals and there is a Reelite adapted to every requirement.

When once installed, Reelites soon pay for themselves in convenience, reduced cost of cord maintenance, increased production and elimination of accident.

The initial cost is but little more than that of a similar device without a reel—while the life of the Reelite will be 4 to 6 times as long, thus a saving of money as well as the prevention of loss of time.

PORTABLE TYPE

Black enameled reel-unit, 7 1/4 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 25 feet of approved rubber covered cord. With heavy wire

open guard or Loxon guard. Will take lamps up to and including 60-watt.

List No.	Description	Cord Feet	List Price Each
1522	Heavy Wire Guard, Half Reflector, Keyless Socket.....	25	\$15.00
1527	Loxon Guard, Key Socket.....	25	13.50
1528	Heavy Wire Guard, Half Reflector, Levolver Socket.....	25	15.00

List Nos. 1522 and 1528 Reelites can be furnished with a Guard and Separable Hook to prevent the Reelite from being torn from its mounting. Reelites furnished with Guards for Separable Hook take an additional list of \$1.00.

DROP-CORD TYPE

Black enameled reel-unit, 5 1/2 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 12 feet of approved rubber cord and with or without key-switch socket.

List No.	Description	Cord Feet	List Price Each
1532	Without Socket.....	12	\$ 9.50
1533	Brass Shell Key Socket....	12	10.00
1534	Composition Key Socket..	12	10.00



PORTABLE TYPE

Black enameled reel-unit, 7 1/4 inches in diameter, with base for attaching to 3 1/4 or 4-inch outlet box; 25 feet of approved rubber covered cord.

List No.	Description	List Price Each
1524	Without Socket or Guard...	\$12.00
†1524 1/2	Keyless Socket (Cord Grip)	13.00
1525	Brass Key Socket (Less Guard).....	12.50
1526	Comp. Key Socket (Less Guard).....	12.50
*1530	Without Wiring Devices....	13.00

*List No. 1530 equipped with No. 18 gauge, 3-conductor cord. Two conductors are connected to the brushes of the Reelite and the third conductor is grounded to the frame.

†This type is 660 watts, 600 volts.



WHITE ADJUSTABLE FIXTURES

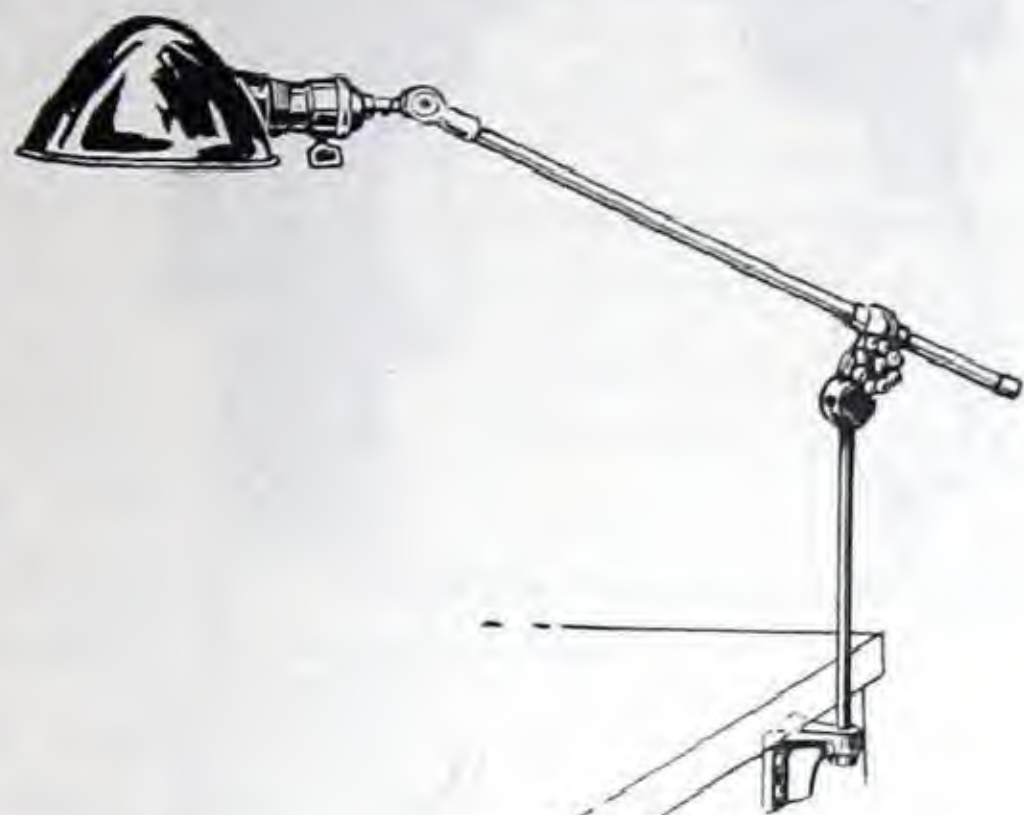
"Applied Illumination" for the Office

No. 5M

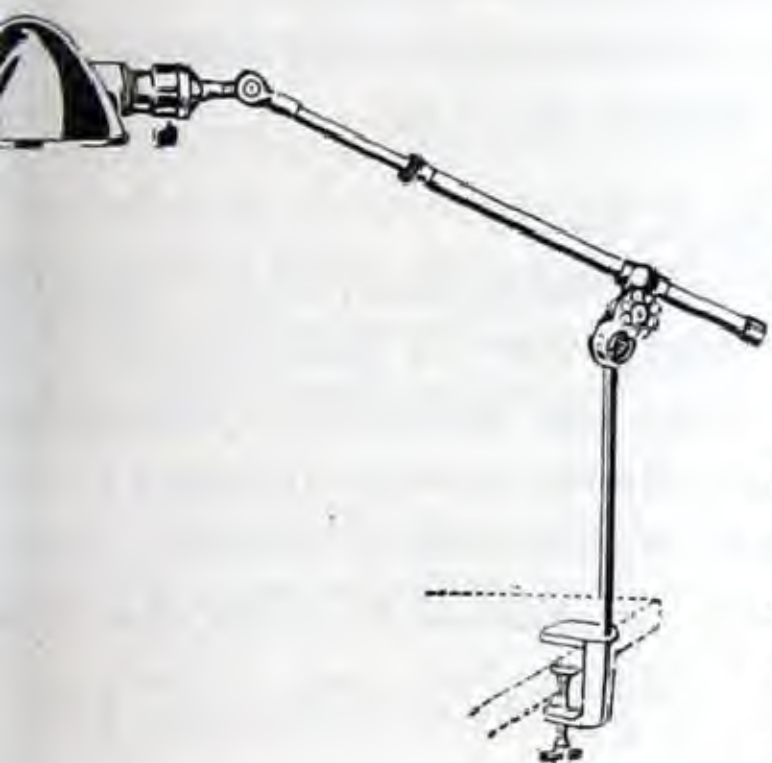
Straight arm
sliding through
universal joint;
18" long, reach
of lamp 26",
height 11".

Attached to
edge of desk with
two screws.
Clears 1 1/4"
overhand.

List Price,
each... \$5.55



No. 5M



No. 8-M

No. 8M

Telescopic Arm. Slid-
ing through universal
joint; 21" extension; reach
of lamp 29"; height 11".

Readily attached (or
detached) to thickness up
to 2 1/8" by means of clamp
on base. This Fixture is
very useful in any office.

List Price, each... \$7.85

No. 1F

Very high grade—
brass with joints of
manganese bronze.

Regularly furnished
with base as shown
(4" x 3 3/4") for at-
tachment by wood screws. Two arm; 36" extreme extension;

universally adjustable. Can be folded flat against the wall.

List Price, each... \$9.45



No. 1F



No. 8F

No. 8F

Telescoping Arm; 15"
to 24" extension; univer-
sally adjustable. A most
popular fixture, particu-
larly in doctors' offices.

List Price, each... \$7.70

WHITE ADJUSTABLE FIXTURES

Adjustable Floor Portables

Of simple design
without filigree, but
eminently practical.
Wired through base
and upright. Ex-
posed cord lies flat
on floor, preventing
accidents by trip-
ping.

No. 11PB —
a Bridge Lamp of
especially fine con-
struction. Tele-
scoping up to six feet. The
design and lighting quality
makes this ideal for bridge
and similar uses. Standard
finishes.

D11PB is equipped with
No. 800 Daylight Unit, spe-
cial heavy duty socket, bake-
lite plug and 6' (in clear) silk
cord.

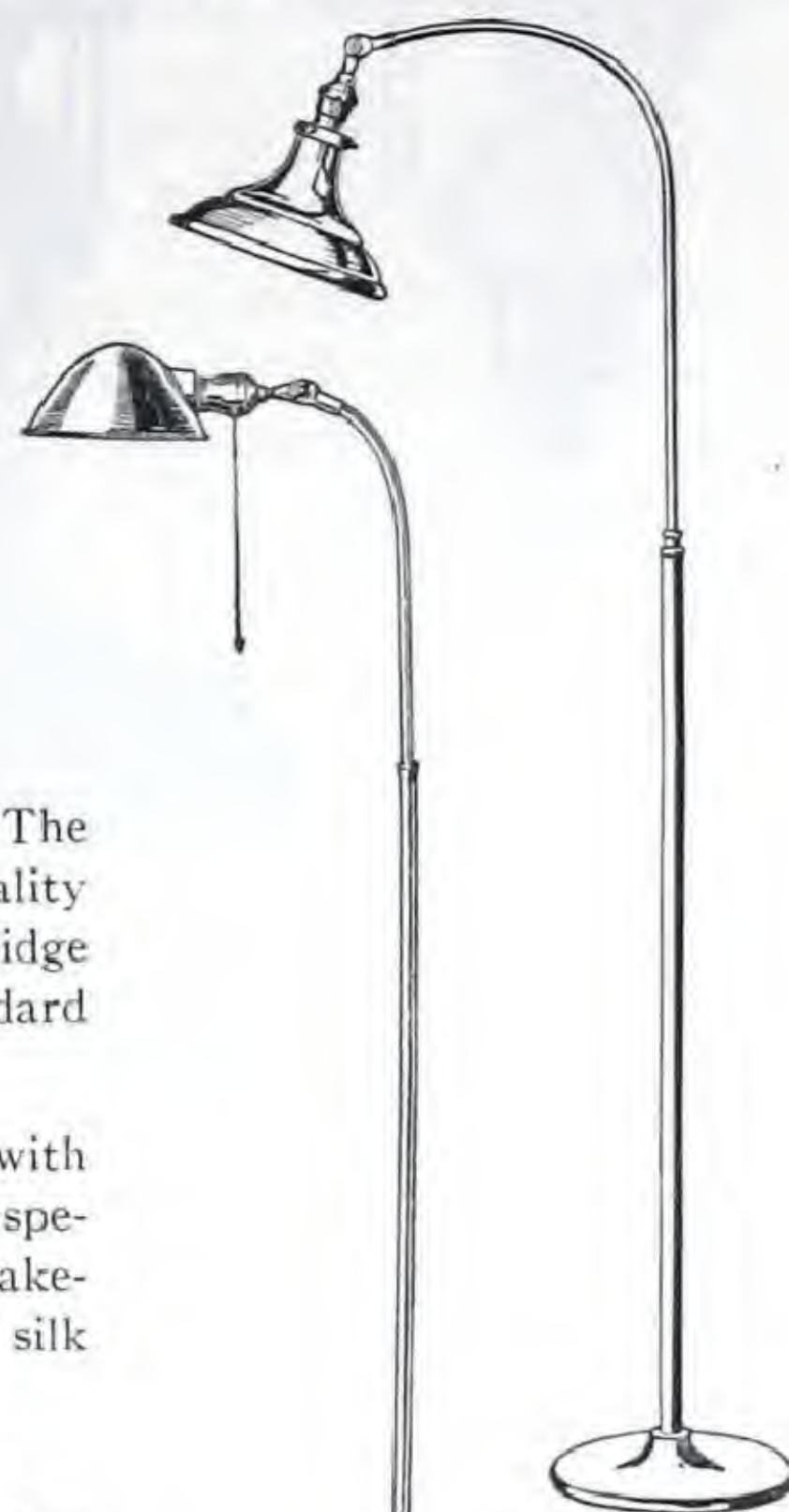
Price on application

No. 10P—with small, but
heavy base; very convenient.
Height adjustable up to six
feet. Cord automatically
coils in base when telescoped.
Standard finishes.

No. D10P — is equipped with No. 100 Daylight Unit,
special heavy duty key socket, bakelite plug and 6' (in
clear) silk cord.

Standard finishes: Old Brass, statuary Bronze.

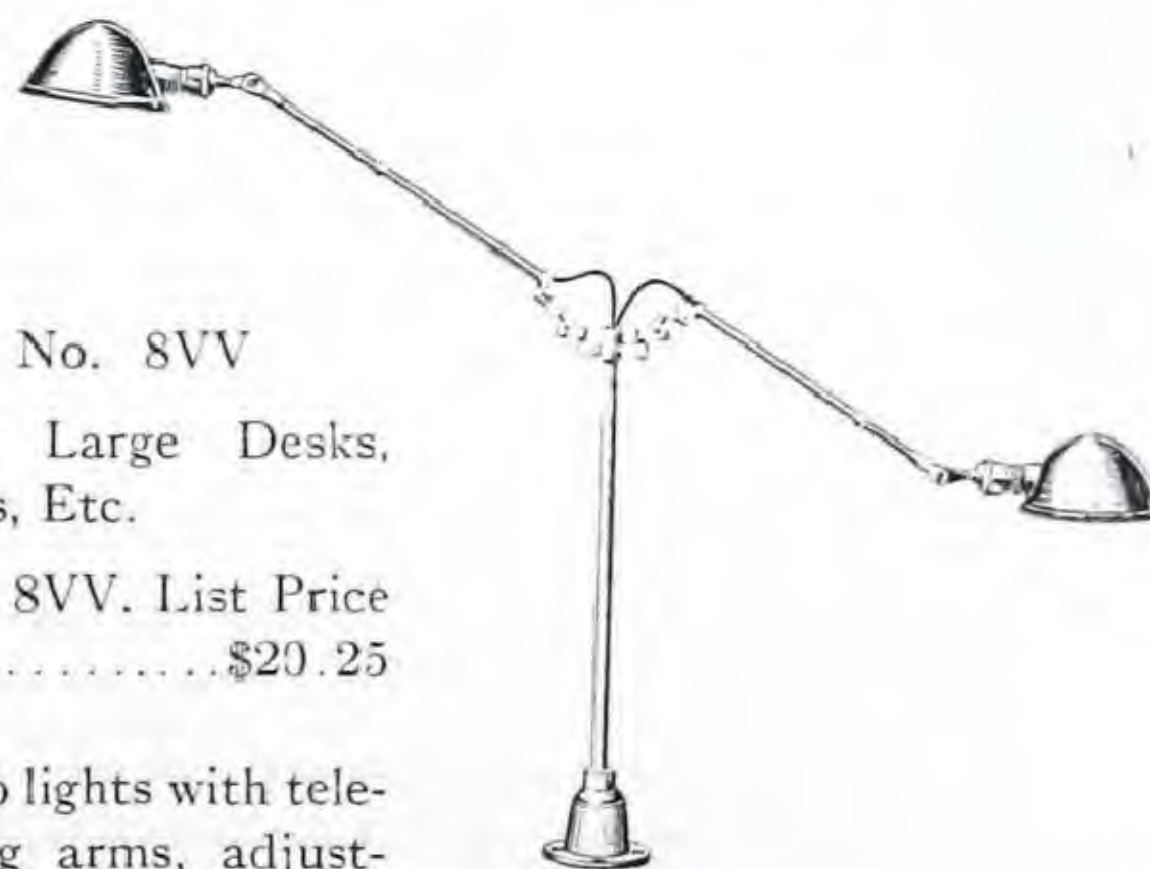
No. D10P. List Price... \$19.00



No. 11PB

No. 10P

Adjustable Standard



No. 8VV

For Large Desks,
Tables, Etc.

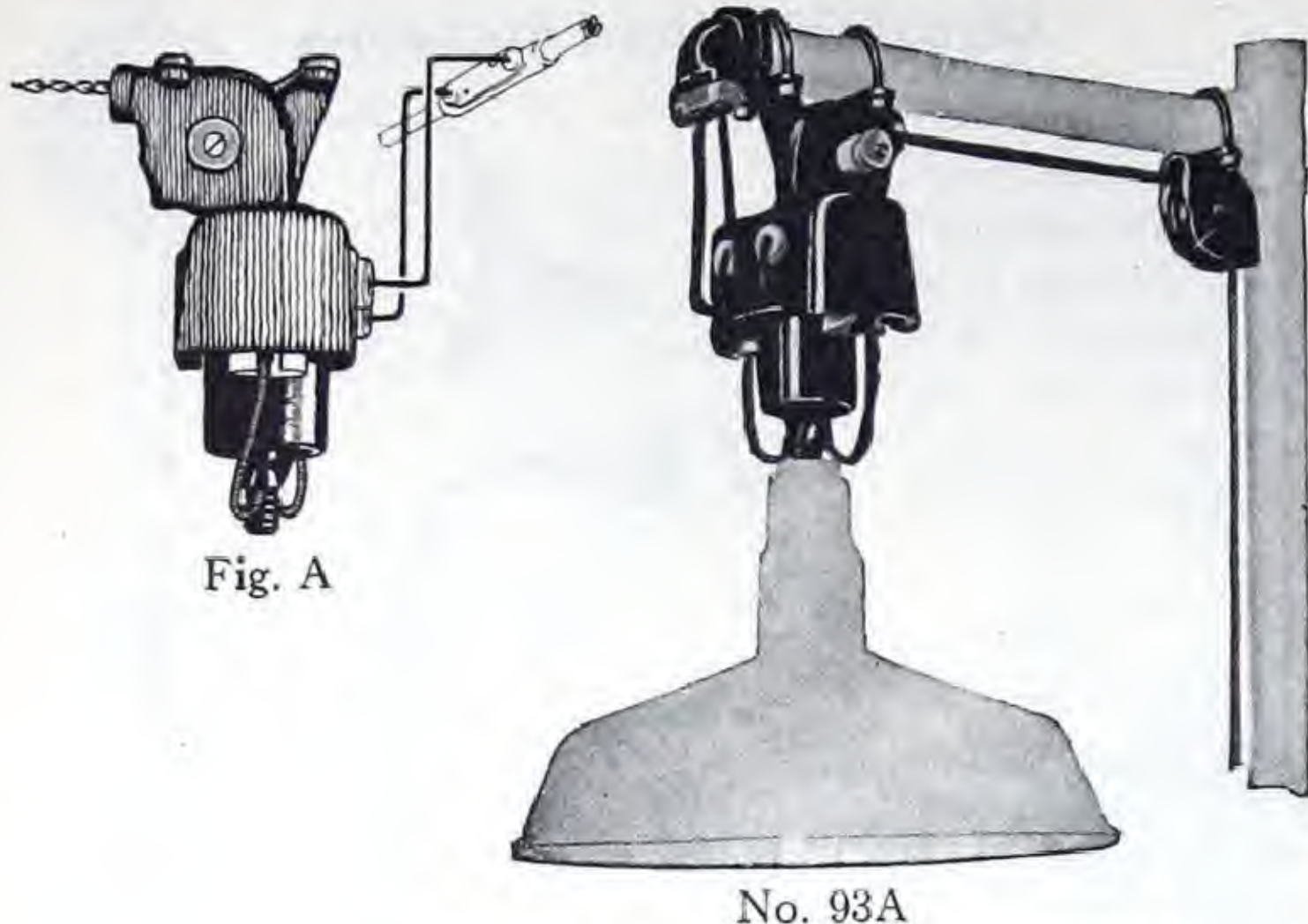
No. 8VV. List Price
Each... \$20.25

Two lights with tele-
scoping arms, adjust-
able at any angle in
any direction. Lights may be concentrated or given their
extreme spread of 5 feet. Height 26". Standard finishes.

No. D8VV is equipped with No. 100 Daylight Units,
special heavy duty key sockets, bakelite plug and 2' (in clear)
silk cord.

No. D8VV. List Price Each... \$29.60

THOMPSON LAMP LOWERING HANGERS



No. 93-A, with a reflector attached—typical outdoor installation—showing also U-Bolts No. 51, Corner Pulley No. 50-B and Bracket End No. 12-15.

Model No. 93-A

The most popular model, so far, has been the No. 93-A, which has a canopy or enclosure of medium depth, adapting it for either indoor or outdoor use. It has two porcelain bushings in the back of the canopy, to provide for the entrance of the line wires into the hanger. It will be observed from the illustration Fig. A that this hanger lends itself readily to either open wiring or conduit distribution.

No. 93-A Hanger with "Built In" Contacts, List Price, \$9.00

No. 93-A-R Hanger with lower member having "Removable Contacts," List Price, \$9.60



Hanger No. 93-B

—is exactly like No. 93-A, except that instead of porcelain bushings, there is one drilled hole, 13/16 inch, in the back of the canopy, for attaching standard conduit fittings, to enable the line wires to be enclosed directly into the hanger, when so desired, as shown in small line drawings above.

Hanger No. 93-B

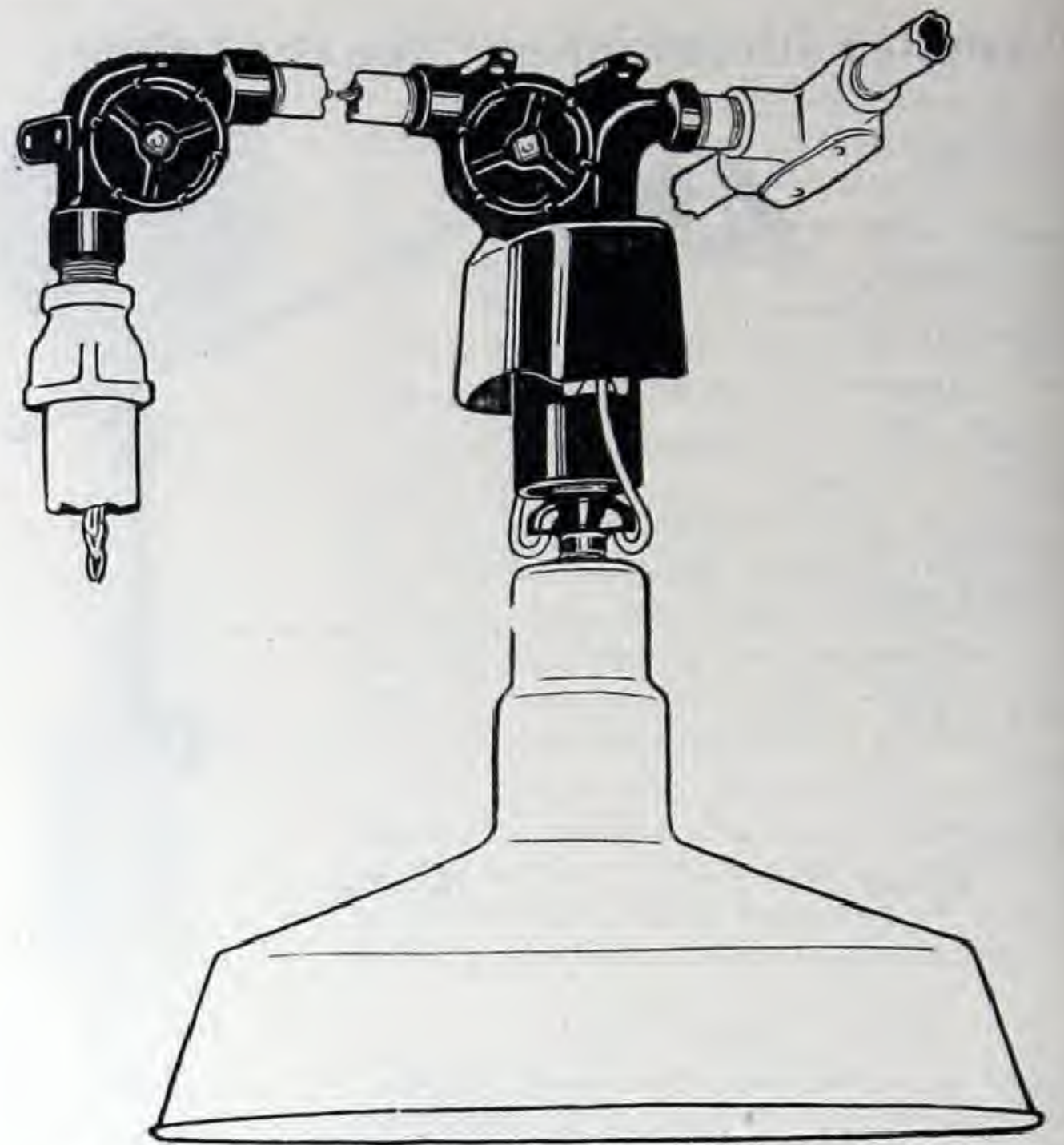
No. 93-B Hanger with "Built-In" Contacts, List Price, \$9.00

No. 93-B-R Hanger with lower member having "Removable Contacts," List Price, \$9.60

In specifying, add the letter 'D' to the model desired (applicable to any model except No. 95), as for instance—Model No. 93-B made in this duplex form would be known as No. 93-B-D; Model No. 97 would be known as No. 97-D; Model No. 201-B would be known as No. 201-B-D, etc. The only change made in these models would be to furnish the upper member in two parts, as above described.

All models except No. 95 can be furnished with the upper member in two parts. This special construction will be priced at 50c per Hanger net in addition to the prices noted above.

THOMPSON LAMP LOWERING HANGERS



Hanger No. 95 shown in connection with enclosed Corner Pulley No. 149

Hanger No. 95

This model is a further development of the "Sealtype" principle. It becomes an integral part of the conduit system with the line wires coming into the hanger on the ceiling or girder line and passing down into the canopy through a chamber or duct which is a part of the sheave housing casting.

All of the No. 95 Hangers are furnished with the sheave housing tapped for 3/4-inch chain conduit, and 1/2-inch wiring conduit.

No. 95 Hanger with "Built In" Contacts, List Price, \$11.00

No. 95-R Hanger with lower member having "Removable Contacts," List Price, \$11.60

Duplex Upper Member

Any of the Hanger models, except No. 95, can be furnished with the upper member in two parts—that is to say, the sheave housing will be separated from the body of the Hanger, provision being made for inserting a 3/4-inch conduit-stem between the sheave housing and the body of the Hanger.

This construction enables the sheave housing to be attached rigidly to the overhead support, and the body of the Hanger to be attached to wiring conduit at a lower elevation—either directly or by a short connection. The lowering chain will then pass down through the conduit-stem and be dead-ended as usual in the lower member of the Hanger.

This type of construction will be of great advantage in forge shops and places where the upper atmosphere is filled with smoke, dirt and corrosive elements. The lamp being attached directly to the lower member, it will be easy for the operator to inspect the latching parts and contacts whenever he lowers the lamp—as contrasted with having the lower member of the Hanger attached to the upper end of a stem.



Duplex Hanger No. 97-D

If the stem should be very long the lower member of the Hanger would be out of reach for easy inspection.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

The term "overhead" has been applied to street lighting equipment of the utilitarian type and to systems in which the energy is carried to the lighting units by overhead wiring, to distinguish installations of this character from ornamental lighting systems, in which the energy is conveyed to the lighting units through underground cable construction.

Overhead street lighting systems are generally installed in the business districts of the larger cities, on interurban highways and in small towns and villages.

The principal advantage to be gained by the use of overhead street lighting equipment is low capital cost.

On the following pages will be found descriptions and illustrations of overhead street lighting equipment designed by Westinghouse to meet the most exacting requirements of any type of overhead street lighting system. Particular attention has been given to simplification and interchangeability of parts with the result that a large variety of complete units is available from a comparatively small number of parts.

There are many obvious advantages to be gained in the use of such equipment, a few of which are mentioned as follows:

1. An entire overhead street lighting system can be planned in advance and a complete section of a municipality can be equipped with a basic system to which may be added reflectors, holophane refractors or enclosing glassware, as it is desired to vary the illumination values.

2. Stocks of spare equipment are maintained at a minimum, carrying a reasonable stock of component parts.

3. The appearance of the system will be uniform throughout.

In addition to the universal Multilux line of fixtures a group of non-interchangeable fixtures has been included to meet the requirements of small or isolated street lighting systems where the use of the universal line would not be justified.

For ease in selection the equipment listed in this catalogue has been grouped in several classes as follows:

1. Universal Multilux fixtures for use with
 - a. Cast aluminum reflectors.
 - b. Porcelain enamelled reflectors.
 - c. Holophane refractors.
 - d. Outer enclosing glassware.
2. Non-interchangeable fixtures for use with
 - a. Standard porcelain enamelled reflectors.
 - b. Screw type porcelain enamelled reflectors.
3. Suspension fittings.
4. Pipe brackets.
5. Constant current regulators and control equipment.

These designs of street lighting equipment are the result of many years of experience on the part of Westinghouse in the field of illumination, and the use of them insures the best in street lighting.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Universal Multilux Fixtures

Westinghouse Universal Multilux Fixtures are designed around four basic types of heads to which many types of reflectors, refractors or enclosing globes may be adapted. The heads may be briefly listed as follows:

1. Wet process series head, maximum voltage 14,000.
2. Dry process series head, maximum voltage 7,000.
3. Cast aluminum series head with exterior terminal bushings, maximum voltage 3,500.
- 3A. Cast aluminum series head, for interior wiring, maximum voltage 3,500.
4. Cast aluminum multiple head with exterior terminal bushings, maximum voltage 115.
- 4A. Cast aluminum multiple head for interior wiring, maximum voltage 115.

The wet process porcelain head has a wet flashover value of 30,000 volts and a dry flashover value of 60,000 volts.

The dry process porcelain head has a wet flashover value of 15,000 volts and a dry flashover value of 30,000 volts.

The basic parts are common to both types, permitting interchangeability, and all current carrying parts are nickel plated.

Both types are designed for inner or outer wiring.

The cast iron canopy and reflector holding rings used on the wet process and dry process heads are hot galvanized. A square head set screw is provided in the hexagonal nut at the top of the canopy to securely lock the head to its supporting bracket or fitting.

The cast aluminum heads for low tension series and multiple service are designed with liberal insulation values. Square head set screws are also provided in the hexagonal nuts at the top of the canopies. Hot galvanized reflector holding rings are used for supporting porcelain enamelled reflectors.

A green duco finish is applied to the cast aluminum heads to match the finish on the aluminum and porcelain enamelled reflectors.

Each of the above heads is designed to take a single type of cast aluminum reflector to which may be attached a refractor ring and globe band. The refractor ring is supported on the reflector with an open hinge at one side and by the exclusive Westinghouse toggle latch on the opposite side. When the globe is used it is supported by an additional bronze band which is fastened to the refractor ring.

When Holophane refractors or outer enclosing globes are not required the cast aluminum reflector may be used and glassware may be added at a later date.

If Holophane refractors or outer globes are not required or contemplated for some time, porcelain enamelled reflectors of the standard or screw type may be attached to the heads by means of adapter rings supplied with the heads.

Westinghouse Holophane Refractors

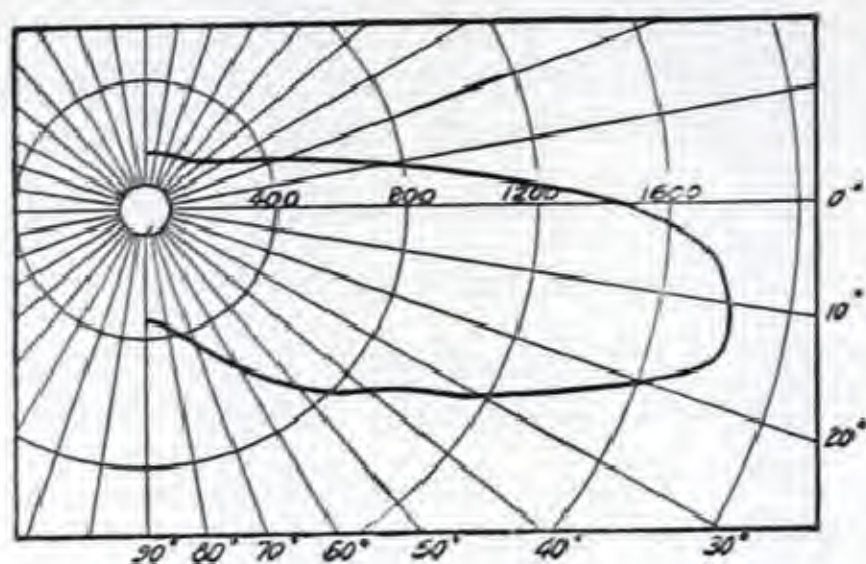
FOR USE WITH PENDENT TYPE LIGHTING UNITS

One of the most important requirements of a street lighting system is uniform illumination upon the roadway and sidewalks. Uniform illumination may be obtained either by close spacing of the lighting units or by controlling the light. The former method would be very costly and the latter method which is most generally adopted is economically and efficiently accomplished by the use of Holophane refractors.

Westinghouse - Holophane refractors have been designed for a wide variety of street lighting applications and may be used either with or without enclosing globes.

The various types of refractors available are described below and from the accompanying distribution curves their applications may be readily determined.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT Holophane Refractors



BOWL TYPE BILUX REFRACTOR

Style No. 344199

For use without enclosing Globe

Maximum Lamp Sizes 300 Watts—6000 Lumens

The bowl type Bilux refractor is designed for use with pendent lighting units to produce asymmetric light distribution and is used in units placed on or adjacent to the curb line. It is furnished with a light velvet finish on the inside of the outer piece permitting its use without an enclosing globe. The velvet finish also serves to reduce the surface brightness and consequently reduces ocular discomfort.

From the distribution curve, it will be observed that two wide beams of light are projected up and down the street at an angle of 22° from the curb line. The candle power directed across the street is considerably lower, as the distance the light has to travel is comparatively short. The candle power directed toward the buildings is also low and so directed that light is properly distributed on the sidewalks but does not become objectionable in the vicinity of houses or buildings.

The light distribution from this refractor is such that very uniform illumination is provided over the street and sidewalks.



BOWL TYPE BILUX REFRACTOR

Style No. 342714

For use with enclosing Globe

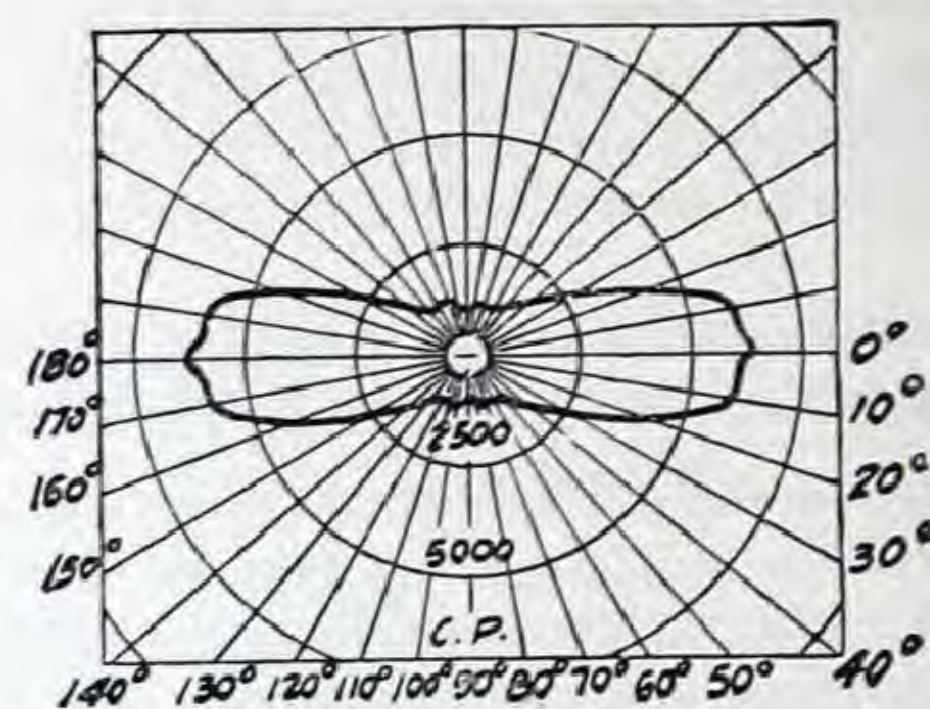
Maximum Lamp Sizes 500 Watts—10,000 Lumens

This refractor is similar to Style No. 344199 but is designed for use in an enclosing globe permitting the use of 500 watt and 10,000 lumen lamps.

The light distribution is practically the same as Style No. 344199, and the resulting illumination is very uniform over the street and sidewalks.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT Holophane Refractors



Distribution from Two-Way Refractor

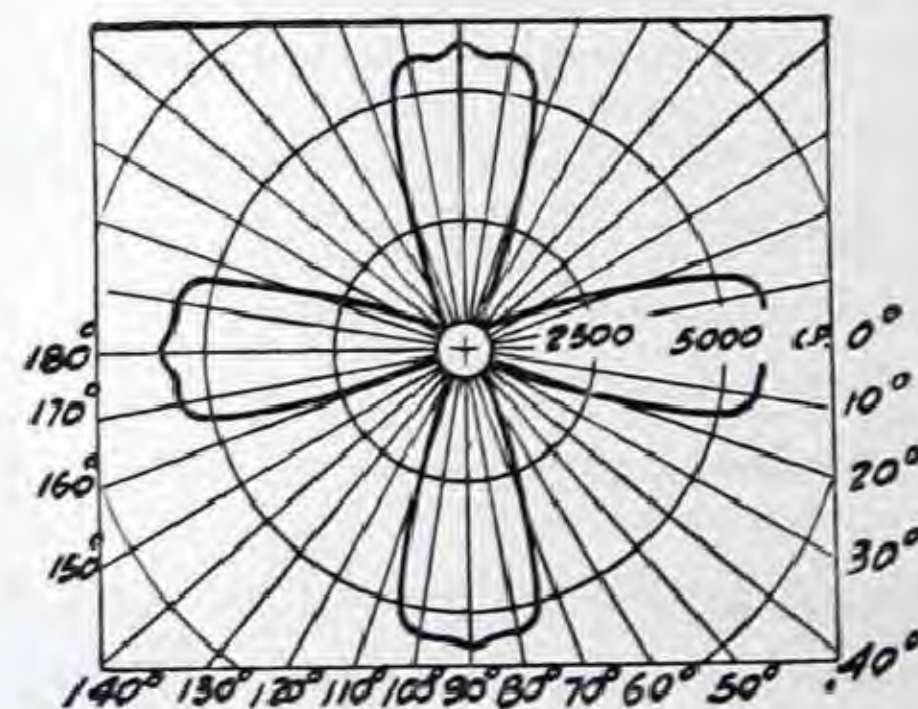
TWO-WAY REFRACTOR

Style No. 353974

Maximum Lamp Sizes

300 Watts—6,000 Lumens

The two-way refractor, as the name indicates, is designed to throw two beams of light in opposite directions 180 degree apart. This refractor is principally used on suspension unit mounted over the centre line of the street.



Distribution from Four-Way Refractor

FOUR-WAY REFRACTOR

Style No. 353975

Maximum Lamp Size

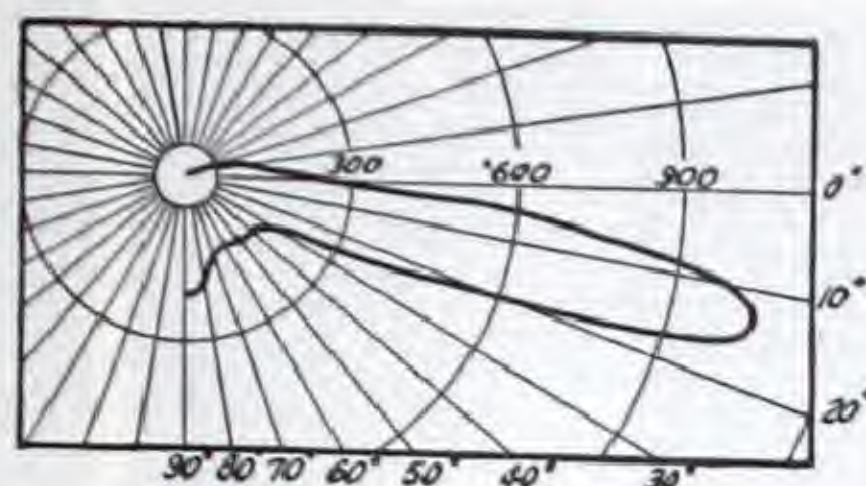
300 Watts—6,000 Lumens

The four-way refractor is designed for use in units mounted over street intersections. Its prism construction is such as to divide the light into four beams laterally 90 degrees apart instead of two beams 180 degrees apart as in the case of the two-way refractor.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

HOLOPHANE REFRACTORS

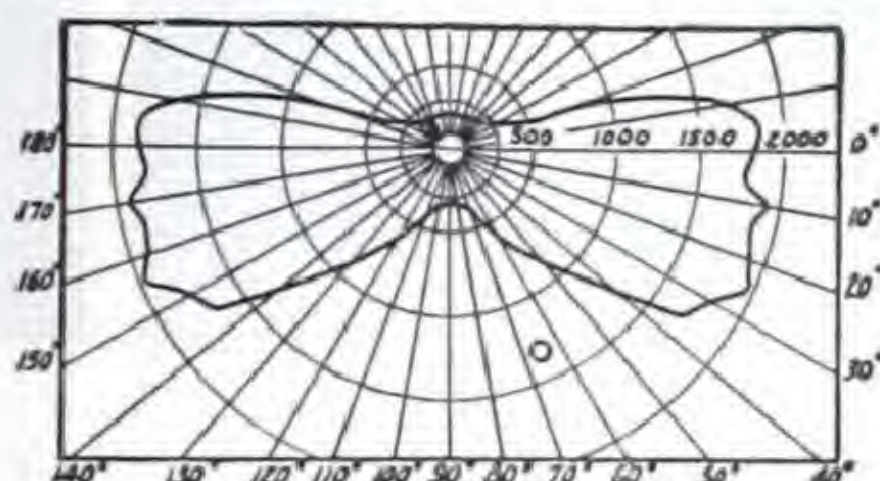


SUPERLUX REFRACTOR
Style No. 344639

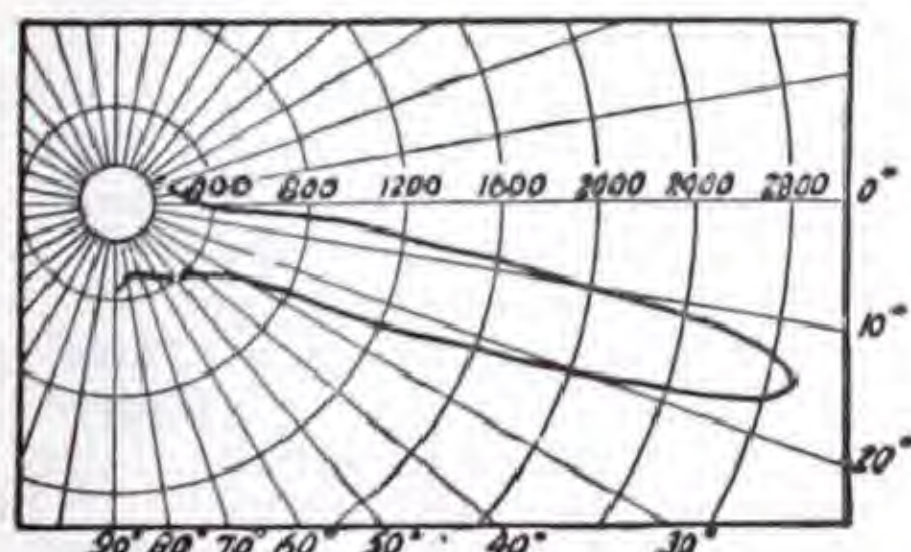
Maximum Lamp Sizes 300 Watts—6,000 Lumens
The superlux refractor is designed to give uniform or symmetrical illumination around the vertical axis and its prisms designed to give a maximum brightness over the entire face of the refractor and to distribute light in the area immediately below the unit. This is undoubtedly the best type of refractor for general service and is recommended for use in pendent units where symmetrical distribution is required.



8" B-WAY REFRACTOR
Style No. H-27819



Maximum Lamp Sizes 300 Watts—6,000 Lumens
The B-way refractor is designed for units mounted at the side of the street. It directs light downwards and spreads it over the street to provide approximately uniform illumination over the street and sidewalks. A small amount of light is directed toward the houses and buildings.

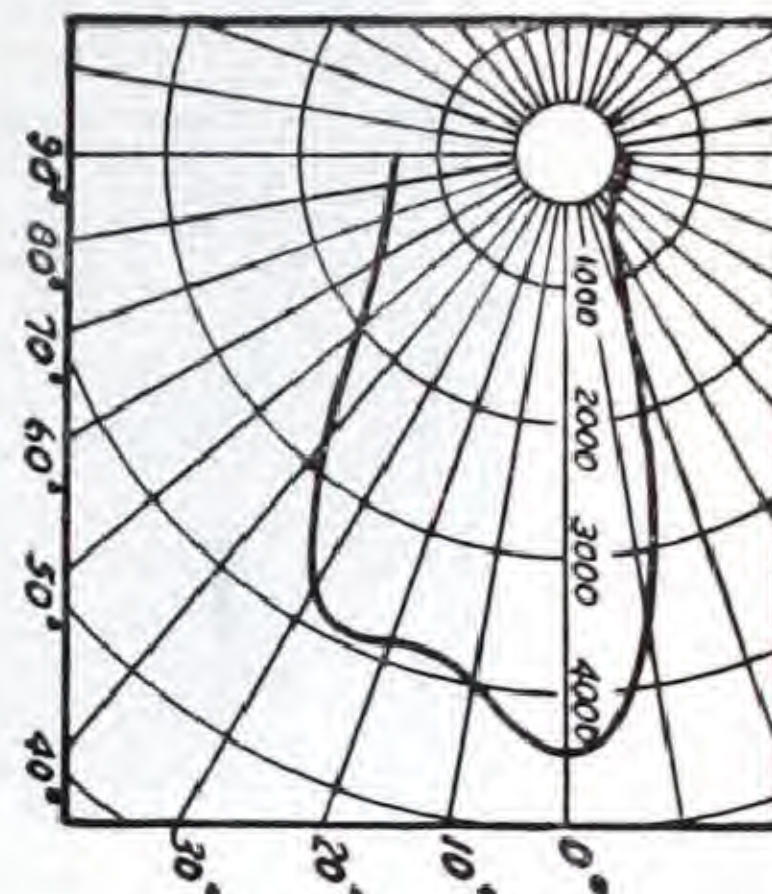


***11" SYMMETRIC BOWL REFRACTOR**
Style No. 351761

Maximum Lamp Sizes 500 Watts—15,000 Lumens
The 11" Symmetric bowl refractor is designed to give symmetrical distribution around the vertical axis. It is designed for use on units mounted over the centre or at the side of the street.
Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Holophane Refractors



***11" B-WAY BOWL REFRACTOR**

Style No. H-27820

Maximum Lamp Sizes

500 Watts—15000 Lumens

The 11" B-way refractor is designed for units mounted at the side of the street. It directs light downward and spreads it up and down the street, providing uniform illumination over the street and sidewalks.

*These Refractors are not adaptable to Universal Multilux Fixtures



Fig. 1

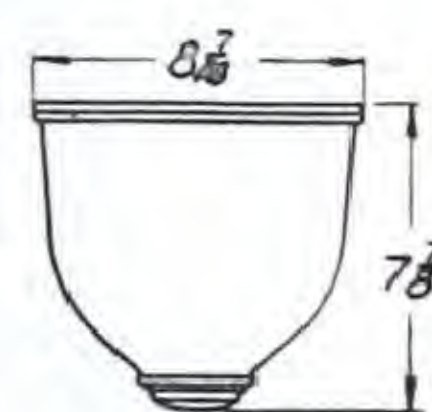


Fig. 2

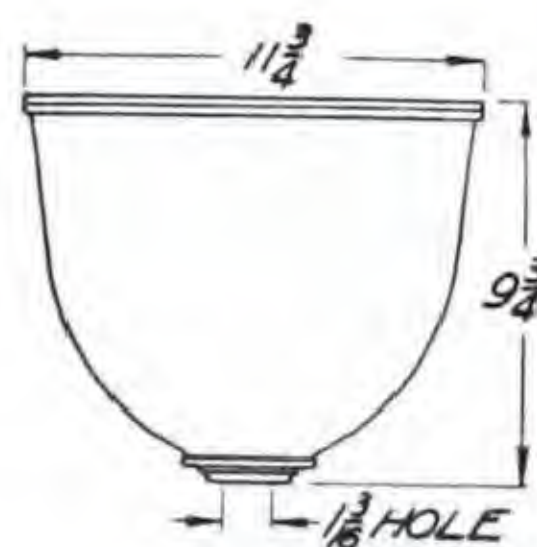


Fig. 3

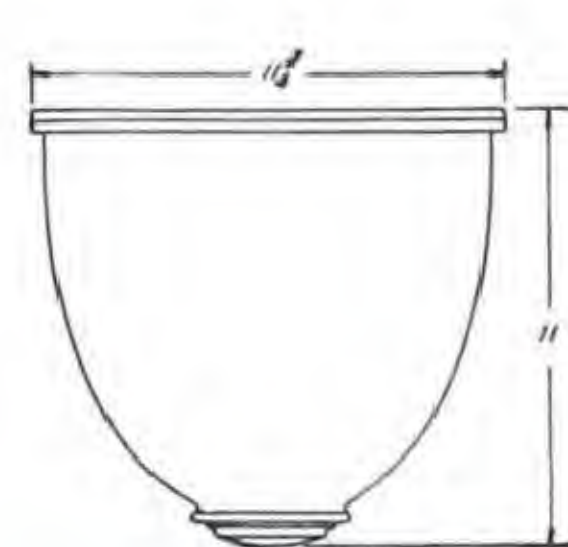


Fig. 4

HOLOPHANE REFRACTORS

For use with Pendent Type Lighting Units

Style Number	Holophane Number	Description	Ref. Fig.
344199	4373-VF	8" Bilux Refractor, Velvet Finish	1
342714	4373	8" Bilux Refractor	1
353974	4376	8" Two-Way Refractor	2
353975	4375	8" Four-Way Refractor	2
H-27819	4377	8" B-Way Refractor	2
344639	4336	8" Superlux Refractor	1
351761	4333-VF	*11" Symmetric Bowl Refractor	3
H-27820	4177-VF	*11" B-Way Bowl Refractor	4

*These Refractors are not adaptable to Universal Multilux Lighting Units.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT Holophane Refractors



Luxsolite Rectilinear Globe
ENCLOSING GLOBE

For 8" Holophane Refractors Style No. 341029

Universal Multilux Fixtures SERIES TYPE



No. H-27456



No. H-27466

Description	Lamps	Wet Process Dry Process Porcelain Porcelain 14000 volts 7000 volts Max. Max.	
		Style No.	Style No.
Multilux fixture with cast aluminum reflector and Holophane superlux refractor.	6000 lumens	H-27456	H-27457
Multilux fixture with cast aluminum reflector and Holophane 2-way refractor.	6000 lumens	H-27458	H-27459
Multilux fixture with cast aluminum reflector and Holophane 4-way refractor.	6000 lumens	H-27460	H-27461
Multilux fixture with cast aluminum reflector and Holophane B-way refractor.	6000 lumens	H-27462	H-27463
Multilux fixture with cast aluminum reflector and Holophane Bilux refractor.	6000 lumens	H-27464	H-27465
Multilux fixture with cast aluminum reflector, Holophane Bilux refractor and Luxsolite globe.	10000 lumens	H-27466	H-27467
Multilux fixture with cast aluminum reflector and Luxsolite globe without refractor.	6000 lumens	H-27468	H-27469

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT Universal Multilux Fixtures SERIES TYPE—Cont.



No. H-27470



No. H-27480



No. H-27476



No. H-27482

Description	Lamps	External Terminals 3500 volts Max.		Interior Wiring 3500 volt Max.	
		Style No.	Style No.	Style No.	Style No.
Multilux fixture with cast aluminum head and reflector with Holophane superlux refractor.	6000 lumens	H-27470	H-274		
Multilux fixture with cast aluminum head and reflector with Holophane 2-way refractor.	6000 lumens	H-27472	H-274		
Multilux fixture with cast aluminum head and reflector with Holophane 4-way refractor.	6000 lumens	H-27474	H-274		
Multilux fixture with cast aluminum head and reflector with Holophane B-way refractor.	6000 lumens	H-27476	H-274		
Multilux fixture with cast aluminum head and reflector with Holophane Bilux refractor.	6000 lumens	H-27478	H-274		
Same with Luxsolite globe.	10000 lumens	H-27480	H-274		
Same without refractor.	6000 lumens	H-27482	H-274		

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Universal Multilux Fixtures
MULTIPLE TYPE



No. H-27484



No. H-27494



No. H-27488



No. H-27496

Description	Lamps	External Terminals 115 volts Style No.	Interior Wiring 115 volts Style No.
Multilux fixture with cast aluminum head and reflector, Holophane superlux reflector.	300 watts	H-27484	H-27485
Multilux fixture with cast aluminum head and reflector, Holophane 2-way reflector.	300 watts	H-27486	H-27487
Multilux fixture with cast aluminum head and reflector, Holophane 4-way reflector.	300 watts	H-27488	H-27489
Multilux fixture with cast aluminum head and reflector, Holophane B-way reflector.	300 watts	H-27490	H-27491
Multilux fixture with cast aluminum head and reflector, Holophane Bilux reflector.	300 watts	H-27492	H-27493
Multilux fixture with cast aluminum head and reflector, Luxsolite globe.	500 watts	H-27494	H-27495
Multilux fixture with cast aluminum head and reflector, Luxsolite globe.	300 watts	H-27496	H-27497
Prices on application.			

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Universal Multilux Fixtures
WITH PORCELAIN REFLECTORS



Description	Lamps	Wet Process Porcelain 14000 volts Max. Style No.	Dry Process Porcelain 7000 volts Max. Style No.
Multilux fixture with porcelain head and standard 18" radial bowl reflector, series socket.	6000 lumens	H-22781	H-22782
Multilux fixture with porcelain head and standard 20" radial bowl reflector, series socket.	6000 lumens	340297	340293



Description	Lamps	External Terminals Style No.	Interior Wiring Style No.
Multilux fixture with cast aluminum head and standard 18" radial bowl reflector, series socket, 3500 volts.	6000 lumens	H-22783	H-22785
Multilux fixture with cast aluminum head and standard 20" radial bowl reflector, series socket, 3500 volts.	6000 lumens	341867	341267



Multilux fixture with cast aluminum head and standard 18" radial bowl reflector, mogul multiple socket, 115 v.	300 watts	H-22784	H-22786
Multilux fixture with cast aluminum head and standard 20" radial bowl reflector, mogul multiple socket, 115 v.	300 watts	341869	341269
Prices on application.			

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Universal Multilux Fixtures

WITH PORCELAIN REFLECTORS—Cont.



Description	Lamps	Wet Process	Dry Process
		Porcelain 14000 volts Max. Style No.	Porcelain 7000 volts Max. Style No.
Multilux fixture with porcelain head and screw type 18" radial bowl reflector, series socket.	6000 lumens	H-27435	H-27437
Multilux fixture with porcelain head and screw type 20" radial bowl reflector, series socket.	6000 lumens	H-27436	H-27438



Description	Lamps	External Terminals	Interior Wiring
Multilux fixture with cast aluminum head and screw type 18" radial bowl reflector, series socket, 3500 v.	6000 lumens	H-27439	H-27443
Multilux fixture with cast aluminum head and screw type 20" radial bowl reflector, series socket, 3500 v.	6000 lumens	H-27440	H-27444



Multilux fixture with cast aluminum head and screw type 18" radial bowl reflector, mogul multiple socket, 115 volts.	300 watts	H-27441	H-27445
Same 20" radial bowl	300 watts	H-27442	H-27446
Prices on application.			

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Part For Universal Pendant Type Fixture



WET PROCESS PORCELAIN HEADS

Complete With Series Sockets

For use with Cast Aluminum Reflector	Style No. H-27507
For use with Standard Type Porcelain Reflectors	354638
For use with Screw Type Porcelain Reflectors	H-27508

DRY PROCESS PORCELAIN HEADS

Complete With Series Sockets

For use with Cast Aluminum Reflector	H-27509
For use with Standard Type Porcelain Reflectors	354658
For use with Screw Type Porcelain Reflectors	H-27510



CAST ALUMINUM HEADS WITH EXTERNAL TERMINALS

	Style No.	
	Series Socket	Multiple Socket
For use with Cast Aluminum Reflector	H-27512	H-27518
For use with Standard Porcelain Reflectors	H-27513	H-27519
For use with Screw Type Porcelain Reflectors	H-27514	H-27520



CAST ALUMINUM HEADS

For Interior Wiring

	Style No.	
	Series Socket	Multiple Socket
For use with Cast Aluminum Reflector	H-27515	H-27521
For use with Standard Porcelain Reflectors	H-27516	H-27522
For use with Screw Type Porcelain Reflectors	H-27517	H-27816
Prices on application.		

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Fixture Parts



No. H27817



No. 335990



No. 335343

	Style No.
" Cast Aluminum Reflector without Refractor or Globe Band	H-27817
" Standard Radial Bowl Reflector	335940
" Standard Radial Bowl Reflector	336153
" Screw Type Radial Bowl Reflector	335343
" Screw Type Radial Bowl Reflector	347917



No. 354632

Standard Reflector Adapter
Screw Type Reflector Adapter



No. 342722

354632
342722



No. H27818



No. 353958

Reflector Ring for 8" Refractors
Globe band for Luxsolite Globe

Standard Series Films (pkg. of 50)
Ampere, 80-400 volt films
Ampere, 30-80 volt films

H-21262
354570
354450

Standard Series Film Socket
Standard Series Receptacle
Mogul Multiple Socket

354660
354659
336179

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Non-Interchangeable Street Lighting Fixtures



No. H-27448



No. H-27450

Multiple Pendent Type Fixtures

For Standard Porcelain Enamelled Reflectors

Style No.	Description
H-27447	Medium Multiple Head only with Cross-arm for exterior wiring.
H-27448	Medium Multiple Head complete with Cross-arm for exterior wiring and 18" Radial Bowl Reflector.
H-27449	Medium Multiple Head complete with Cross-arm for exterior wiring and 20" Radial Bowl Reflector.
H-21316	Medium Multiple Head only for interior wiring.
H-27450	Medium Multiple Head complete for interior wiring and 18" Radial Bowl Reflector.
H-27451	Medium Multiple Head complete for interior wiring and 20" Radial Bowl Reflector.
335940	18" Radial Bowl Reflector only.
336153	20" Radial Bowl Reflector only.
H-21545	Medium Multiple Socket only.

Westinghouse non-interchangeable fixtures are available in two distinct types as follows:

1. Standard Reflector type.
2. Screw Reflector type.

The standard reflector type is designed for both interior and exterior wiring: in the latter case a cross-arm with porcelain insulators is provided as an integral part of the body and porcelain bushings are provided for the entrance of wiring.

18" and 20" radial bowl porcelain enamelled reflectors are available for this fixture and may be used with lamps up to 200 watts as the fixture is only provided with a medium socket.

The screw reflector type is also designed for both interior and exterior wiring and the latter type is provided with a cross-arm with porcelain insulators as an integral part of the body and porcelain bushings are provided for the entrance of wiring.

The screw reflector type is recommended for use where extreme wind and vibration conditions exist.

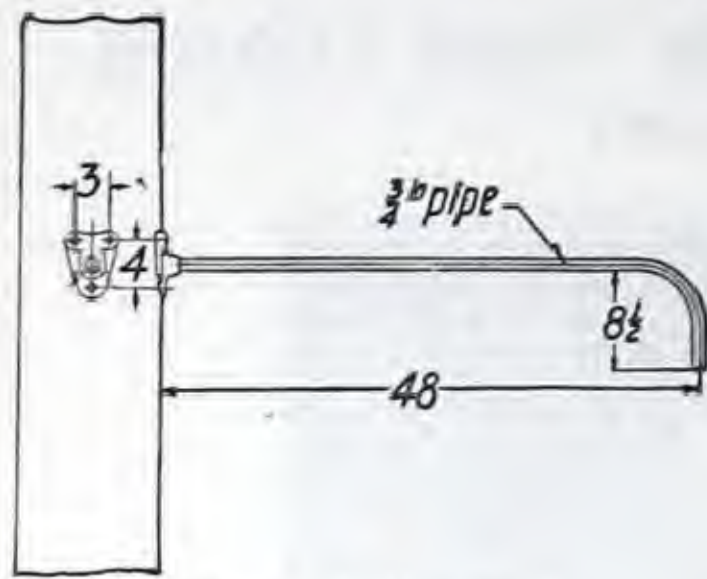
18" and 20" radial bowl reflectors are available for this fixture and up to 300 watt lamps may be used as it is available with both medium and mogul sockets.

Both types of fixtures are supplied with cast iron bodies which are hot galvanized.

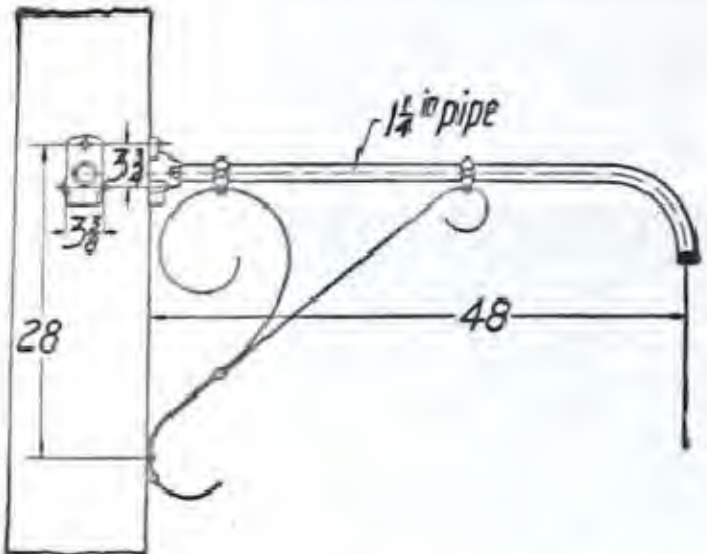
Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

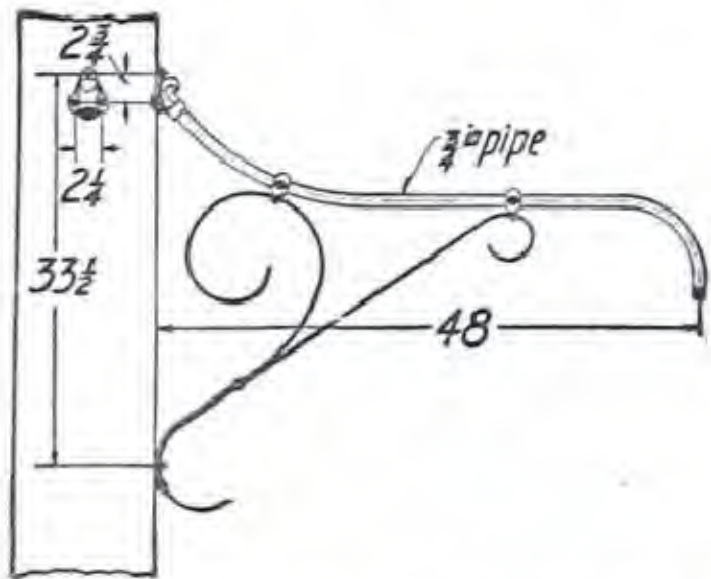
Street Lighting Brackets and Suspension Fittings



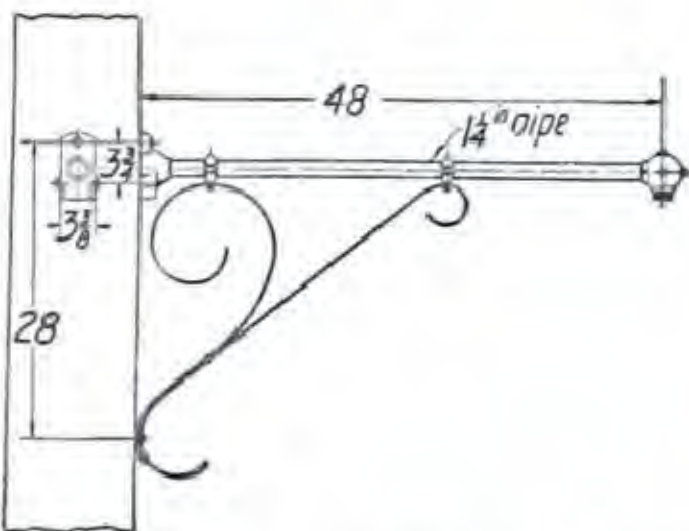
Type A Bracket



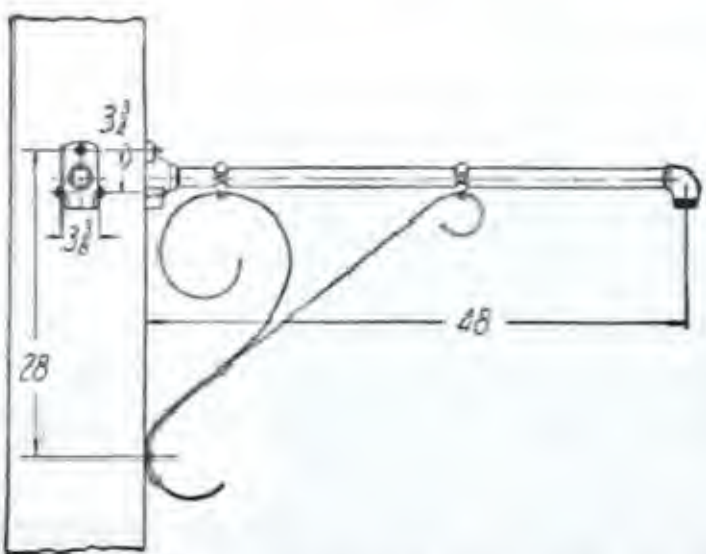
Edison Bracket—Double Scroll



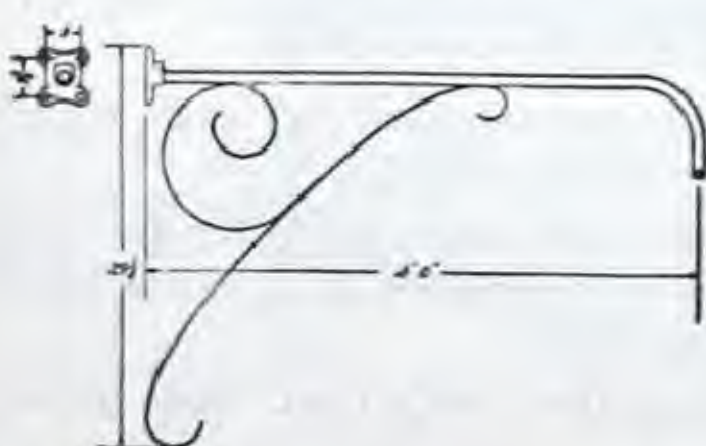
Majestic Bracket—Double Scroll



Spartan Bracket—Double Scroll



Civic Bracket—Double Scroll



Type C Bracket

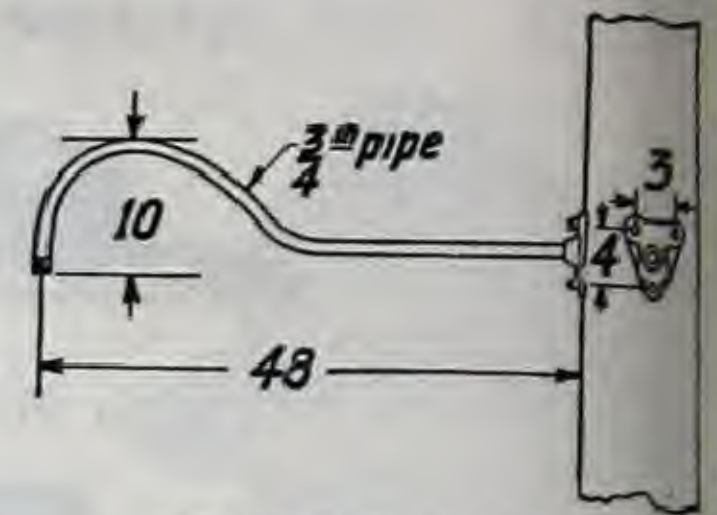
GENERAL DESCRIPTION

Westinghouse street lighting brackets and suspension fittings are supplied in a variety of designs with hot galvanized finish.

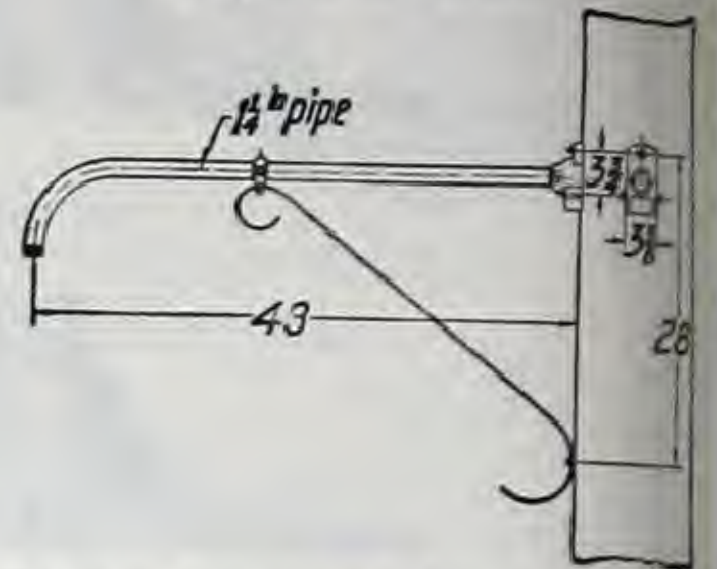
These brackets are available in standard lengths of 4 feet with $\frac{3}{4}$ "-1" or $1\frac{1}{4}$ " pipe. Single or double scrolls are available and scroll clamps are provided to permit adjustment for pole rake.

Various types of brackets are available for supporting the several types of fixtures according to weight and size.

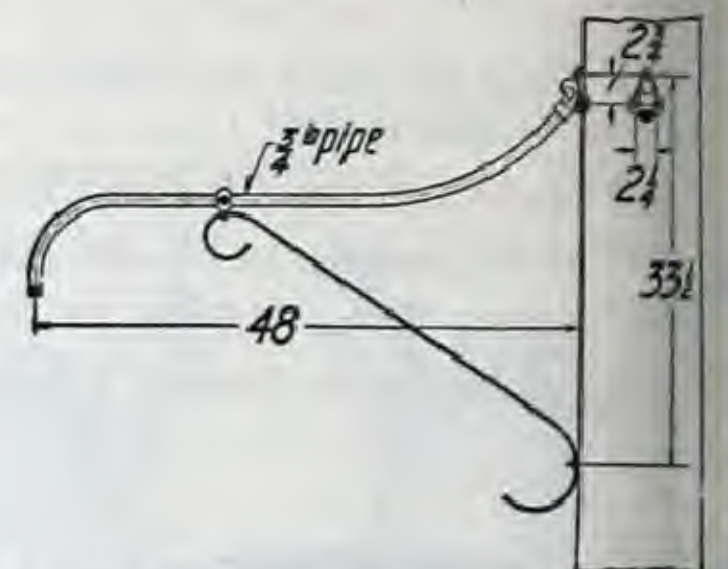
A wide variety of suspension fittings is also available to meet the many conditions imposed by the various types of overhead street lighting fixtures.



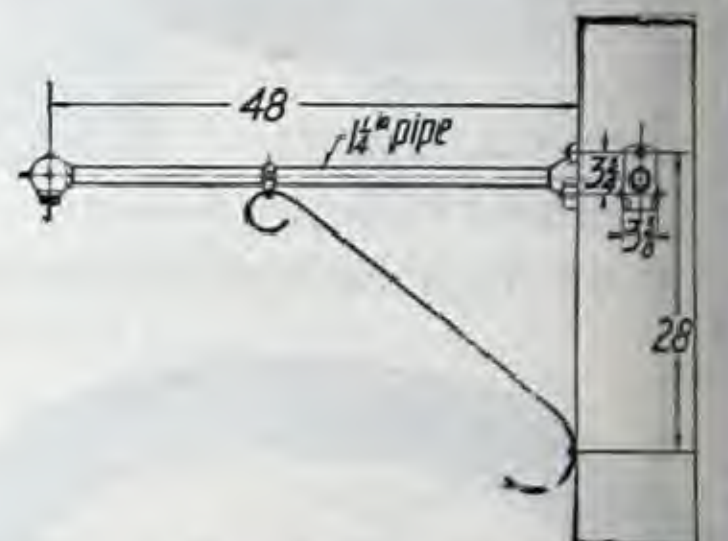
Type B Bracket



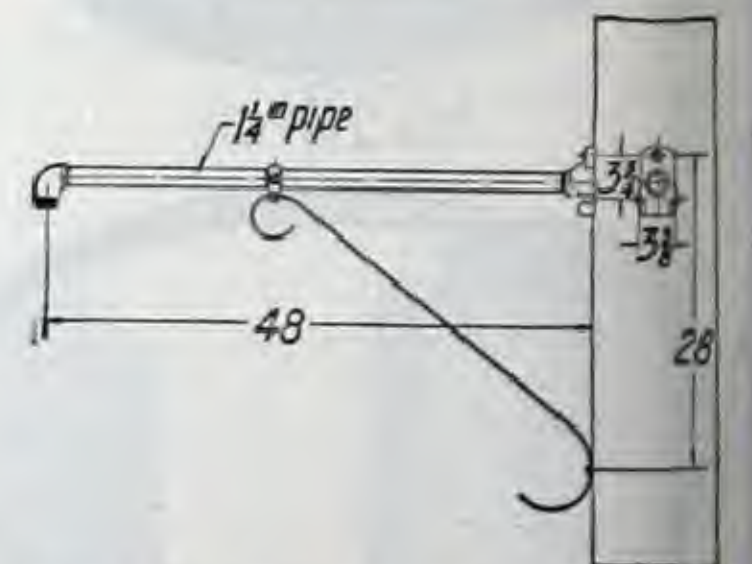
Edison Bracket—Single Scroll



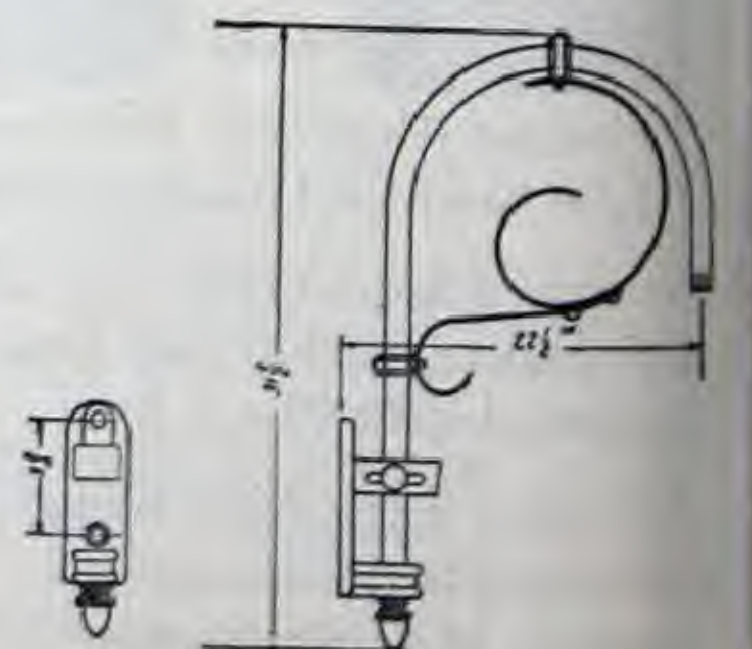
Majestic Bracket—Single Scroll



Spartan Bracket—Single Scroll



Civic Bracket—Single Scroll



Pole Crook

	Style No.
	Galvanized
4' x $\frac{3}{4}$ " Type "A" Bracket	H-22872
4' x $\frac{3}{4}$ " Type "B" Bracket	352245
4' x $1\frac{1}{4}$ " Edison Bracket single scroll	340347
4' x $1\frac{1}{4}$ " Edison Bracket double scroll	352274
4' x $\frac{3}{4}$ " Majestic Bracket single scroll	337562
4' x $\frac{3}{4}$ " Majestic Bracket double scroll	352249
4' x 1" Spartan Bracket single scroll	H-22876
4' x 1" Spartan Bracket double scroll	H-22827
4' x $1\frac{1}{4}$ " Spartan Bracket single scroll	340348
4' x $1\frac{1}{4}$ " Spartan Bracket double scroll	352264
4' x $1\frac{1}{4}$ " Civic Bracket single scroll	340250
4' x $1\frac{1}{4}$ " Civic Bracket double scroll	346355
4' x $\frac{3}{4}$ " Type "C" Bracket	H-21334
4 x 1" Type "C" Bracket	H-22817
$1\frac{1}{4}$ " Pole Crook with Adjustable Pole Plate	351757

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Suspension Fittings



Cable Clamp



Type D Loop



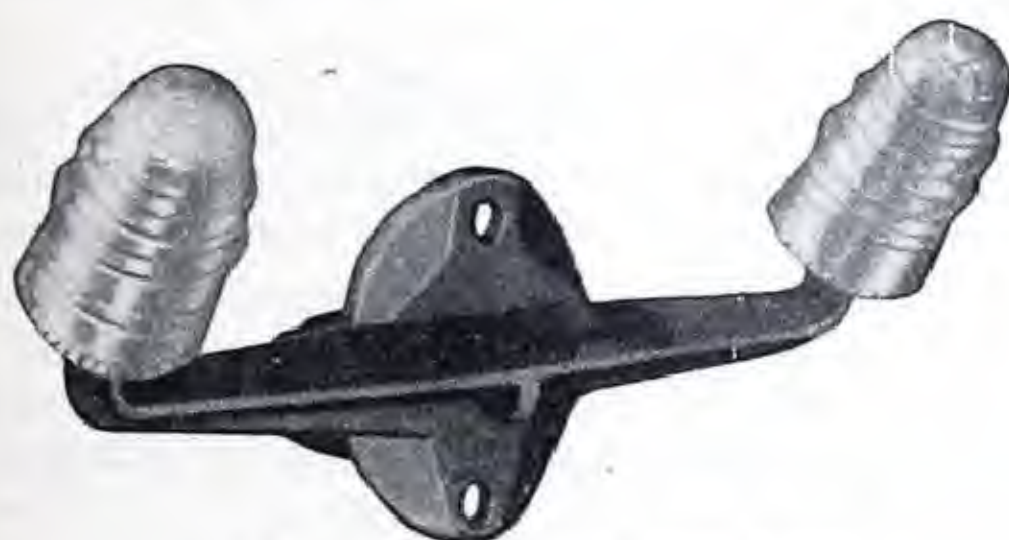
Interchangeable Cross-Arm



Simple Cross Arm



Swivel Cross-Arm with Type D Loop



Angle Change Brace Arm

Style No.	Description
3202	Cable Clamp with $\frac{3}{4}$ " Stud.
3344	Cable Clamp with $1\frac{1}{4}$ " Stud.
27826	Cable Clamp with Hook.
3398	Cable Clamp with Swivel Eye.
3210	Type "D" Loop, $\frac{3}{4}$ ".
3338	Type "D" Loop, $1\frac{1}{4}$ ".
3200	Interchangeable Cross-Arm, $\frac{3}{4}$ ".
3343	Interchangeable Cross-Arm, $1\frac{1}{4}$ ".
4508	Simple Cross-Arm, $\frac{3}{4}$ ".
4471	Simple Cross-arm, $1\frac{1}{4}$ ".
3639	$\frac{3}{4}$ " Locknut.
3737	$1\frac{1}{4}$ " Locknut.
3508	Swivel Cross-arm with $\frac{3}{4}$ " type "D" Loop.
3509	Swivel Cross-arm with $1\frac{1}{4}$ " type "D" Loop.
27827	Swivel Cross-arm with hook.
3510	Swivel Cross-arm with cable clamp and $\frac{3}{4}$ " stud.
3511	Swivel Cross-arm with cable clamp and $1\frac{1}{4}$ " stud.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

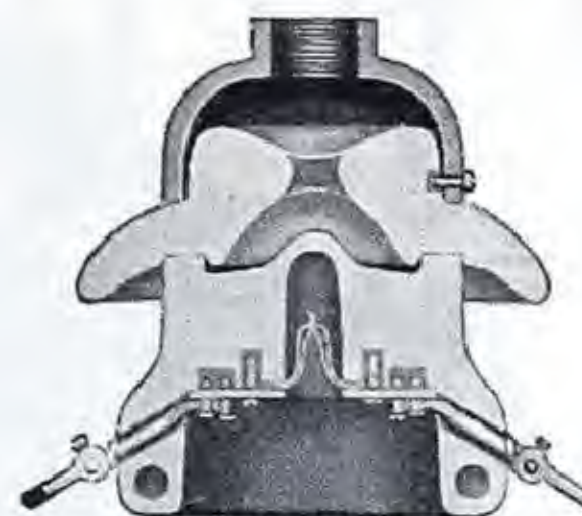
Suspension Fittings



Double-Bushed Suspension Hanger



High-Voltage Insulator



Section of Streethood Showing Outside Terminals



Jupiter Insulator



High-Voltage Cross-Arm



Grip Arm

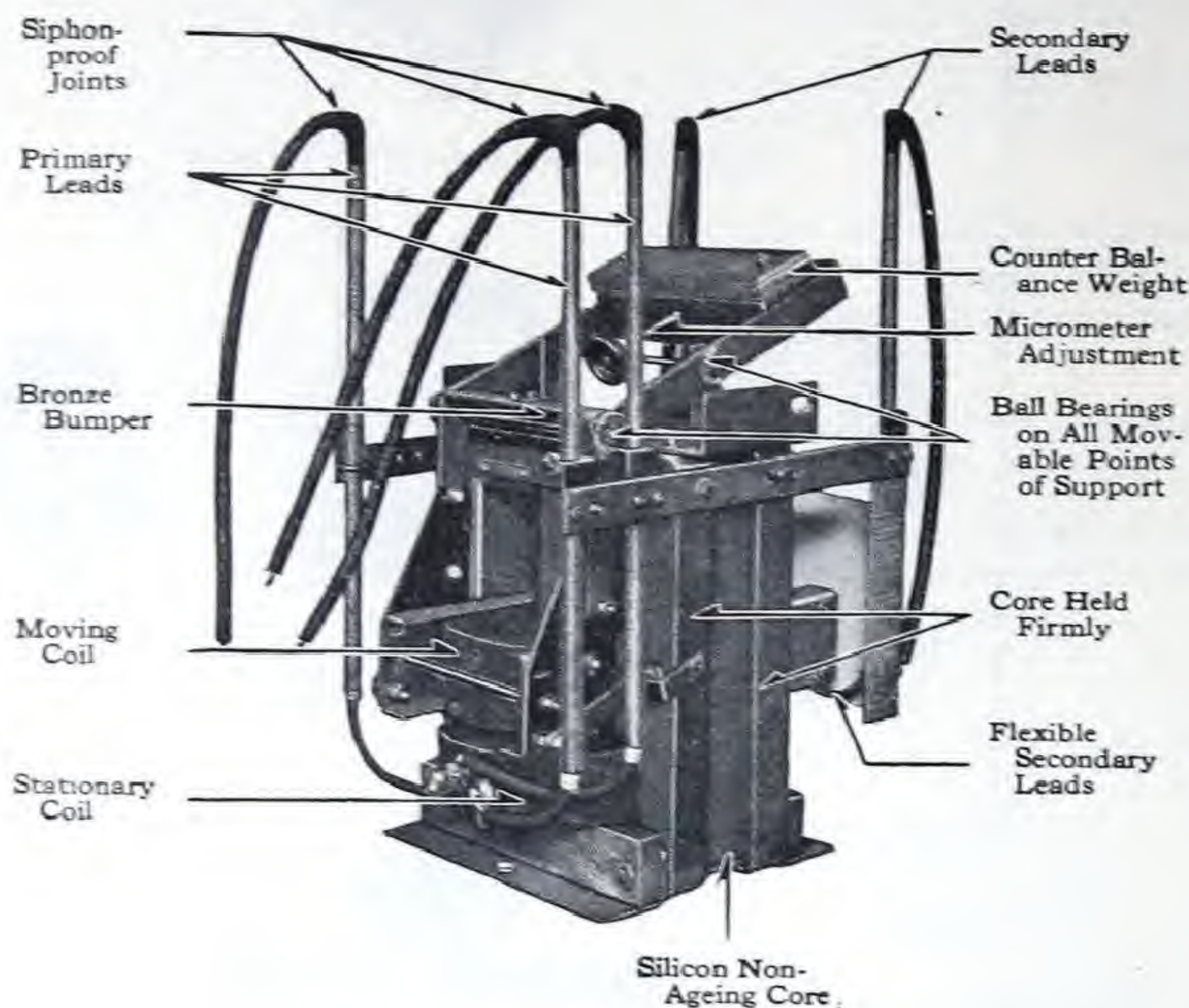
Style No.	Description
354494	Double Bushed Suspension Hanger, $\frac{3}{4}$ ".
354528	Double Bushed Suspension Hanger, $1\frac{1}{4}$ ".
334768	$1\frac{1}{4}$ " to $\frac{3}{4}$ " Reducing Bushing.
342437	$\frac{3}{4}$ " to $\frac{1}{2}$ " Reducing Bushing.
337444	Outside Terminals for porcelain heads.
346327	High Voltage Insulator with $\frac{3}{4}$ " stud.
346362	High Voltage Insulator with hook.
346363	Jupiter Insulator with $\frac{3}{4}$ " stud.
346364	Jupiter Insulator with hook.
346360	High Voltage Cross-arm.
335205	Grip Arm.
346198	Angle Change Brace Arm.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Pole-Type Constant Current Regulating Transformers

Type "LP"



Interior View Type LP Regulator



Exterior View Type LP Regulator

GENERAL

Type "LP" constant current regulating transformers embody a new type of construction and an entirely new design of operating mechanism. A parallel motion mechanism supports the moving secondary coil. This ensures a parallel position of the coils regardless of load condition and assures improved operating characteristics under all operating conditions.

OPERATION

The operating characteristics shown below are based on average measured iron loss, copper loss at 75°C., load power factor of 99½%, rated load, and normal primary voltage.

The design differs widely from the hinged coil type, the operation of type "LP" regulators being very simple. When the primary coil is energized the repulsion between the primary and secondary coils causes the secondary coil to move to a position fixed by the counter weight and forces of repulsion. In moving, the secondary coil is assisted by the counter weight and guided by the parallel motion mechanism.

CONSTRUCTION

The non-ageing silicon steel core is rigidly clamped to and held firmly by structural steel and frames affording minimum weight with quiet operation. The counter weight is supported by a lever and is easily adjusted within very close limits by a Vernier adjustment screw. After adjustment to the correct position for rated constant current, the counter weight is securely locked in position by lock nuts.

The coils are wound on a Micarta tube affording high insulation to the centre leg of the core. The winding is broken into sections by inserting wooden spacers at intervals in the winding. This permits the circulation of oil and ensures an

even temperature. The coils are thoroughly impregnated by the thermo vacuum process with high grade insulating compound. The moving coil is insulated from the outer legs of the core by Micarta channels. The leads are insulated by Micarta tubing.

With the parallel motion mechanism the secondary current regulation is even better than with the hinged type construction formerly used. Secondary current is maintained within 1% of rated current from full load to short circuit.

In accordance with A.I.E.E. recommendations, the pole type constant current regulating transformers are designed to deliver the rated output at the secondary terminals to a 99½% power factor load at 5% below rated primary voltage. The temperature rise of the windings will not exceed 55°C. when operated 8 hours continuously at half load.

The regulators normally carried in stock and listed below are rated 2300 volt primary with 10% reduced voltage tap, 6.6 ampere secondary, 25 and 60 cycles. When the regulator is fully loaded it is recommended that the 2070 volt tap be used when the average voltage supply is less than 2180 volts. For partial load the full primary winding should be used.

The case is made of boiler iron with all joints welded; for the larger sizes tubes are welded into the walls to increase the radiated surface, thus permitting operation within the specified temperature rise limits with a minimum amount of oil.

A light sheet steel cover is provided to afford easy access to the mechanism for adjustment and inspection.

SPECIAL REGULATORS

Constant current regulating transformers with special voltages, frequencies or current can be furnished on special order.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Manhole Type Constant Current Regulating Transformers

The operating mechanism of the manhole type constant current regulating transformer is identical to that of the pole type. The manhole type regulating transformer is required to operate submerged in water at times and it is necessary, therefore, that an immersion proof tank be used and that the lead joints be made to both primary and secondary terminals.

In accordance with A.I.E.E. recommendations, the manhole type constant current regulating transformers are designed to deliver rated output at secondary terminals to a 99½% power factor at 5% below rated primary voltage. The temperature rise of the winding will not exceed 55°C., when operated fifteen hours continuously at half

OPERATION

The operating characteristics shown below are based on average measured iron loss, copper loss at 75°C., load power factor of 99½%, rated load and rated primary voltage.

CONSTRUCTION

The tank of the type "LM" regulating transformer is made of heavy sheet steel with steel channels across the bottom to protect the tank. It is

Type "LM"



made water proof by a cork gasket between the top rim and the cover. The gasket is shellaced on one side and liberally greased on the other, making possible the removal of the cover without injury to the gasket. The tank is protected with two coats of battleship grey paint.

The three primary leads and two secondary leads terminate at separate terminal boards. Four bronze wiping sleeves, 1 inch inside diameter, are provided for primary and secondary entrance leads. White lead joints should be made on all subway installations to ensure satisfactory operation of the regulating transformer if submerged.

The mechanism of the manhole type unit is identical with the pole type unit, with the exception of the terminal board provided with the manhole type; the same features of construction and rating for the type LP also apply to the type "LM."

The parallel motion type mechanism makes possible the design of manhole type regulating transformers in ratings of 30 kw. or less with an overall diameter not exceeding 30 inches. This eliminates the necessity of using a tandem type design.

PERFORMANCE DATA

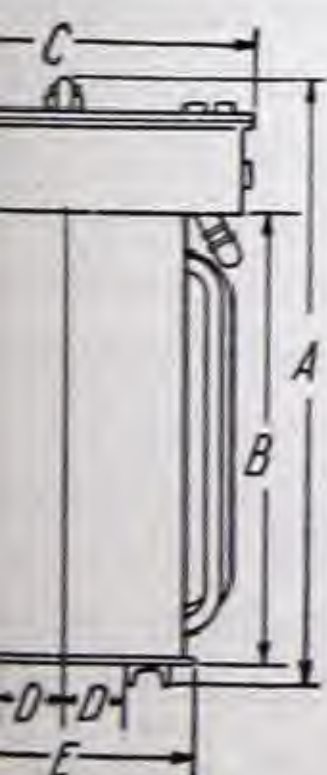
2300-2070 Volt Primary, 6.6 Ampere Secondary, 60 Cycle

Rating Kw.	Primary		Secondary		Efficiency				Power Factor				Gals. Oil
	Amperes	Kv-a Input	Nor. Load Volts*	Open Cir. Volts	Full Load	¾ Load	½ Load	¼ Load	Full Load	¾ Load	½ Load	¼ Load	
5	2.94	6.75	760	1023	93.2	91.2	87.2	77.3	75	56	38	20	38
7½	4.41	10.13	1140	1534	94.2	92.2	88.8	79.8	75	56	38	20	45
10	5.88	13.50	1520	2045	94.7	93.1	90.0	81.8	75	56	38	20	45
15	8.82	20.25	2280	3068	95.4	93.9	91.3	83.9	75	56	38	20	55
20	11.77	27.00	3040	4090	95.8	94.6	92.1	85.5	75	56	38	20	55
25	14.70	33.75	3800	5113	96.3	95.2	93.0	86.9	75	56	38	20	75
30	17.64	40.50	4560	6135	96.5	95.4	93.3	87.3	75	56	38	20	75

Note: Efficiency and power factor based on rated load, average measured iron loss, copper loss at 75°C., 99½% power factor

This voltage is available at the secondary terminals with a 99½% power factor load connected and with 95% of normal voltage applied to the primary. With 100% of normal voltage, the available load voltage will be 105% of the values shown.

Performance Data on 25 cycle regulators may be obtained on application to the nearest district office.



DIMENSIONS IN INCHES

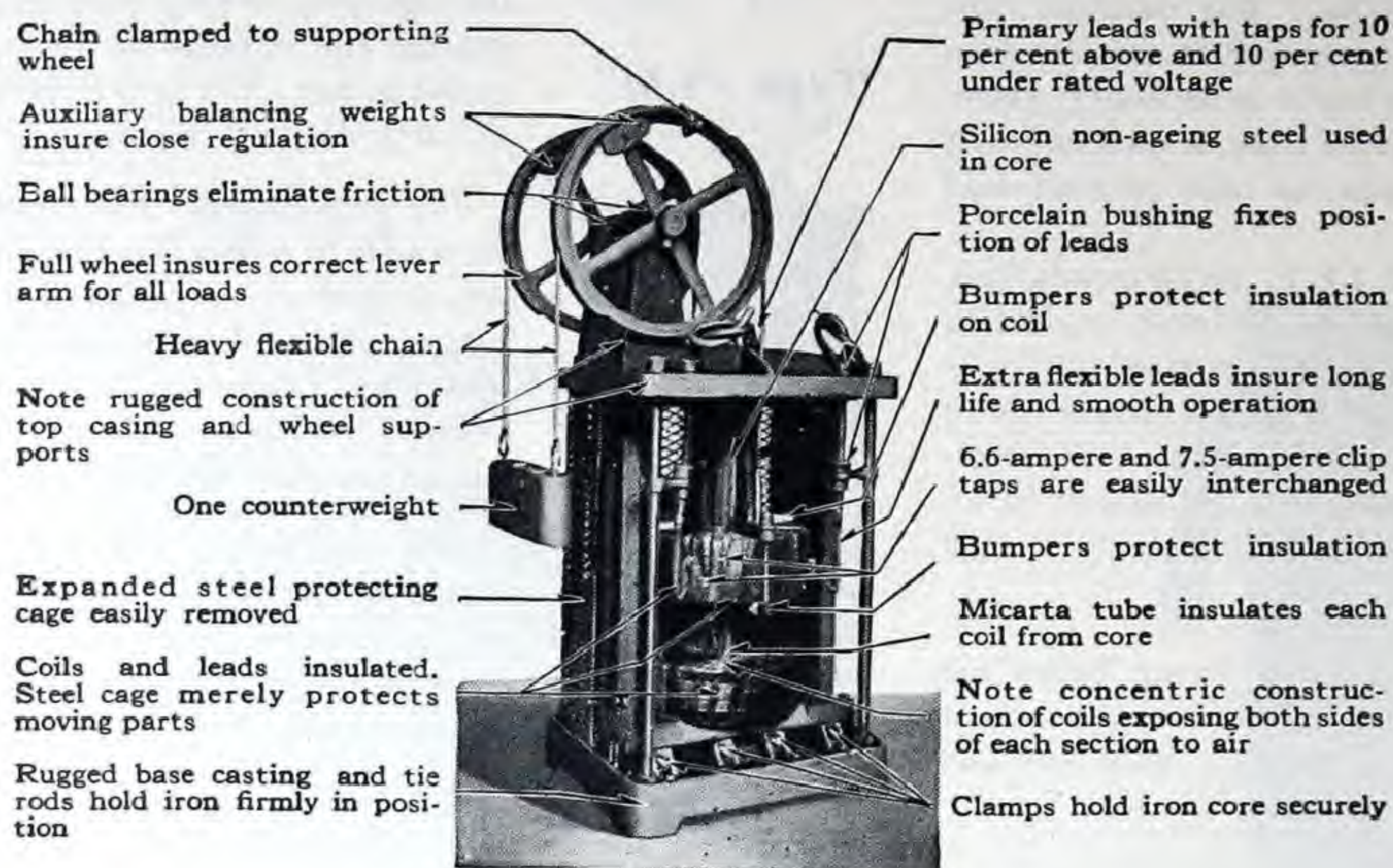
Rating Kw.	A	B	C	D	E
5	50	39	23	3	14
7½	51	40	25	4½	17
10	51	40	25	4½	17
15	53	42	27½	4½	18
20	53	42	27½	4½	18
25	54	43	29½	5	21
30	54	43	29½	5	21

Above dimensions apply to 60 cycle regulators and are for reference only. For official dimensions of 25 and 60 cycle regulators apply to the nearest district office.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Station-type Constant Current Regulating Transformers Type "RS"



Station-Type Regulator

The station type "RS" constant current regulating transformer is designed for manually-controlled indoor operation or may be adapted for automatic operation as outlined below. Type "RS" regulating transformers have 2300 volt primary windings with taps for 2100 or 2500 volts. The secondary is designed for 6.6 or 7.5 ampere constant current with a 90 per cent tap in the secondary for improved power factor and efficiency for 35 to 90 per cent loads. This same improved performance may be obtained for any secondary load from 0 to 90 per cent when the 100 per cent load secondary connection is employed and when 2300 volts is applied to the 2500 volt primary connection or 2100 volts to the 2300 volt primary connection. Further improvement in performance may be obtained for any secondary load from 0 to 80 per cent when the 100 per cent load secondary connection is employed and when 2100 volts is applied to the 2500 volt primary connection.

The equivalent of an 80 per cent tap is possible with 2300 volt primary by using the 90 per cent secondary tap and the 2500 volt primary tap, and the table of performance is based on the use of this connection for 75, 50 and 25 per cent loads. In accordance with A.I.E.E. recommendations the regulators are designed to deliver rated kw. load at the secondary terminals to a 99½ per cent power factor load and with 5 per cent reduced primary voltage. The temperature rise above ambient temperatures will not exceed 55° Centigrade when operated at half load continuously for 15 hours. All regulators are adjusted on test to give secondary constant current within 1 per cent rated.

The shell-type case of the station-type regulator is made of silicon non-ageing steel securely held to insure quiet operation and low iron loss. In order to secure maximum ventilation and even temperature in the winding, the coils are divided into a number of concentric sections. The inside section is wound on a Micarta tube affording good mechanical strength and at the same time high insulation between the coil and the centre leg of the core. The succeeding sections are wound over wooden spacing strips placed at intervals about the circumference so as to introduce ventilating ducts. Having both sides of each section exposed to the air assures an even copper temperature, and in addition this method of construction gives a coil of light weight, aiding in obtaining high sensitiveness to changes in load.

The secondary coils of the station-type regulators from 5 to 30 kw. inclusive are designed for single-circuit operation only, while the 35 to 70 kw. sizes are designed for two interconnected secondary operation as shown in the diagram below. The 35 and 40 kw. units are insulated for single-circuit operation but the 50, 60 and 70 kw. units must be specially manufactured when required for single-circuit secondary operation.

AUTOMATIC OPERATION

Any of the non-automatic station (Type "RS") constant current regulating transformers will operate automatically when the connected load is not less than 50 per cent below rating. The reduced capacity secondary taps should not be used when operated automatically. However, the reduced capacity primary taps as outlined above should be used when normal voltage or 90 per cent of normal voltage is applied to the primary and when the connected load is less than 91 per cent of rated. Regulators over 35 kw. rating should not be operated automatically when the connected load is less than half rating; however, the smaller rating will operate satisfactorily at lighter loads.

When full automatic station-type regulators are required to operate from full load to short circuit, regulators of a high reactance type should be used. Prices and complete information may be secured from the nearest district office.

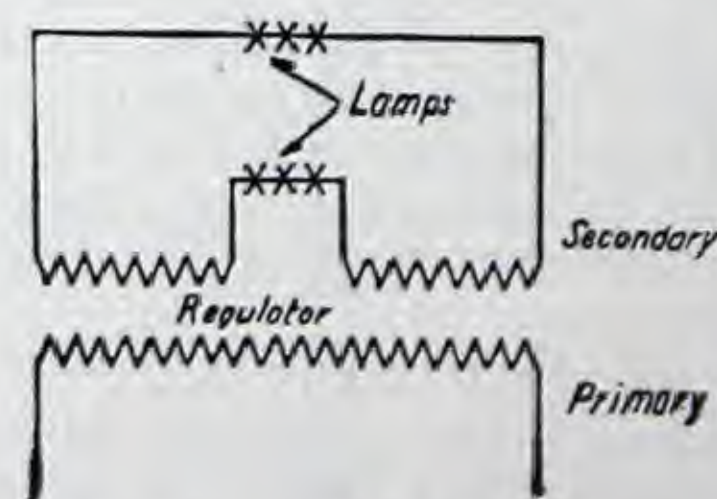


Diagram of Inter-Connected Secondary Circuits

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

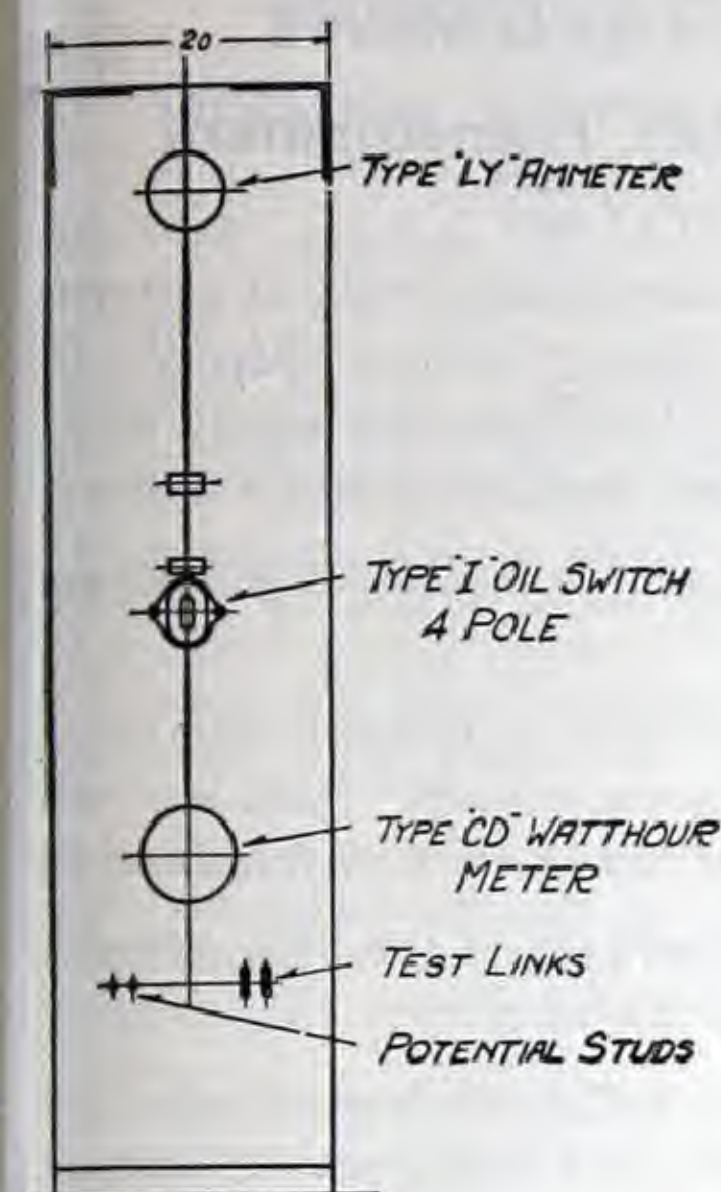


Fig. 1

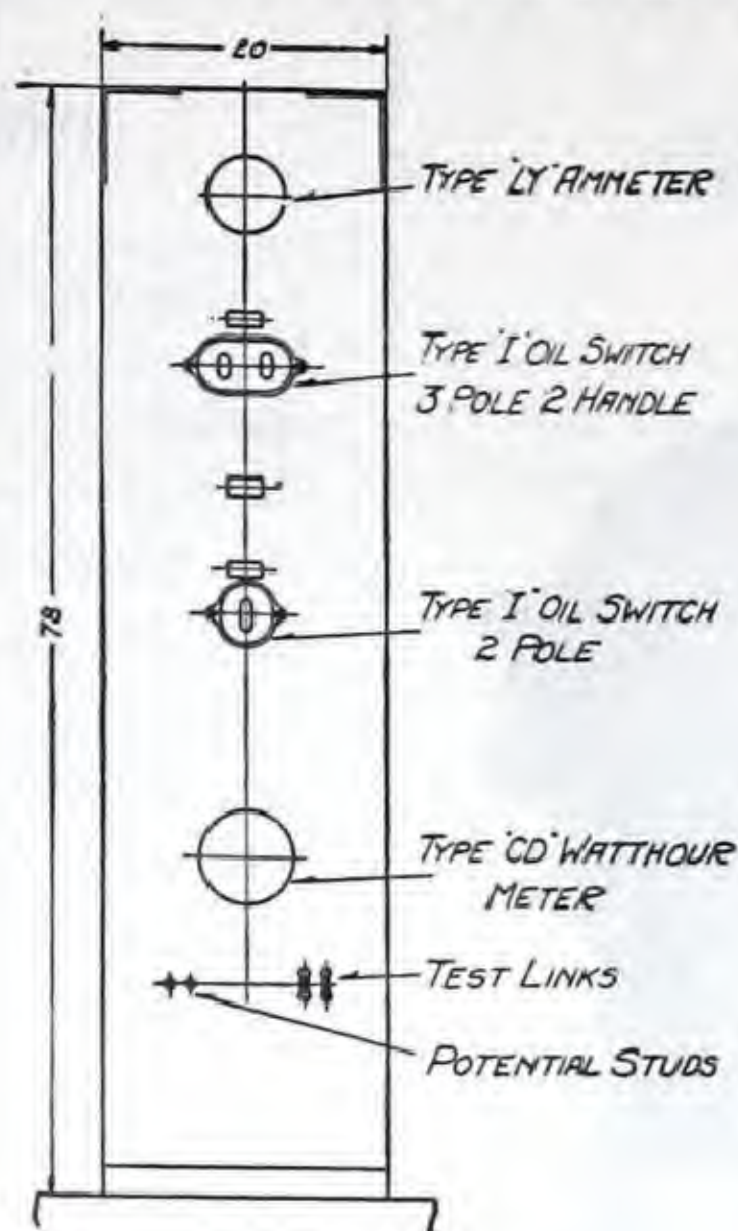


Fig. 2

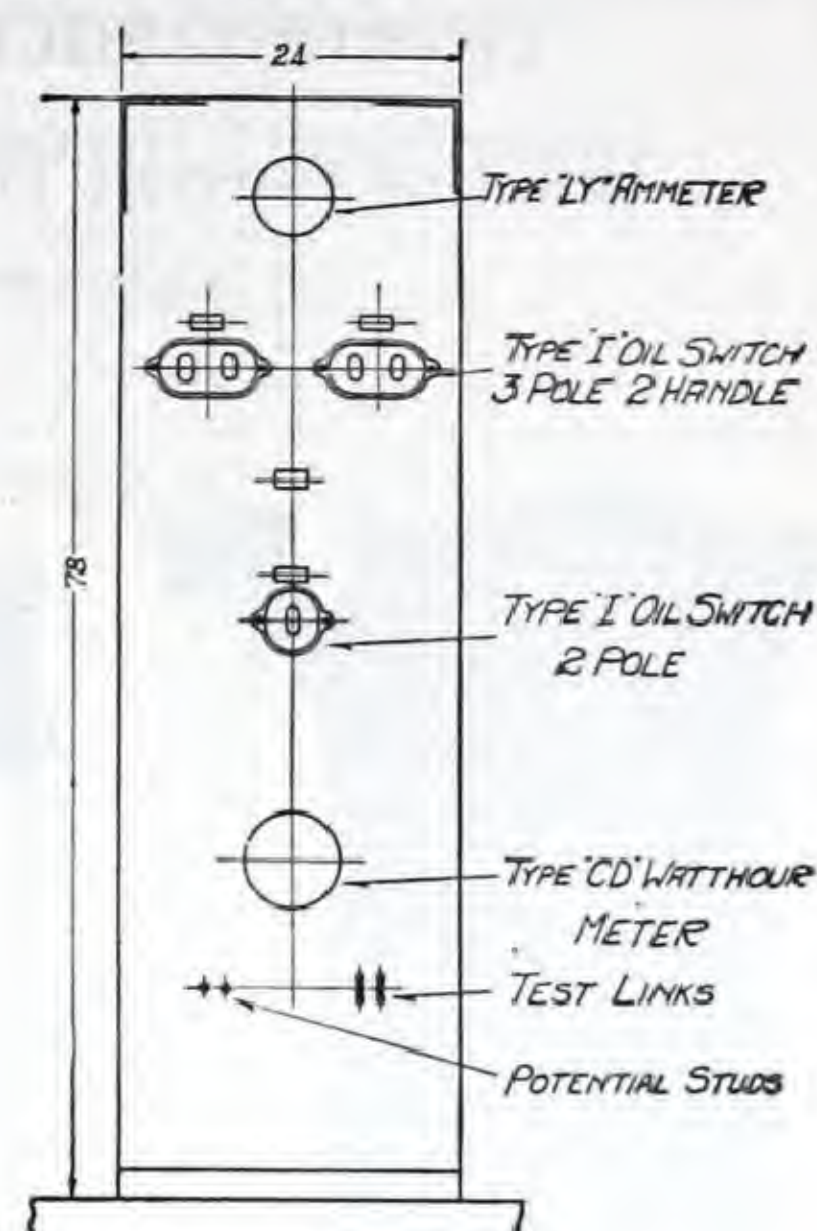


Fig. 3

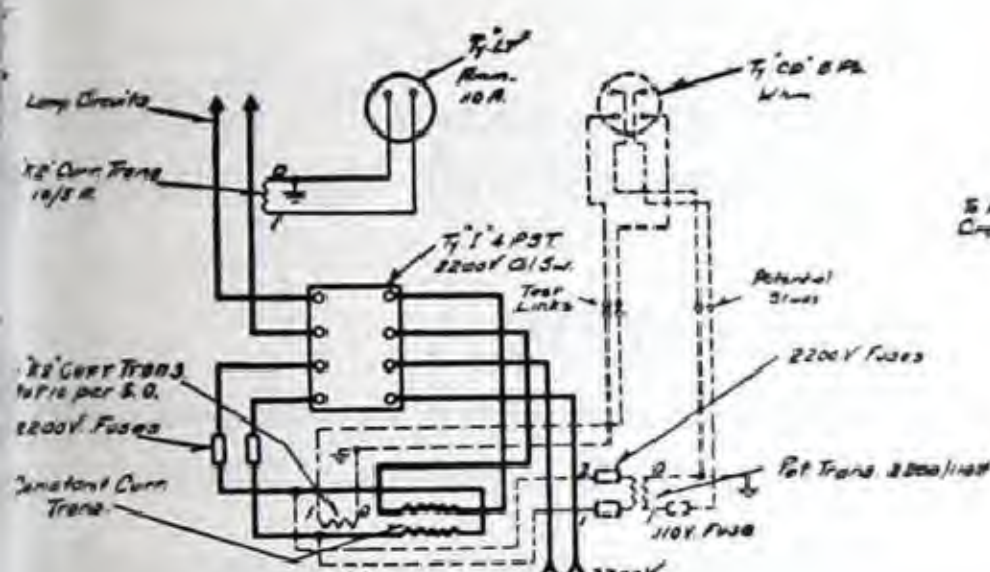


Fig. 4

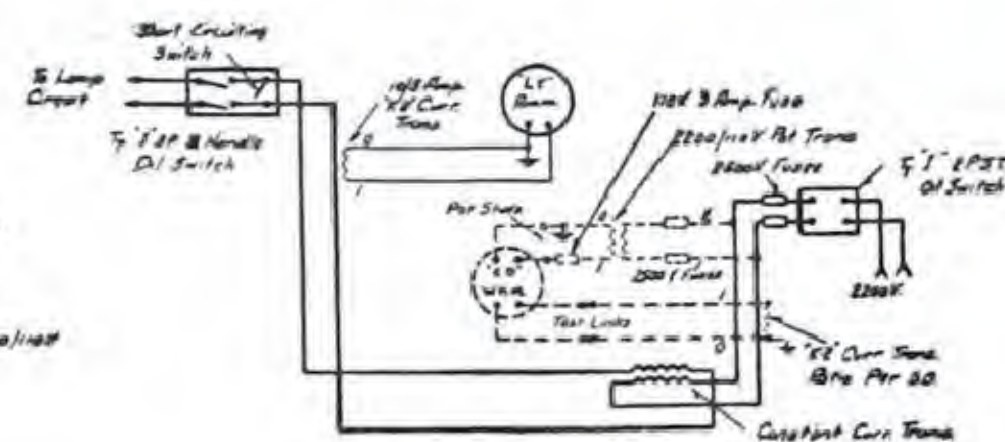


Fig. 5

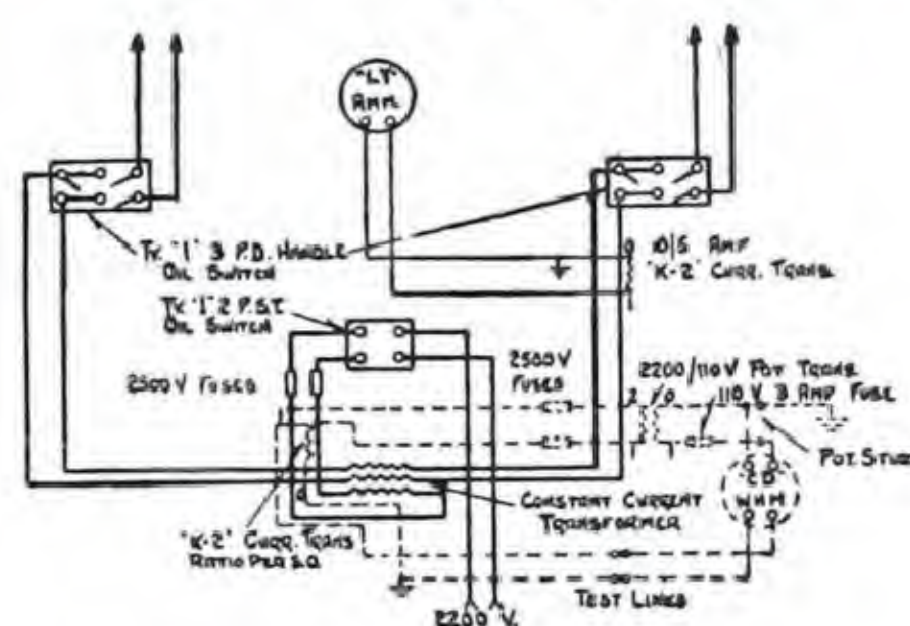


Fig. 6

Control Panels

Control panels are furnished in black marine finished steel inches high, the single circuit panel 20 inches wide and the o-circuit 24 inches wide, complete with wall braces 5 feet g, and channel iron base.

The standard panel for single circuit constant-current regulating transformers is the two-switch panel, figures 2 d 5, and includes one two pole single-throw oil switch and one three pole two handle oil switch with short-circuiting ntacts, one type "LY" ammeter with Type "K-2" current nsformer and mounting brackets, two single pole fused ounts complete with mounting brackets and fuses connected the primary circuit.

The standard panel for two circuit constant-current regulating transformers is the three-switch panel, figures 3 d 6, and includes one two pole single-throw oil switch and o three-pole two handle oil switches with short-circuiting ntacts. Other equipment is the same as supplied on the gle circuit panel.

Single circuit panels with one four pole single-throw pole itch, figures 1 and 4, may be used for closing both primary d secondary circuits with one operation but their use is t recommended.

Any of the above types of control panels may be obtained h metering equipment. Metering equipment includes e type "CD" watthour meter, one type "K-2" current nsformer, dry-type potential transformer with primary and ndary fuses and necessary mounting brackets.

The metering equipment shown by dotted lines on the ing diagrams will be supplied only when style number luding it is specified. Prices on application.

WITHOUT METERING EQUIPMENT—25 and 60 Cycle

Regulator Rating Kw.	Circuits	Switches	Figure Outline	Figure Diag.	Style No.
5	Single	1	1	4	H-27640
10	Single	1	1	4	H-27641
15	Single	1	1	4	H-27642
20	Single	1	1	4	H-27643
5	Single	2	2	5	H-27644
10	Single	2	2	5	H-27645
15	Single	2	2	5	H-27646
20 and 25	Single	2	2	5	H-27647
50	Single	2	2	5	H-27648
30 and 35	Two	3	3	6	H-27649
40 and 50	Two	3	3	6	H-27650
60 and 70	Two	3	3	6	H-27651

WITH METERING EQUIPMENT—25 Cycle

5	Single	1	1	4	H-27652
10	Single	1	1	4	H-27653
15	Single	1	1	4	H-27654
20	Single	1	1	4	H-27655
5	Single	2	2	5	H-27656
10	Single	2	2	5	H-27657
15	Single	2	2	5	H-27658
20 and 25	Single	2	2	5	H-27659
30	Single	2	2	5	H-27660
30 and 35	Two	3	3	6	H-27661
40	Two	3	3	6	H-27662

60 Cycle

5	Single	1	1	4	H-27663
10	Single	1	1	4	H-27664
15	Single	1	1	4	H-27665
20	Single	1	1	4	H-27666
5	Single	2	2	5	H-27667
10	Single	2	2	5	H-27668
15	Single	2	2	5	H-27669
20 and 25	Single	2	2	5	H-27670
30	Single	2	2	5	H-27671
30 and 35	Two	3	3	6	H-27672
40 and 50	Two	3	3	6	H-27673
60 and 70	Two	3	3	6	H-27674

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Isolating Current Transformers

or Safety Coils



Safety coil
3 KW and
larger



Group Series
Safety Coil
1 and 2 KW Size



GP Pole
Type Safety
Coil



GM Manhole
Type Coil

APPLICATION

Isolating current transformers or safety coils are small transformers designed to insulate individual lamps or groups of lamps from the high voltage series circuit. Besides providing a low voltage and a corresponding degree of safety, a safety coil has other important operating advantages such as reduction in cable cost; protection of lamp against surges; prevention of arcing when lamp filament burns out; better maintenance of line insulation; greater dependability of service and better current regulation. Safety coils also allow the use of 15 and 20 ampere lamps which have a more rugged filament than the 6.6 ampere lamp, and higher efficiency than multiple lamps.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Isolating Current Transformers

or Safety Coils

Although the outstanding use of safety coils is with individual lamps on series street lighting circuits, there are many special applications to which Westinghouse safety coils are the economical solution. A few specific applications are:

1. Where a series group system is desirable but high potentials are impracticable.

(a) On side streets or alleys when a new pole line would be required to carry the main series circuit. The low voltage safety-coil circuit can often be run on existing telephone poles.

(b) On bridges and in subways when the high potential of the regular series circuit is prohibitive.

(c) For lighting of fire alarm and police boxes where the high potential of the series circuit would be dangerous so near the ground.

2. When a few lamps are wanted in a building and a mainline circuit is not available.

3. Where individual large lamps, such as are used on ornamental standards, must be operated from high voltage series circuits.

OPERATION

The primary of these coils is connected in the series circuit while the secondary supplies the low potential circuit.

Safety coils of two kilowatts or less may be operated continuously on open circuit without injury; those of larger sizes will operate two hours without injury.

CONSTRUCTION

Westinghouse individual lamp safety coils are carefully made and heavily insulated to assure satisfactory operation on series circuits up to 10,500 volts rating. The transformer is of two-winding shell type construction. The primary and secondary coils are wound on separate Micarta tubes with each winding having high layer insulation and ample provision for the higher stresses encountered on the end turns. The separate Micarta tubes are telescoped over each other insuring high insulation between the primary and secondary windings. The high grade silicon non-ageing transformer iron is then assembled and the core insulated from the coils by molded Micarta channels. The assembly after being dried and thoroughly impregnated by the thermo vacuum process is placed in a hot galvanized all welded steel case. The transformer is insulated from the tank with four thicknesses of fullertboard. After the transformer is placed in its case, the case is filled with insulating compound and the cover fastened and sealed so as to make the transformer absolutely moisture proof. The primary and secondary lead wires are brought through the case in sleeves designed to prevent the collection of moisture and to exclude all moisture from the interior of the case. The leads are sealed by means of lead bushings pressed into the sleeves.

Each coil is tested as follows before shipping:

- (1) 2200 volts high to low and iron for one minute.
- (2) 2500 volts low to iron for one minute.
- (3) 300% overpotential for five minutes.

Prices on application.

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Isolating Current Transformers

For Safety Coils

The "GM" manhole type coil has pipe terminals welded to case, which being hot galvanized permits the use of a lead joint. If the coils are installed in the base of a pole where the coil is not required to operate submerged, a water-proofed taped joint is satisfactory.

The "GP" pole type safety coils is identical with the manhole type except that a bracket is added for mounting the coil on a pole in an inverted position.

Group series safety coils of 1 and 2 kilowatt sizes are air-cooled and of the same construction as Type "MA" current transformers. The magnetic circuit, with laminations exposed to the air, is clamped between cast iron end caps which protect the windings, the leads extending downward through suitable bushings in the bottom end caps. The coils are impregnated with an insulating compound which roughly seals up the joints between the laminations and end caps.

The 3 Kw. sizes and larger are coil insulated and air cooled and have the same form of construction as the Type "SK" distribution transformers. These sizes are available in both manhole or manhole type cases and each has a film protective coating mounted inside the transformer case.

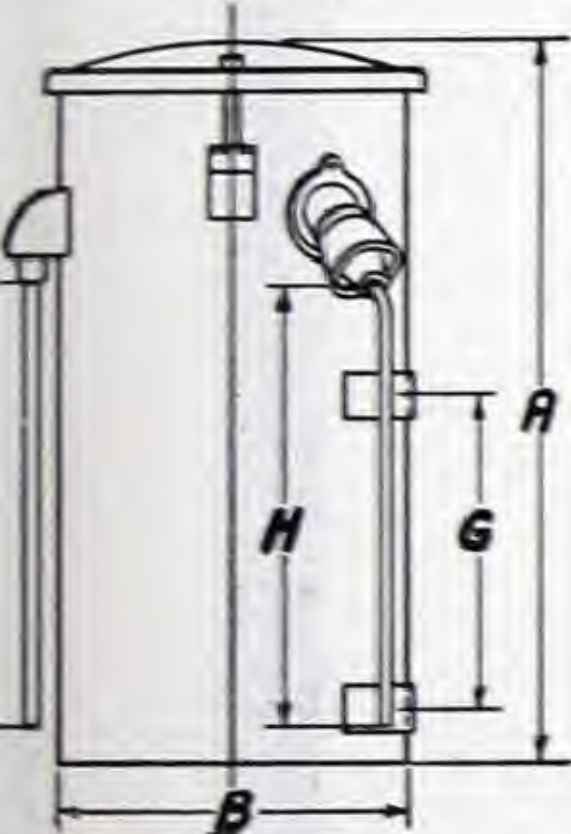
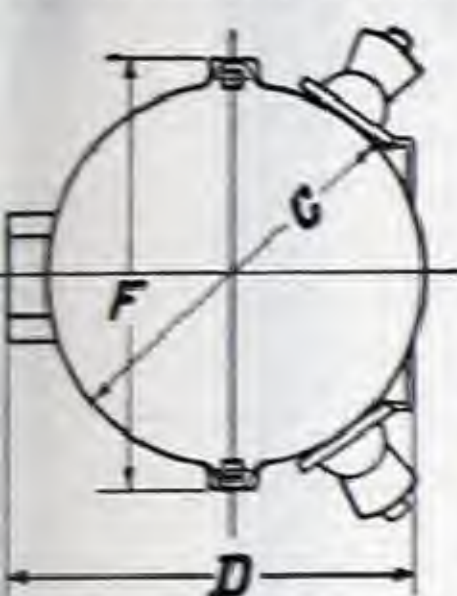


Fig. 5

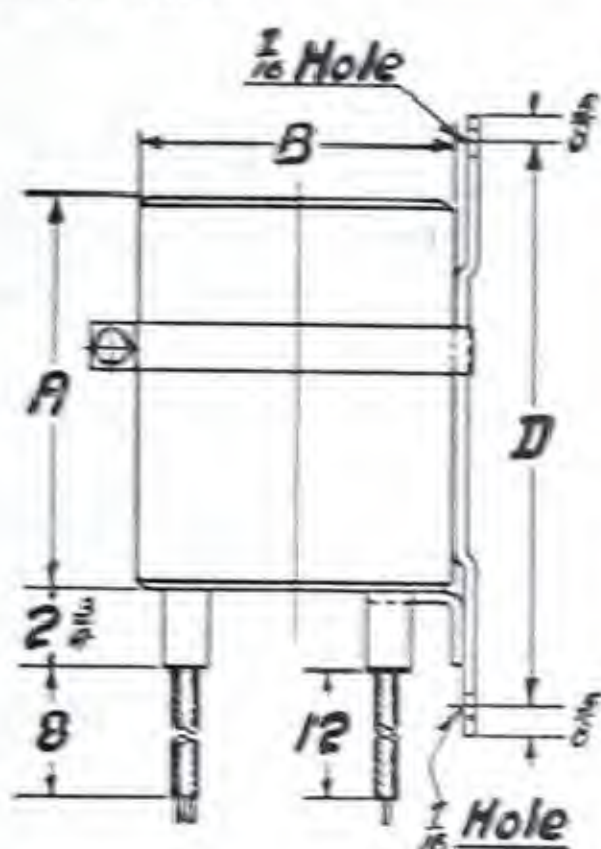


Fig. 7

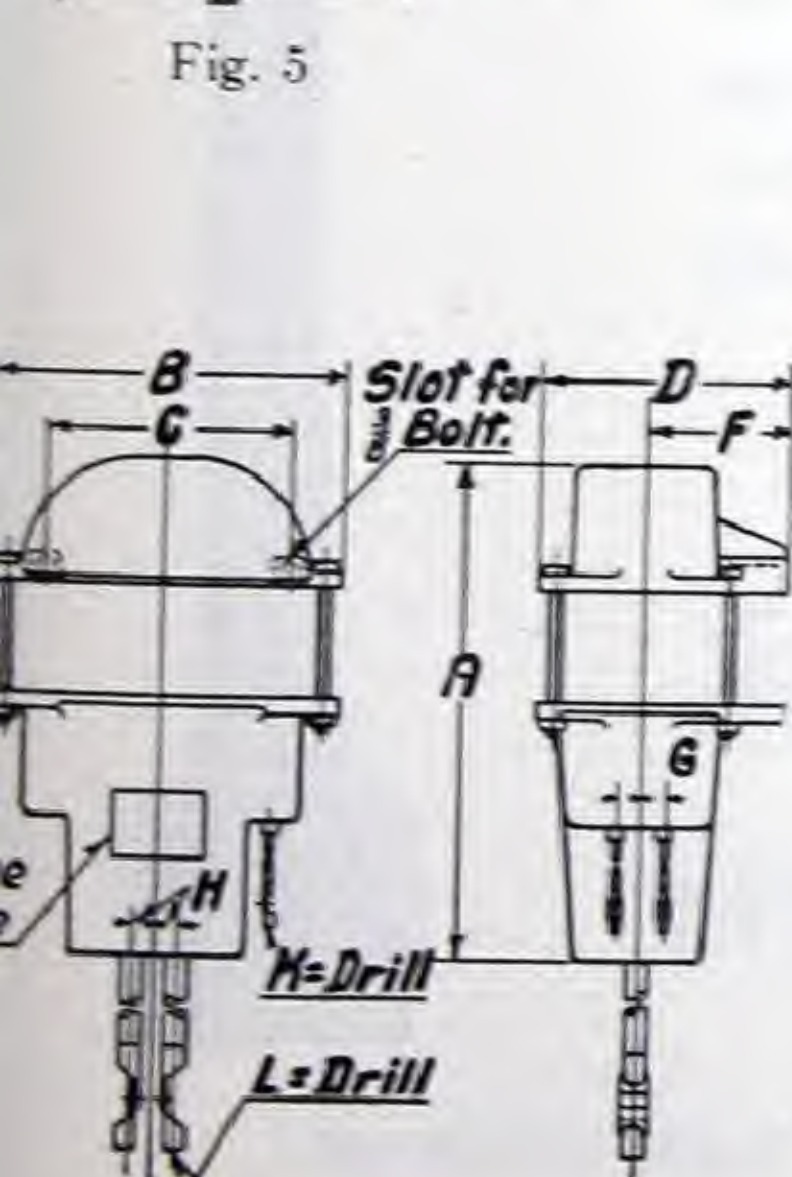
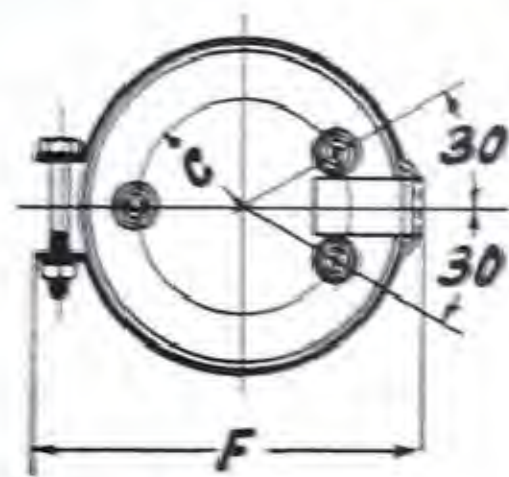


Fig. 6

Prices on application.

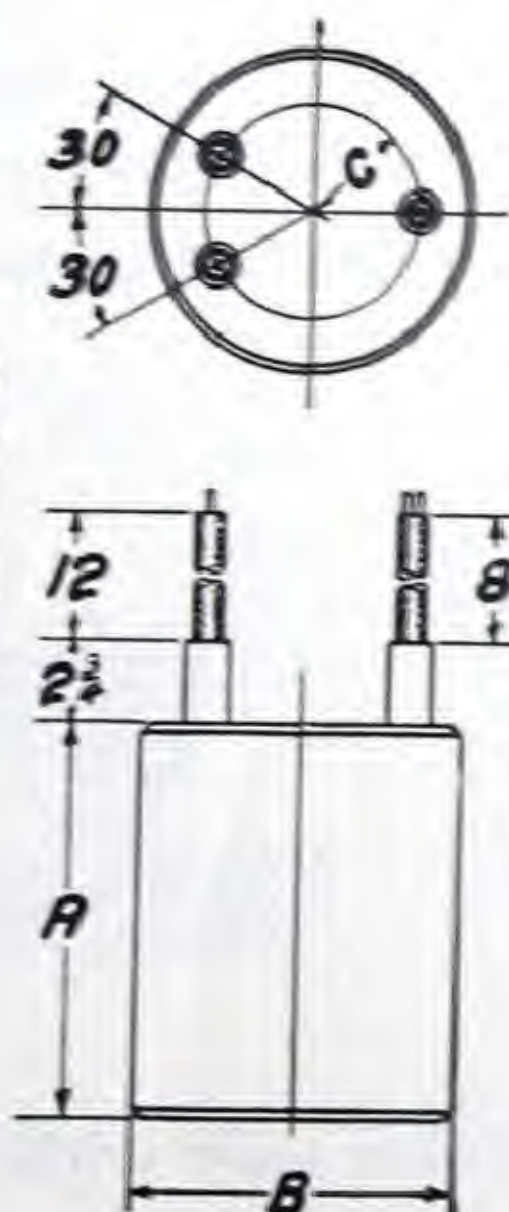


Fig. 8

WESTINGHOUSE OVERHEAD STREET LIGHTING EQUIPMENT

Isolating Current Transformers

or Safety Coils

Outline Dimensions in Inches

TYPE GM FOR MANHOLE MOUNTING

For Operating one 6.6-15 or 20 Ampere Lamp from 6.6 Ampere 60 Cycle Constant Current Circuit. Figure 8.

Lamp Rating						
Lumens	Amps.	A	B	C	D	F
1000-2500	6.6-6.6	6 11/16	6 11/16	2 1/4	.....	.....
2500-4000	6.6-15	6 11/16	6 11/16	2 1/4	.....	.....
4000-6000	15-20	8 3/8	6 11/16	2 1/4	.....	.....
6000-10000	20-20	8 3/8	6 11/16	2 1/4	.....	.....
10000-15000	20-20	9	7 3/4	2 3/4	.....	.....
15000-25000	20-20	10 1/4	8 1/2	3 1/8	.....	.....

TYPE GP FOR POLE MOUNTING

For Operating one 6.6-15 or 20 Ampere Lamp from 6.6 Ampere 60 Cycle Constant Current Circuit. Figure 7.

Lamp Rating						
Lumens	Amps.	A	B	C	D	F
1000-2500	6.6-6.6	6 11/16	6 11/16	2 1/4	11 3/4	8 1/8
2500-4000	6.6-15	6 11/16	6 11/16	2 1/4	11 3/4	8 1/8
4000-6000	15-20	8 3/8	6 11/16	2 1/4	11 3/4	8 1/8
6000-10000	20-20	8 3/8	6 11/16	2 1/4	11 3/4	8 1/8
10000-15000	20-20	9	7 3/4	2 3/4	12 1/8	9 1/8
15000-25000	20-20	10 1/4	8 1/2	3 1/8	14 1/8	9 7/8

DUPLEX ISOLATING CURRENT TRANSFORMERS

For Operating Two 6.6-15 or 20 Ampere Lamps from a 6.6 Ampere 60 Cycle Constant Current Circuit.

Lamp Rating													
Lumens	Amps.	Fig. No.	A	B	C	D	F	G	H	K	L		
2/1000-2/2500	6.6-6.6	8	6 11/16	6 11/16	2 1/4	.....	.....	.....	.....	.....	.....	.....	.....
2/2500-2/4000	6.6-15	8	6 11/16	6 11/16	2 1/4	.....	.....	.....	.....	.....	.....	.....	.....
2/4000-2/6000	15-20	8	8 3/8	6 11/16	2 1/4	.....	.....	.....	.....	.....	.....	.....	.....
2/6000-2/10000	20-20	8	10 1/4	8 1/2	3 1/8	.....	.....	.....	.....	.....	.....	.....	.....
2/10000-2/15000	20-20	8	10 1/4	8 1/2	3 1/8	.....	.....	.....	.....	.....	.....	.....	.....
2/15000-2/25000	20-20	6	15 1/2	11 1/4	7 1/8	7 1/8	4 1/2	5 1/4	5 1/4	5 1/4	5 1/4	5 1/4	5 1/4

GROUP SERIES TYPE

6.6. Ampere Primary-6.6 Ampere Secondary, 60 cycles. For Operating Groups of Lamps in Series on Secondary.

Kv-a Rating	Fig. No.	A	B	C	D	F	G	H	J	K	L
25	8	6 11/16	6 11/16	2 1/4	.....	.....	.....	.....	.....	.....	.....
50	8	8 3/8	6 11/16	2 1/4	.....	.....	.....	.....	.....	.....	.....
1.00	6	15 1/2	11 1/4	7 1/8	5 1/4	3 1/8	.....	.....	.....	.....	.....
2.00	6	15 1/2	11 1/4	7 1/8	5 1/4	3 1/8	.....	.....	.....	.....	.....
3.00	5	26	14 3/8	15 1/8	17 3/8	18 1/2	10 3/4	24	24	.....	.....
4.00	5	29	14 3/8	15 1/8	17 3/8	18 1/2	13 3/4	24	24	.....	.....
5.00	5	29	14 3/8	15 1/8	17 3/8	18 1/2	13 3/4	24	24	.....	.....
7.50	5	30 1/2	16 1/4	17 1/4	19 1/8	19 3/4	13 3/4	24	24	.....	.....
10.00	5	30 1/2	16 1/4	17 1/4	19 1/8	19 3/4	13 3/4	24	24	.....	.....

SERIES PRIMARY-MULTIPLE SECONDARY TYPE

For Operating 115 Volt Multiple Lamps from a 6.6 Ampere 60 Cycle Constant Current Circuit.

Lamp Rating	Fig. No.	A	B	C	D	F
Watts						
40						
60	8	6 11/16	6 11/16	2 1/4	.....	.....
100						
150						
200	8	8 3/8	6 11/16	2 1/4	.....	.....
250						
500	8	8 3/8	6 11/16	2 1/4	.....	.....
750	8	9	7 3/4	2 3/4	.....	.....
1000	8	10 1/4	8 1/2	3 1/8	.....	.....
40						
60	7	8 3/8	6 11/16	2 1/4	11 3/4	8 1/8
100						
150						
200	7	6 11/16	6 11/16	2 1/4	11 3/4	8 1/8
250						
500	7	8 3/8	6 11/16	2 1/4	11 3/4	8 1/8
750	7	9	7 3/4	2 3/4	12 1/8	9 1/8
1000	7	10 1/4	8 1/2	3 1/8	14 1/8	9 7/8

Dimensions are for reference only. For official dimensions and for dimensions of 25 cycle Safety Coils apply to the nearest Office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Cast Iron Standards

ARCADIAN DESIGN

The Arcadian design has a plain column with sharp clear-cut lines which give distinction and simple dignity to the standard. It is available in six different heights in both single and two-light forms. The single-light column is equipped with a Type U universal fitter to which any of the luminaires described hereinafter may be attached without any intermediate casing. The numeral following the name of the standard indicates the height in feet of the column only. The column heights indicated below are measured from the ground line to the flange on which the luminaire is mounted. The two-light column height and style number include the column complete, with the Arcadian two-light top section.



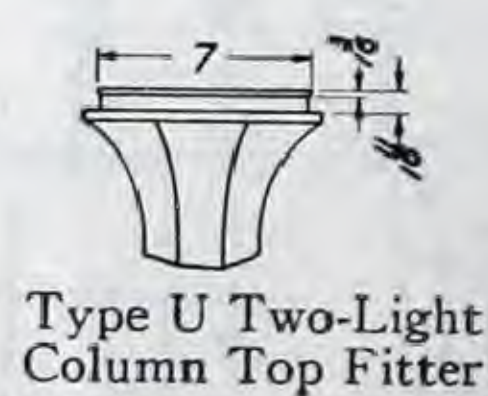
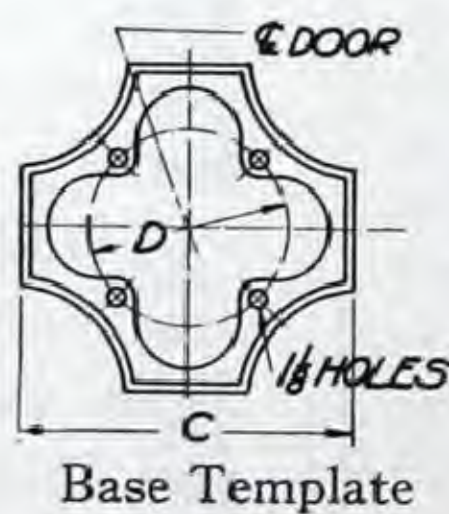
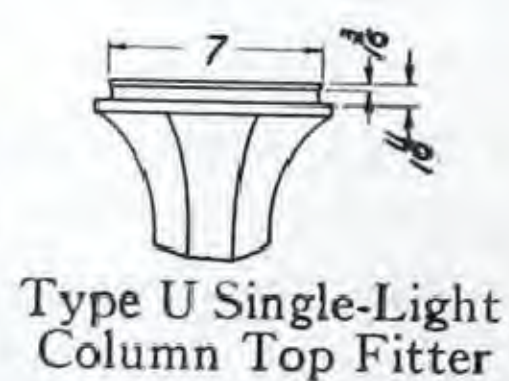
Description	Column Height		Light Center		Dimensions in Inches		Ship Wt. Lb., Each	Style No.
	Ft.	In.	Ft.	In.	Base C	Bolt D		

Single-Light

Arcadian 10	10	0	11	0	16	9 $\frac{3}{4}$	245	347310
Arcadian 11	11	0	12	0	16	9 $\frac{3}{4}$	250	347311
Arcadian 12	12	0	13	0	20	12	420	347312
Arcadian 13	13	0	14	0	20	12	460	347313
Arcadian 14	14	0	15	0	20	12	530	347314
Arcadian 15	15	0	16	0	20	12	580	347315

Two-Light

Arcadian 10	11	10	12	10	16	9 $\frac{3}{4}$	395	337880
Arcadian 11	12	10	13	10	16	9 $\frac{3}{4}$	400	337881
Arcadian 12	13	10	14	10	20	12	570	337882
Arcadian 13	14	10	15	10	20	12	610	337883
Arcadian 14	15	10	16	10	20	12	680	337884
Arcadian 15	16	10	17	10	20	12	730	352391



Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Cast Iron Standards

CAPITAL DESIGN

The Capital design has sharp clear-cut lines which give an appearance of distinction and simple dignity to the standard. It is available in three different heights in both single and two-light forms. The single-light column is equipped with a Type U universal fitter to which any of the luminaires described hereinafter may be attached without any intermediate casing. The numeral following the name of the standard indicates the height in feet of the column only. The column heights indicated below are measured from the ground line to the flange on which the luminaire is mounted. The two-light column height and style number include the column complete, with the Cosmopolitan two-light top section.

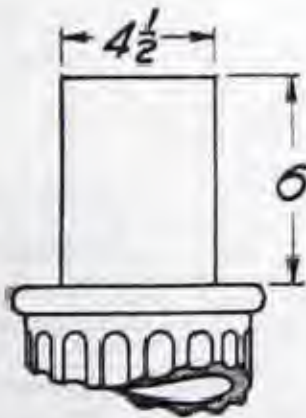
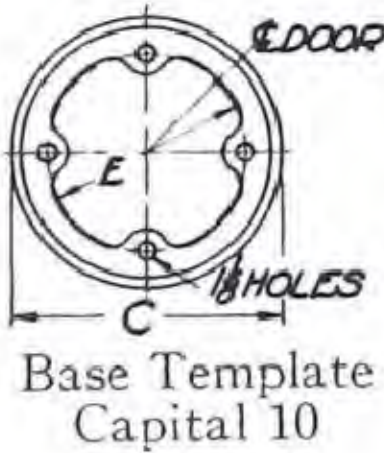
Description	Column Height		Light Center		Dimensions in Inches			Ship. Wt. Lb. Each	Style No.
	Ft.	In.	Ft.	In.	C	D	E		

Single-Light

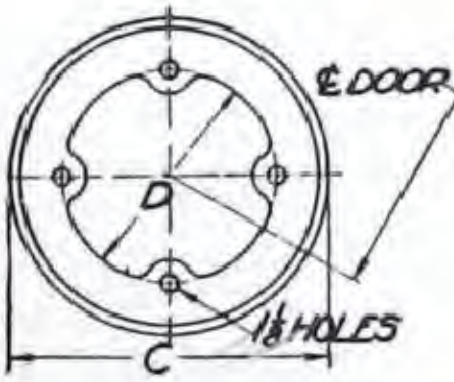
Capital 10	10	0	11	0	18	....	13½	415	347810
Capital 12	12	0	13	0	20	13½	....	495	347812
Capital 15	15	0	16	0	20	13½	....	595	347815

Two-Light

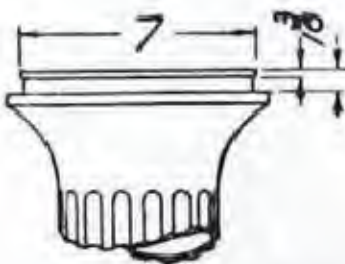
Capital 10	11	11	12	11	18	....	13½	545	338170
Capital 12	13	11	14	11	20	13½	....	625	338172
Capital 15	16	11	17	11	20	13½	....	725	338175



Type G Two-Light Column Top Fitter



Base Template Capital 12 and 15



Type U Single-Light Column Top Fitter

Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

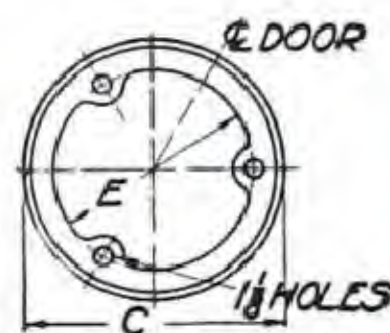
WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Cast Iron Standards

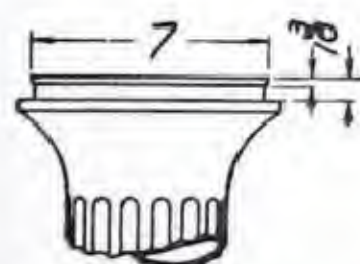
VILLA DESIGN

The Villa design has sharp clear-cut lines which give an appearance of distinction and simple dignity to the standard. It is available in two different heights in both single and two-light forms. The single-light column is equipped with a Type U universal fitter to which any of the luminaires described hereinafter may be attached without any intermediate casing. The numeral following the name of the standard indicates the height in feet of the column only. The column heights indicated below are measured from the ground line to the flange on which the luminaire is mounted. The two-light column height and style number include the column complete, with the Villa two-light top section.

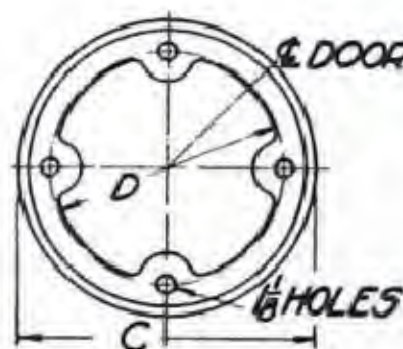
Descrip- tion	Column		Light		Dimensions in Inches			Ship. Wt.	Style No.
	Height	Center	Base	Bolt	Center	Lbs.			
	Ft. In.	Ft. In.	C	D	E	Ea.			
Single-Light									
Villa 10	10	0	11	0	17½	....	12¼	235	348110
Villa 12	12	0	13	0	19	14½	....	325	348112
Two-Light									
Villa 10	11	8	12	8	17½	....	12¼	310	338260
Villa 12	13	8	14	8	19	14½	....	400	352337



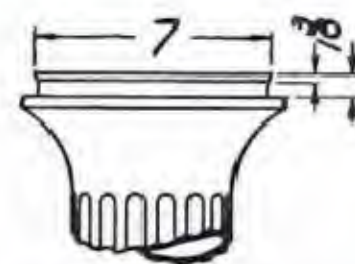
Base Template Villa 10



Type U Single-Light Column Top Fitter



Base Template Villa 12



Type U Two-Light Column Top Fitter

Dimensions are for reference only. For official dimensions apply to the nearest district office.

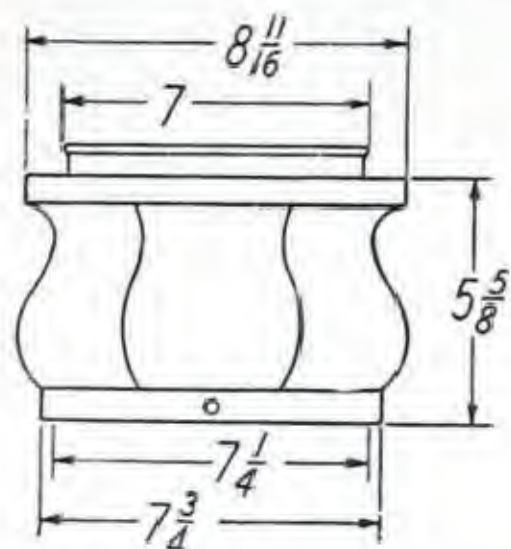
Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

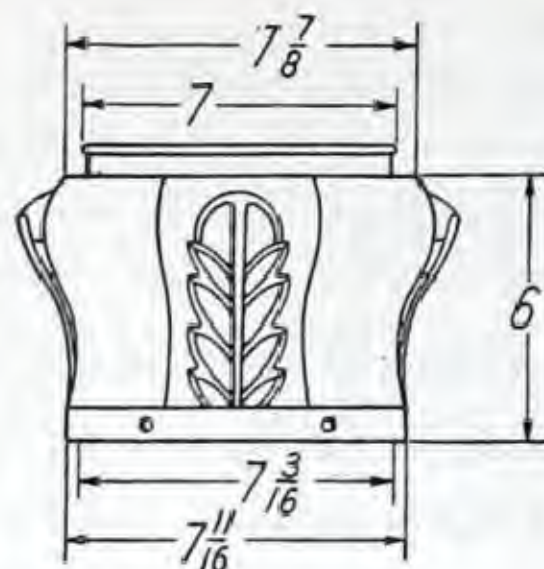
Casing Adaptors

FOR CAST-IRON STANDARDS

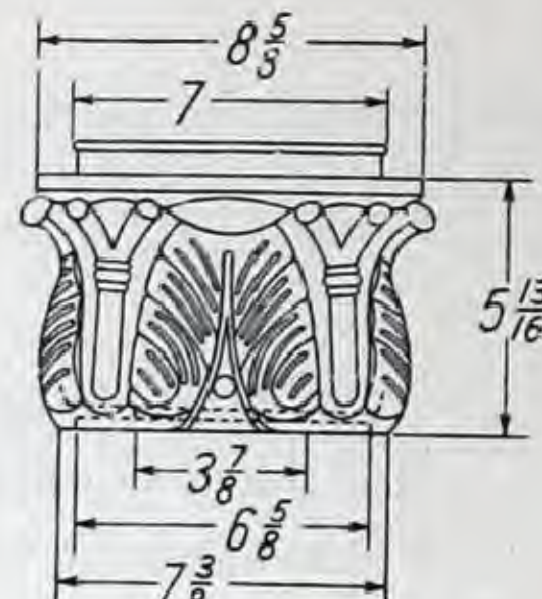
The casing adaptors shown are used principally for use in converting existing installations of cluster-light standards to the more modern and efficient single-light type. These adaptors are of cast-iron painted with a high grade black weatherproof paint.



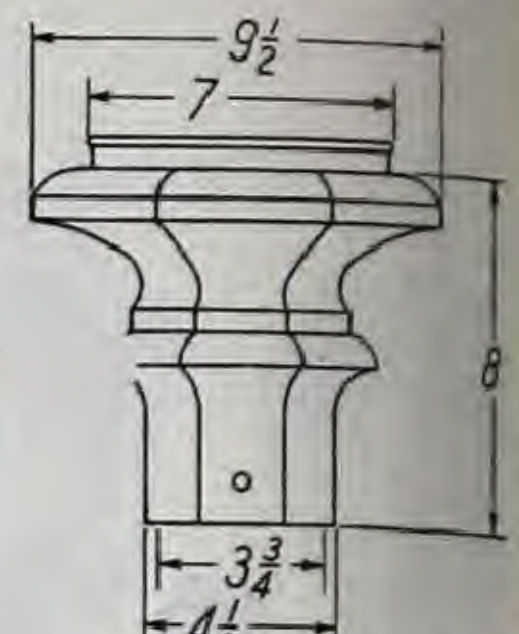
Arcadian



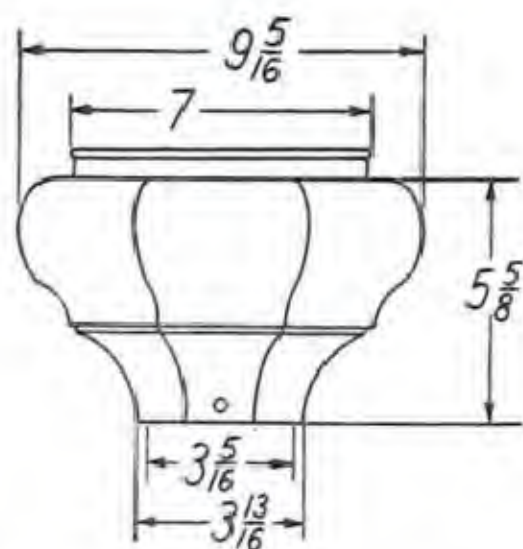
California



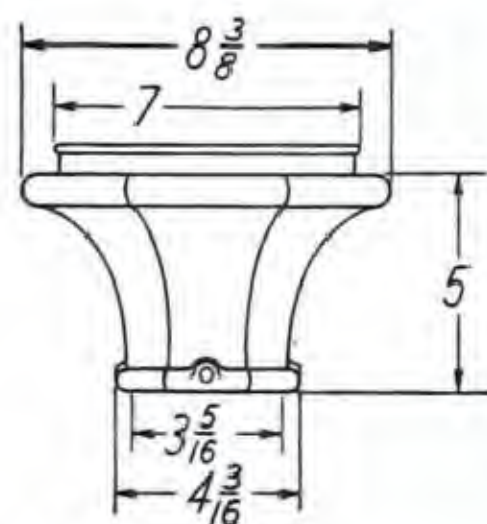
Commercial



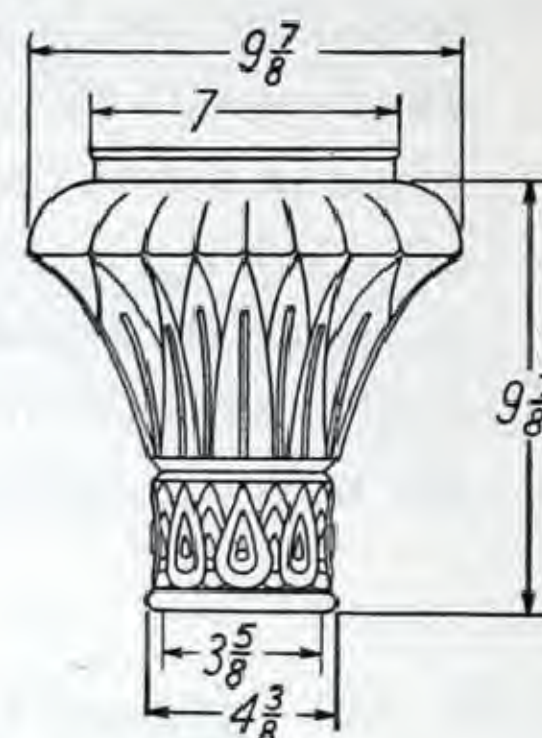
Commonwealth



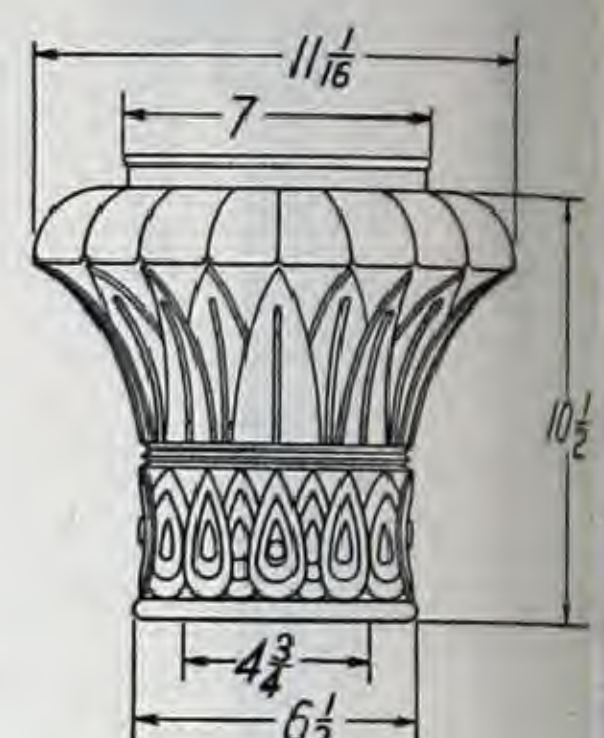
Edgewater Large



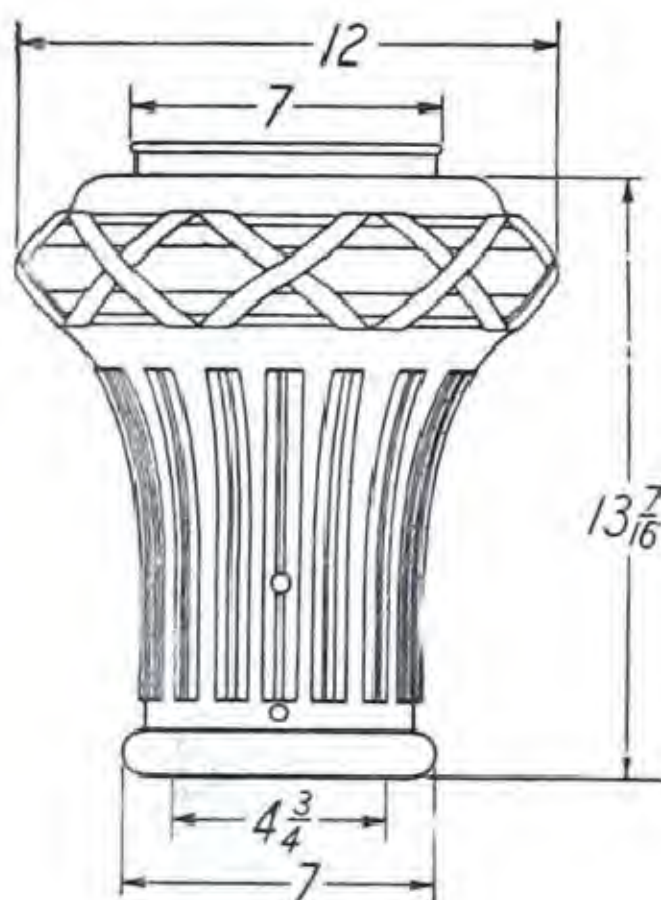
Edgewater Small



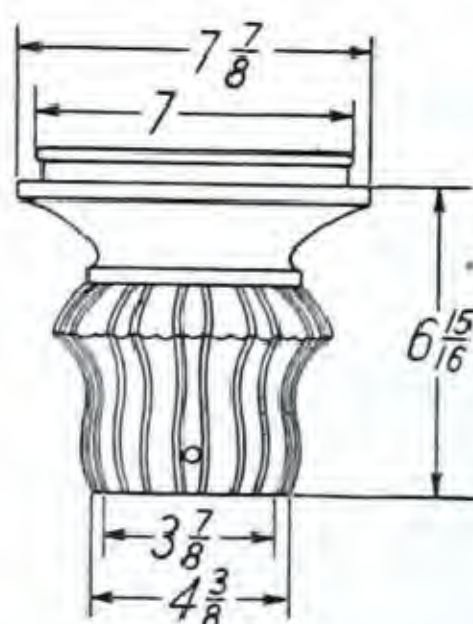
Egyptian Junior



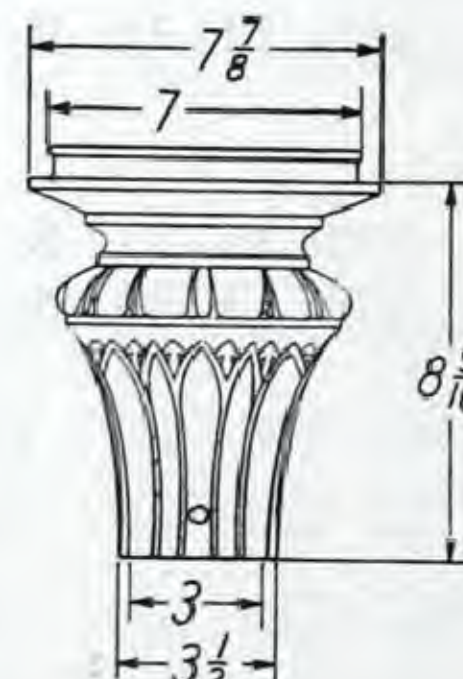
Egyptian Senior



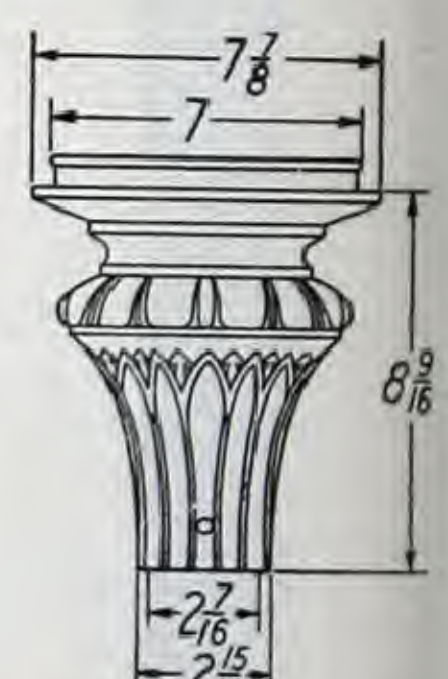
Grand View



Park View



Villa Senior



Villa Junior

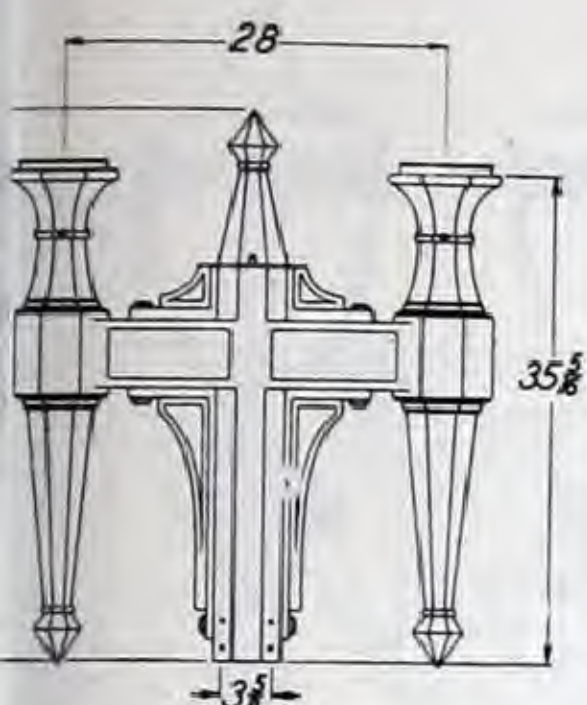
Name of Casing	Type of Column Top Fitter	Additive Heights of Casing, Inches	Approx. Wt., Lb., Ship.	Style No.
Arcadian.....	U	5 5/8	18	350662
California.....	U	6	18	351491
Commercial.....	R	5 1/2	22	353423
Commonwealth.....	H, J	8	19	351522
Edgewater, large.....	E	5 5/8	17	351382
Edgewater, small.....	E	5	16	353387
Egyptian Junior.....	J	9 7/8	24	336293
Egyptian Senior.....	B	10 1/2	34	336294
Grand View.....	G	13 1/2	45	353736
Park View.....	J	7	14	351381
Villa Junior.....	D	8 1/2	19	353782
Villa Senior.....	D	8 1/2	17	353757

Prices on application.

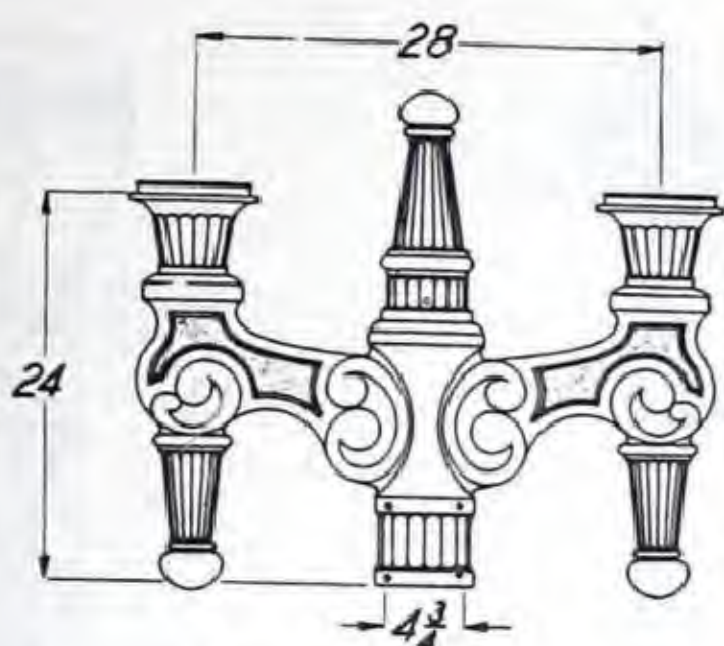
Order By Style Number

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Two-Light Top Sections and Brackets



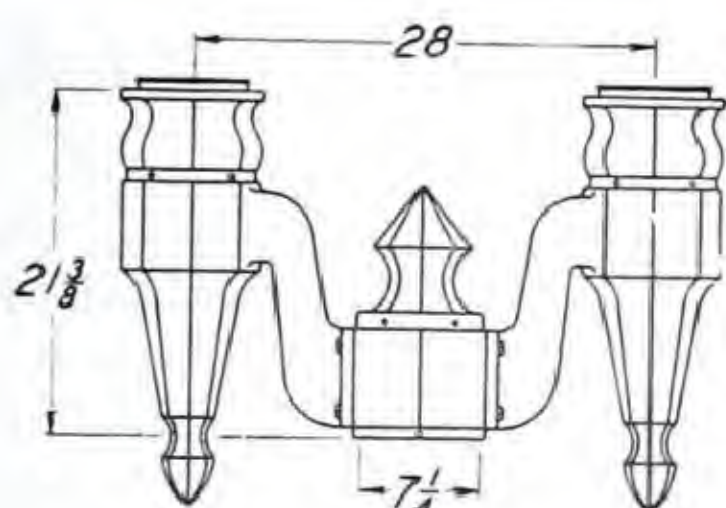
Edgewater



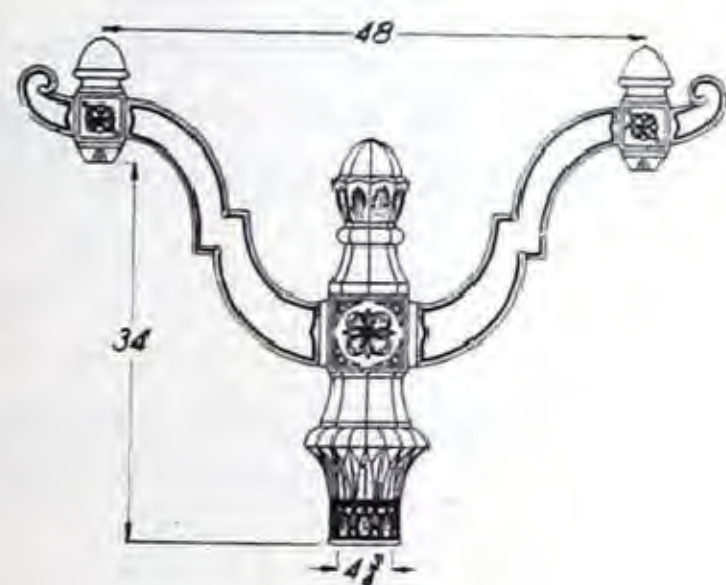
Cosmopolitan



Villa



Arcadian



Santiago

Description			Type	Ship Fitter Lb., Ea.	Style No.
ian	Two-light	Cast-iron	U	150	338395
opolitan	Two-light	Cast-iron	G	130	338394
water	Two-light	Cast-iron	J	225	338389
go	Two-light	Cast-iron	G	200	338390
	Two-light	Cast-iron	U	80	338393

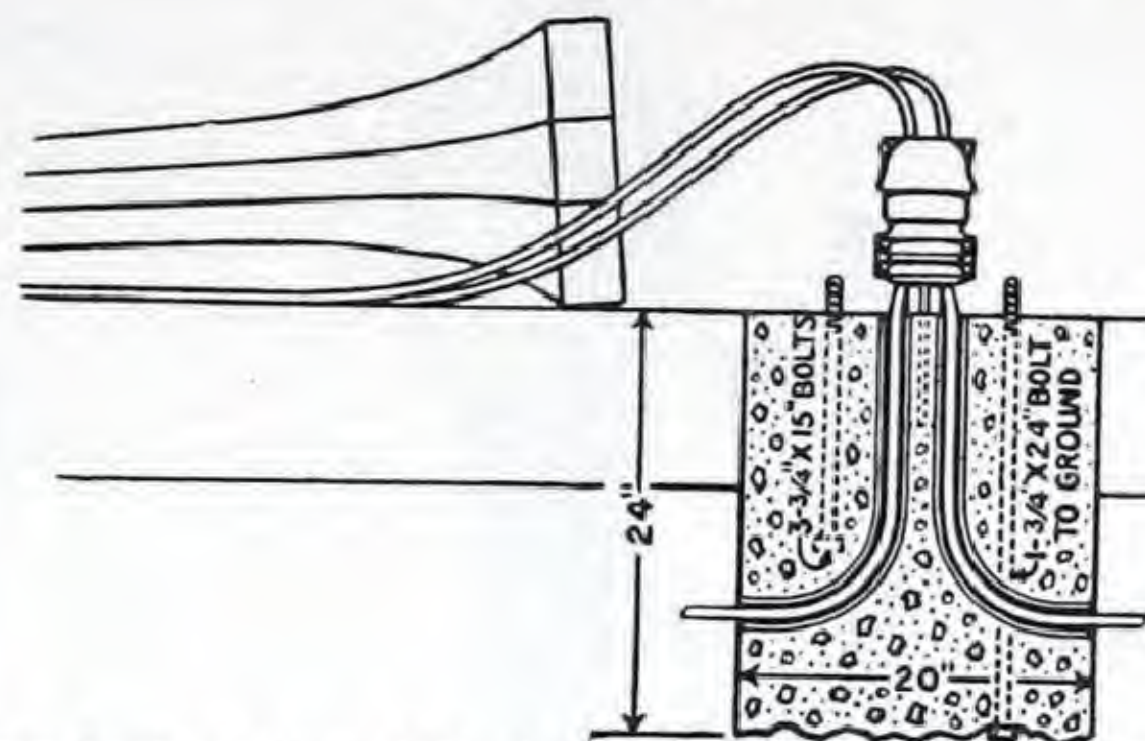
Dimensions are for reference only. For official dimensions to the nearest district office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Accessories for Lighting Standards

POTHEADS



Showing Installation of Pothead by the Use of Iron Support Imbedded in Concrete Foundation



Disconnecting Pothead with Ground Support

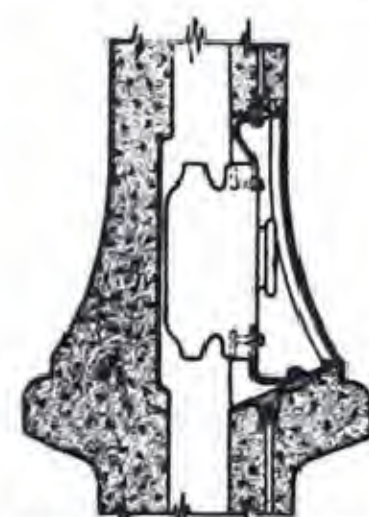


Parts for Disconnecting Pothead

Description	Ship. Wt. Lb., Ea.	Style No.
Simple pothead complete (without compound).....	16	343266
Disconnecting pothead complete (without compound).....	17	343265
Pothead compound 1-gallon can (sufficient for 12 potheads).....	11	354500
Ground test plug.....	1	336045

Prices on application.

PEERLESS CUTOUT



Peerless Cutout in Base of Granite Standard



Peerless Cutout Open



Peerless Cutout Closed

Description	Ship. Wt. Lb., Ea.	Style No.
Peerless cutout complete with mounting bracket for Sheridan 12 or 13.....	14	354580

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Trolleyite Brackets



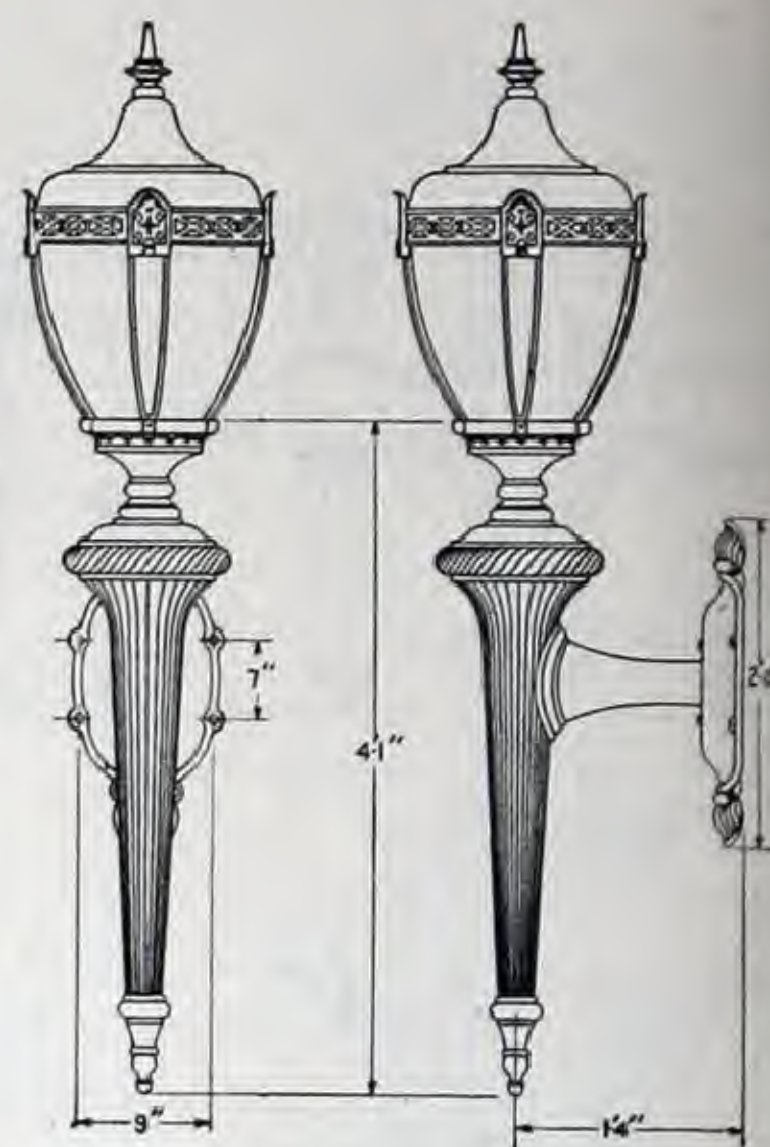
Columbian Trolleyite Bracket

When conditions warrant, the purely utilitarian trolley pole may be utilized as a street lighting unit. This is accomplished by the addition of either single or double ornamental brackets.

Westinghouse brackets are designed to support any Westinghouse luminaire. Different styles of brackets are available so that a harmonious combination can be very easily secured. The use of trolleyite brackets provides an economical and attractive method of lighting streets on which trolley poles are already in



Trolley Pole Equipped with Columbian Brackets, Metropolis Base and Acorn Finial



Columbian Trolleyite Bracket

place. The same types of luminaires may be used on both standards and trolleyite brackets, thus making the luminaires uniform in appearance throughout the city. Prices on double brackets will be furnished upon request.

Further ornamentation of trolley poles may be secured by the addition of ornamental bases, etc.

Style number covers brackets only. Prices on steel trolley poles will be furnished on application.

COLUMBIAN TROLLEYLITE BRACKETS

Description	Wt., Lb. Ship.	Style No.
For 4-inch pipe.....	130	352381
For 5-inch pipe.....	135	352382
For 6-inch pipe.....	140	352383
For 7-inch pipe.....	150	352384
For wooden poles.....	120	352380

Brackets can also be furnished for mounting on concrete trolley poles. Prices will be furnished upon request.

Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

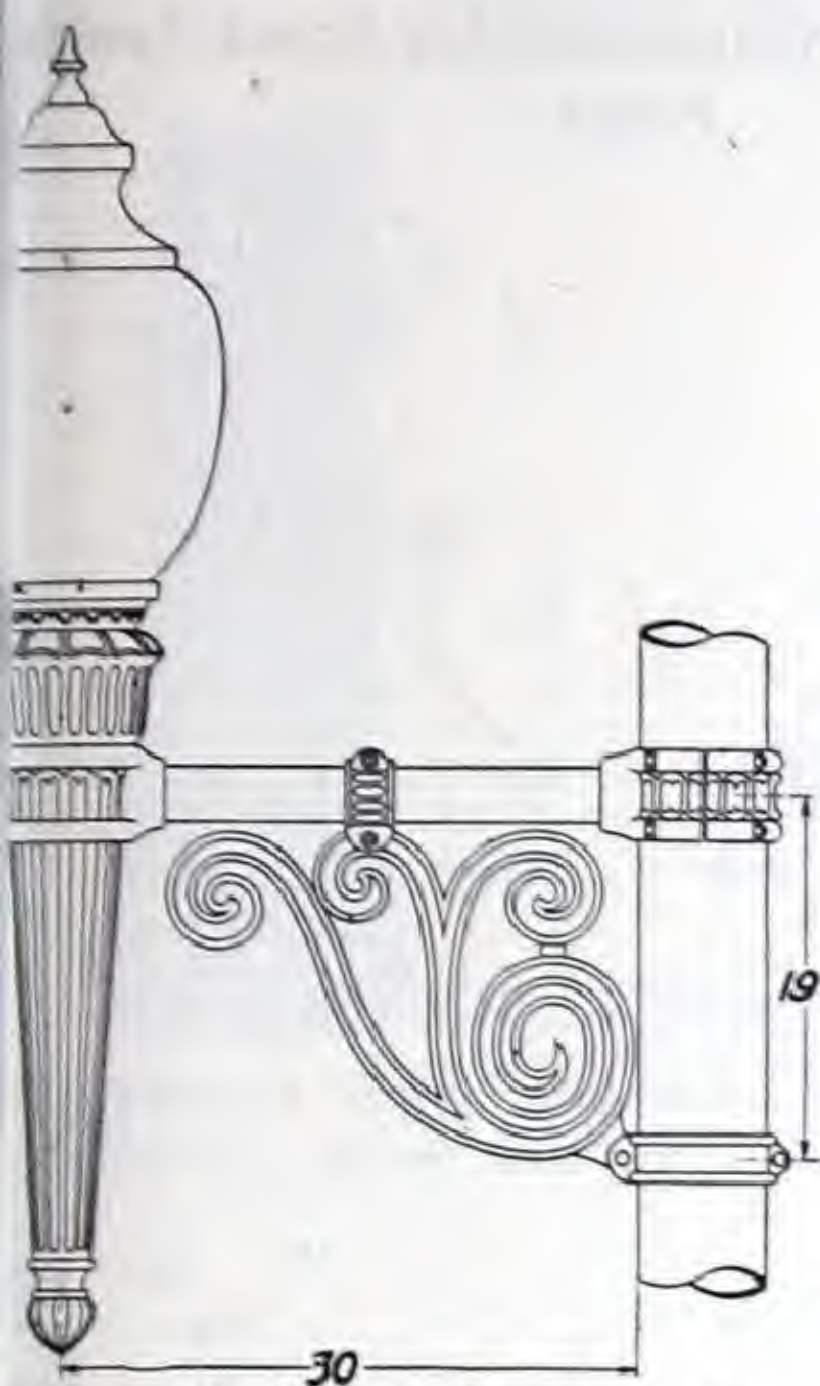
WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Trolleyite Brackets

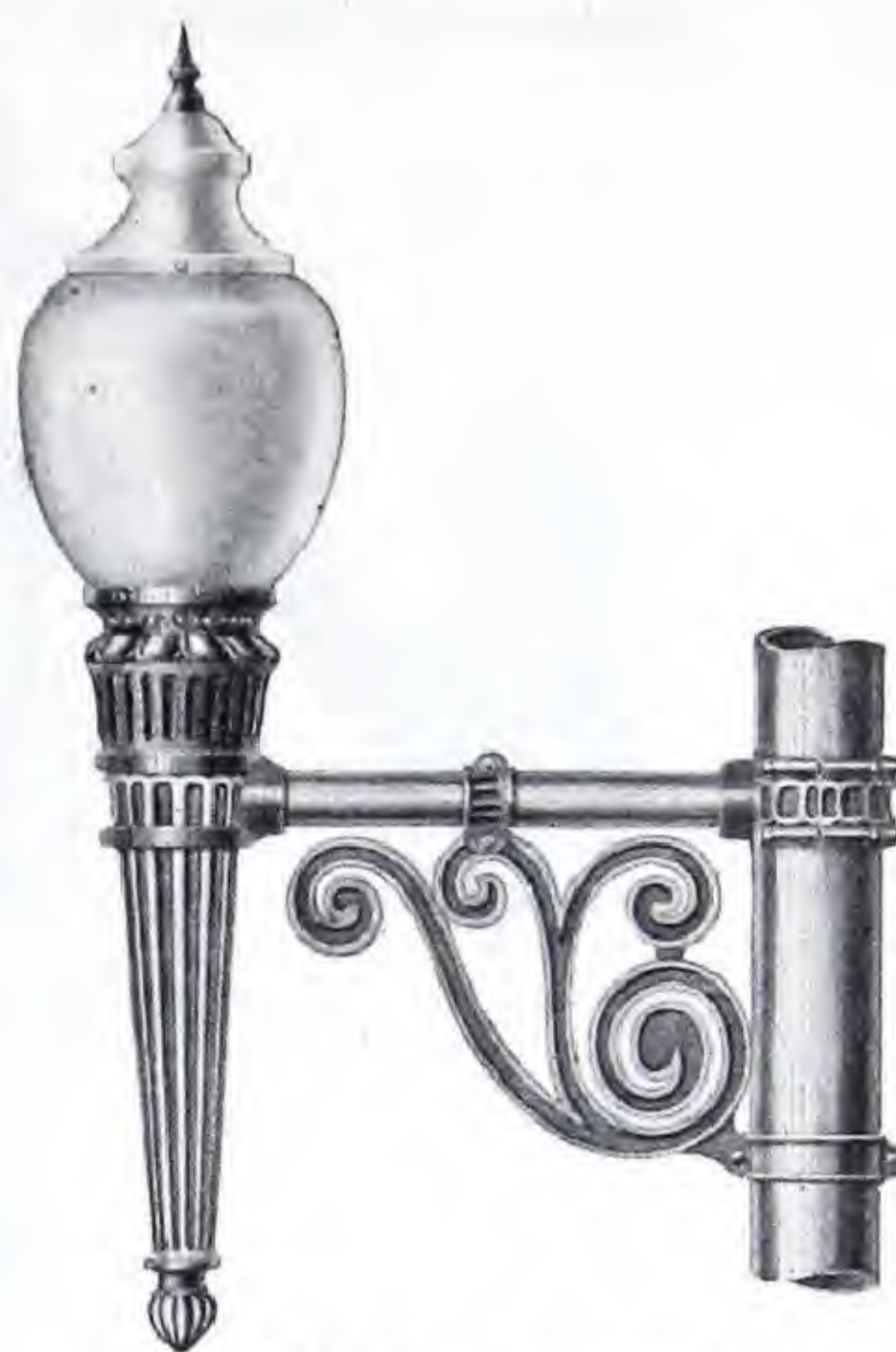
(Continued)

CAROLINA TROLLEYLITE BRACKETS

Description	Wt., Lb. Ship.	Style No.
For 4-inch pipe....	140	352260
For 5-inch pipe....	140	352261
For 6-inch pipe....	145	352262
For 7-inch pipe....	145	352263
For wooden pole...	135	352264



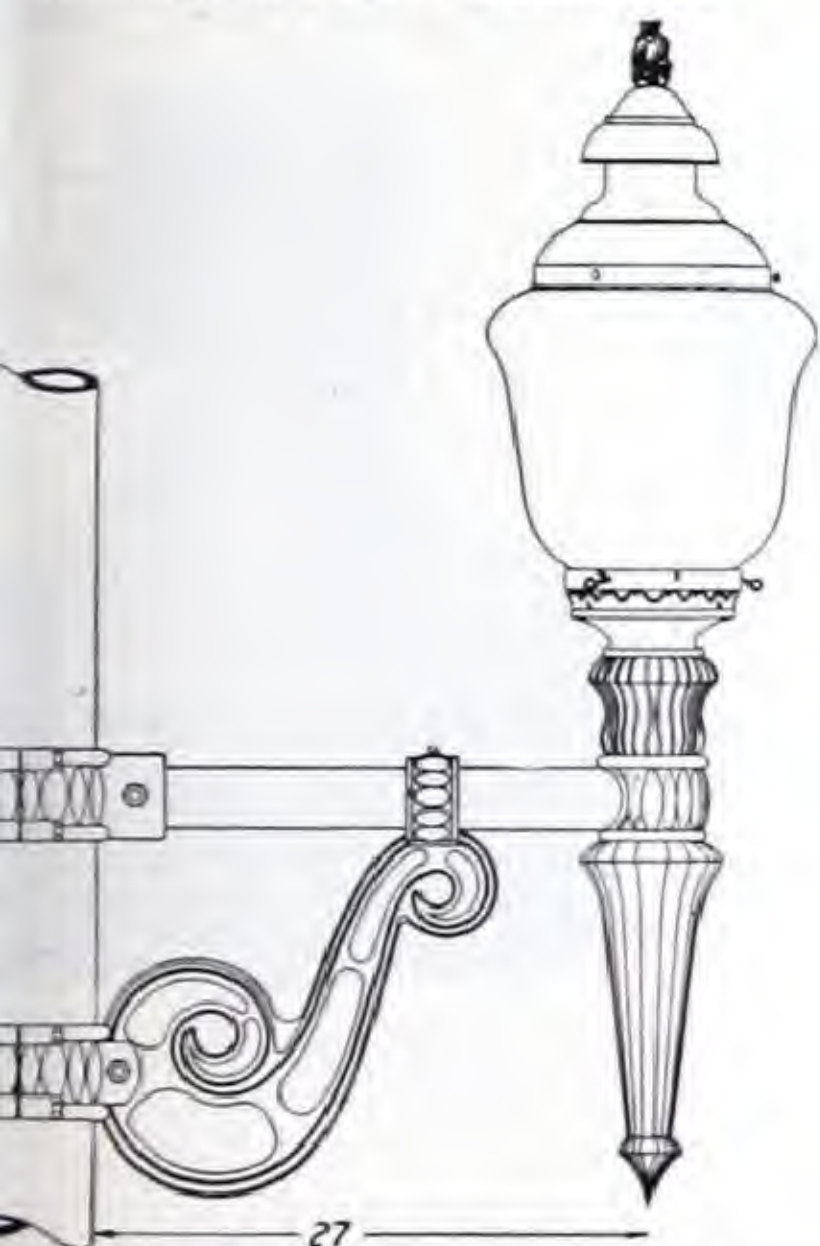
Carolina Trolleyite Bracket with Washington Senior Luminaire



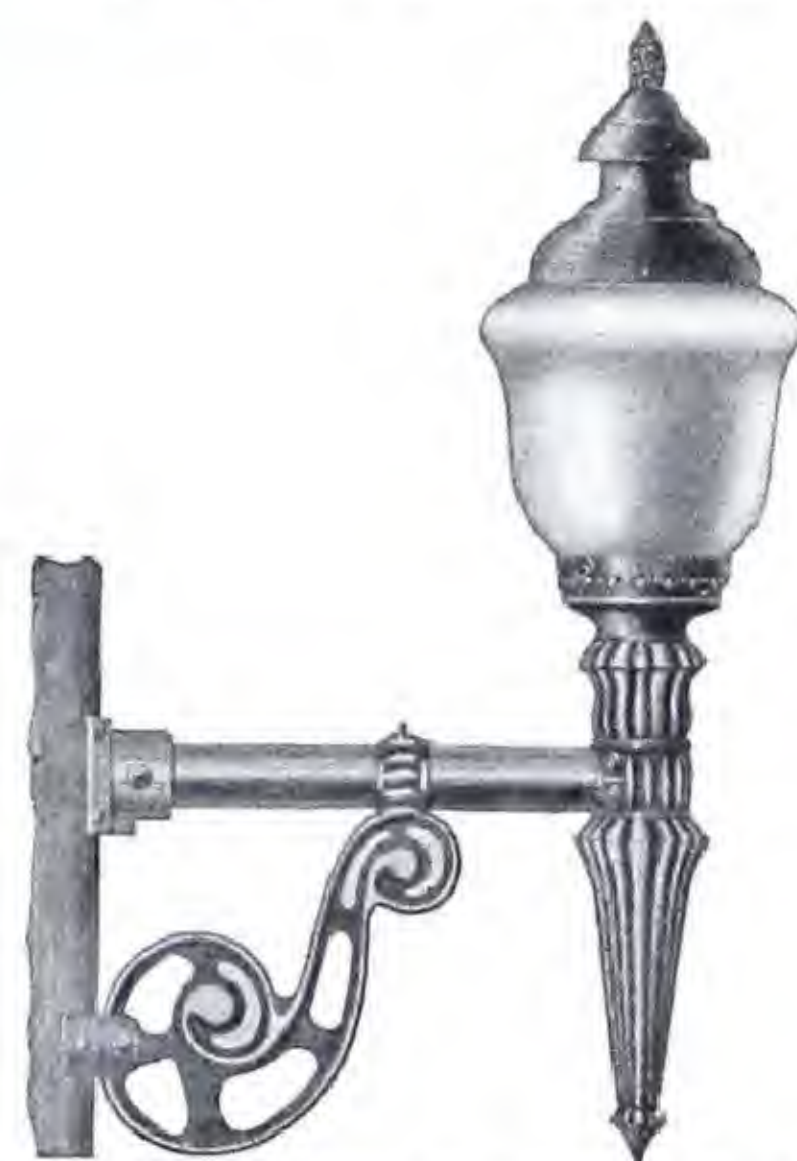
Carolina Trolleyite Bracket with Washington Senior Luminaire

SOL-LUX TROLLEYLITE BRACKETS

Description	Wt., Lb. Ship.	Style No.
For 4-inch pipe....	120	342088
For 5-inch pipe....	120	342089
For 6-inch pipe....	125	342090
For 7-inch pipe....	125	342091
For wooden pole...	110	342985



Sol-Lux Trolleyite Bracket with Sol-Lux Senior Luminaire



Sol-Lux Trolleyite Bracket with Sol-Lux Senior Luminaire

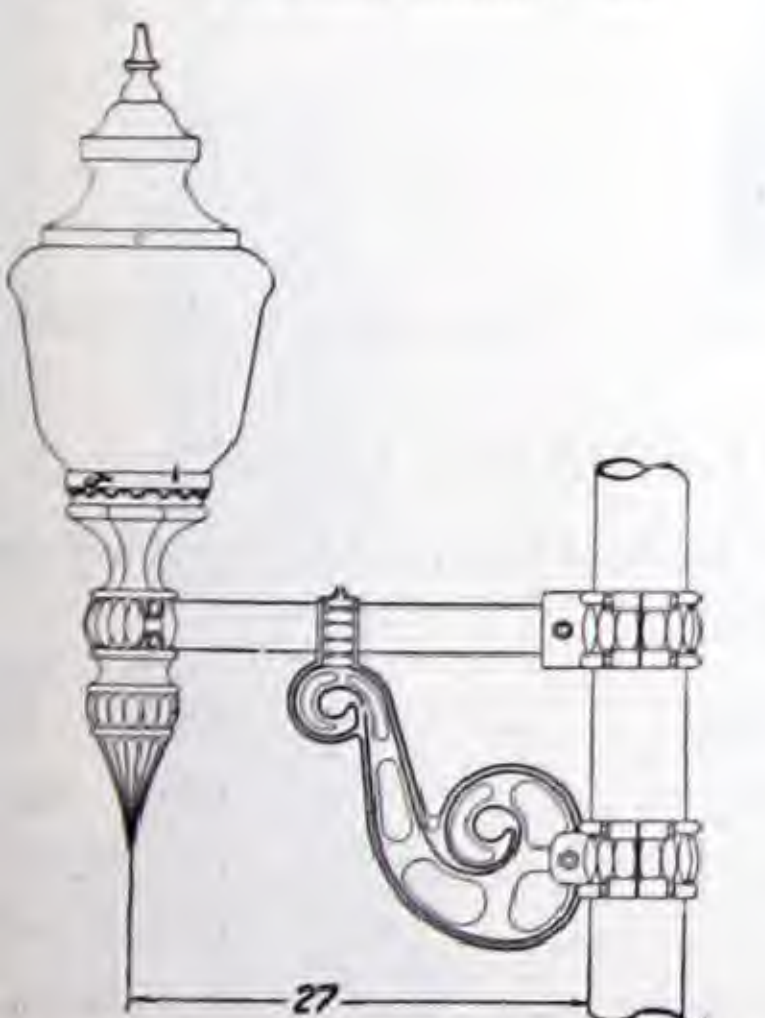
SOL-LUX SHORT TORCH TROLLEYLITE BRACKETS

Description	Wt., Lb. Ship.	Style No.
For 4-inch pipe....	110	350796
For 5-inch pipe....	110	350797
For 6-inch pipe....	115	350798
For 7-inch pipe....	115	350799
For wooden pole...	100	350800

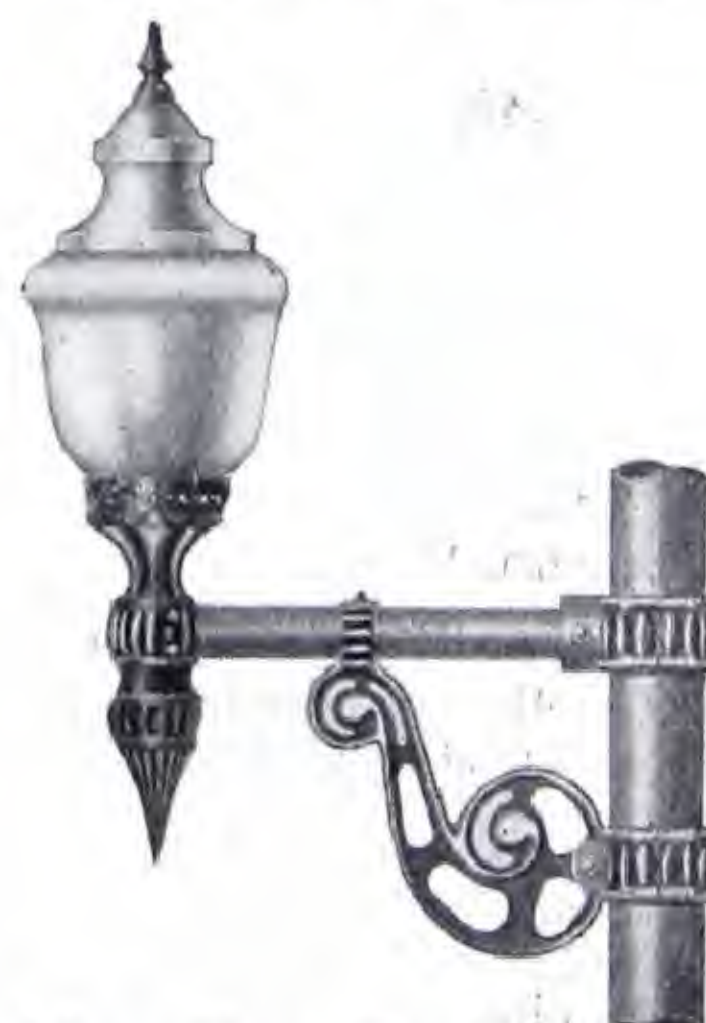
List price includes brackets complete except without luminaires.

Brackets can also be furnished for mounting on concrete trolley poles. Prices will be furnished upon request.

Dimensions are for reference only. For official dimensions apply to the nearest district office.



Sol-Lux Short Torch Trolleyite Bracket with Crystalux Senior Luminaire



Sol-Lux Short Torch Trolleyite Bracket with Crystalux Senior Luminaire

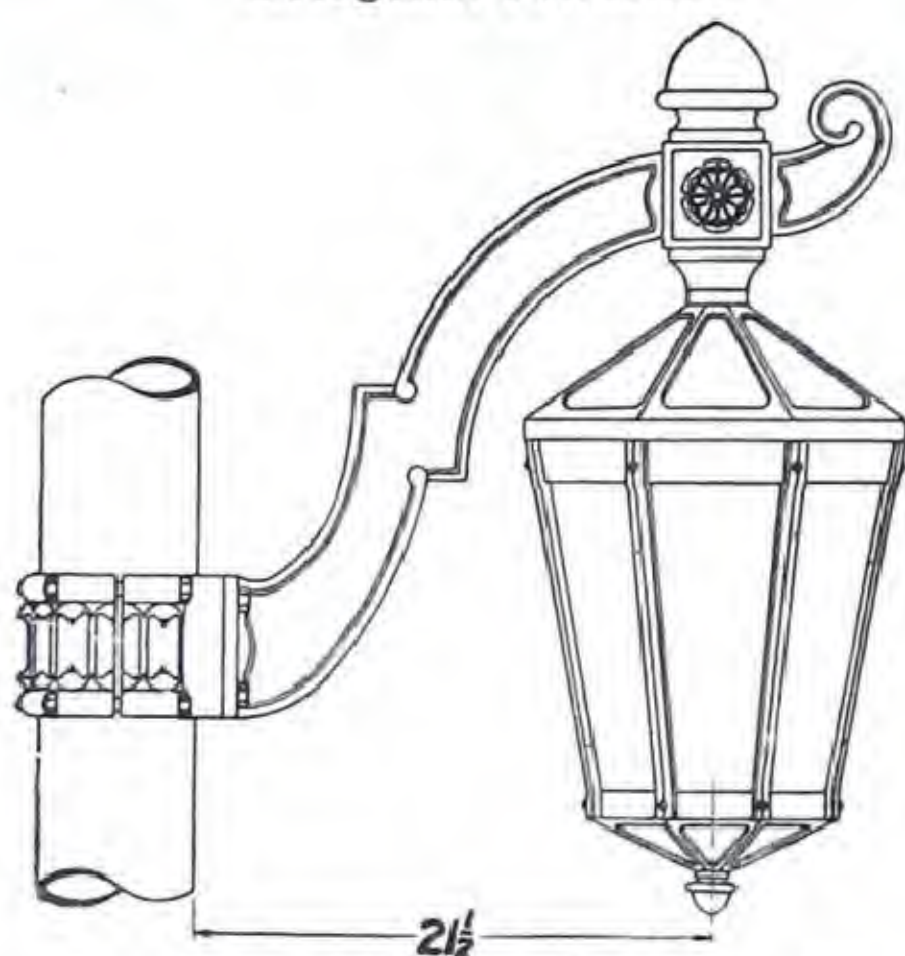
Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Trolleyite Brackets—Continued



Santiago Trolleyite Bracket with Octagonal Pendant



Santiago Trolleyite Bracket with Octagonal Pendant

SANTIAGO TROLLEYLITE BRACKETS

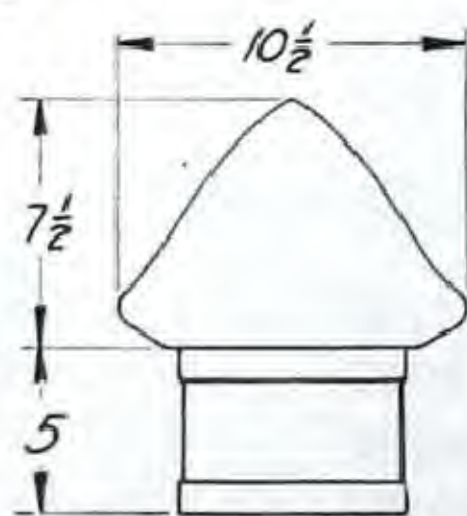
Description	Wt., Lb. Ship.	Style No.
For 4-inch pipe.....	75	352205
For 5-inch pipe.....	75	352206
For 6-inch pipe.....	75	352207
For 7-inch pipe.....	75	352208
For wooden pole.....	75	352209

Prices on application.

Ornamental Equipment for Steel Trolley Poles



Acorn Finial



Acorn Finial

ACORN TROLLEY POLE FINIALS

Acorn trolley pole finial is a cast-iron ornament for the top of tubular steel trolley poles.

Description	Wt., Lb. Ship.	Style No.
For 2½-inch pipe.....	3	335603
For 3-inch pipe.....	5	339608
For 4-inch pipe.....	8	339387
For 5-inch pipe.....	10	339718
For 6-inch pipe.....	15	350015

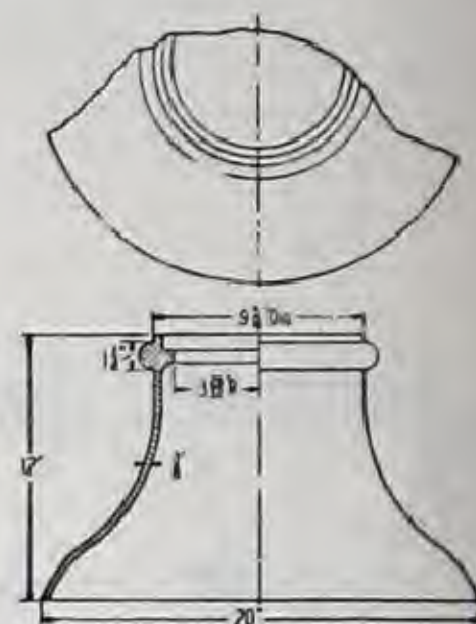
Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Ornamental Equipment for Steel Trolley Poles



Plain Wheel Guard



Plain Wheel Guard

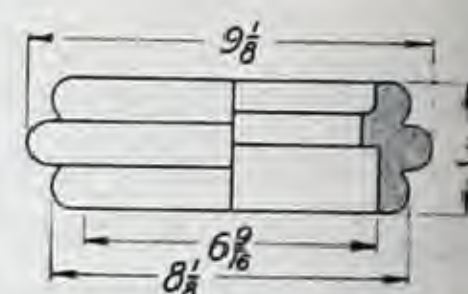
PLAIN WHEEL GUARDS

Plain wheel guard is a cast-iron base to slip over tubular steel poles to protect the pole from being damaged by the wheels of vehicles.

Description	Wt., Lb. Ship.	Style No.
For 6-inch pipe.....	60	351398
For 7-inch pipe.....	65	351399
For 8-inch pipe.....	75	351400



Pole Collar



Pole Collar

ORNAMENTAL POLE COLLARS

Ornamental pole collar is a cast-iron collar for covering the swaged joints of tubular steel trolley poles.

Description	Wt., Lb. Ship.	Style No.
For 5-6 inch joints.....	16	354531
For 6-7 inch joints.....	20	354532
For 7-8 inch joints.....	24	354533



Duquesne Trolley Base



Duquesne Trolley Base

DUQUESNE TROLLEY BASES

A light ornamental base made in two parts for bolting around trolley pole after erection.

Description	Wt., Lb. Ship.	Style No.
For 5-inch pipe.....	100	35176
For 6-inch pipe.....	100	35176
For 7-inch pipe.....	100	35176

Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Ornamental Equipment for Steel Trolley Poles—Continued

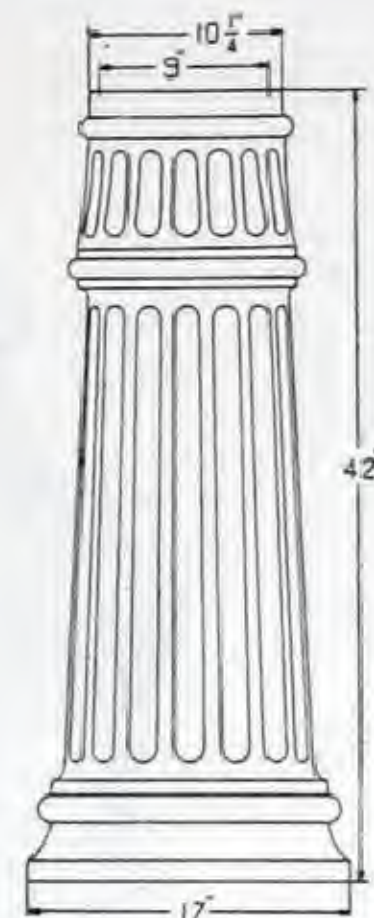


Hawthorne Trolley Base

HAWTHORNE TROLLEY BASES

Hawthorne trolley base is a light-weight base for sliding over trolley poles of six, seven and eight-inch diameters.

Description	Wt., Lb. Ship.	Style No.
For 6-inch pipe.....	165	353810
For 7-inch pipe.....	175	352366
For 8-inch pipe.....	200	352367

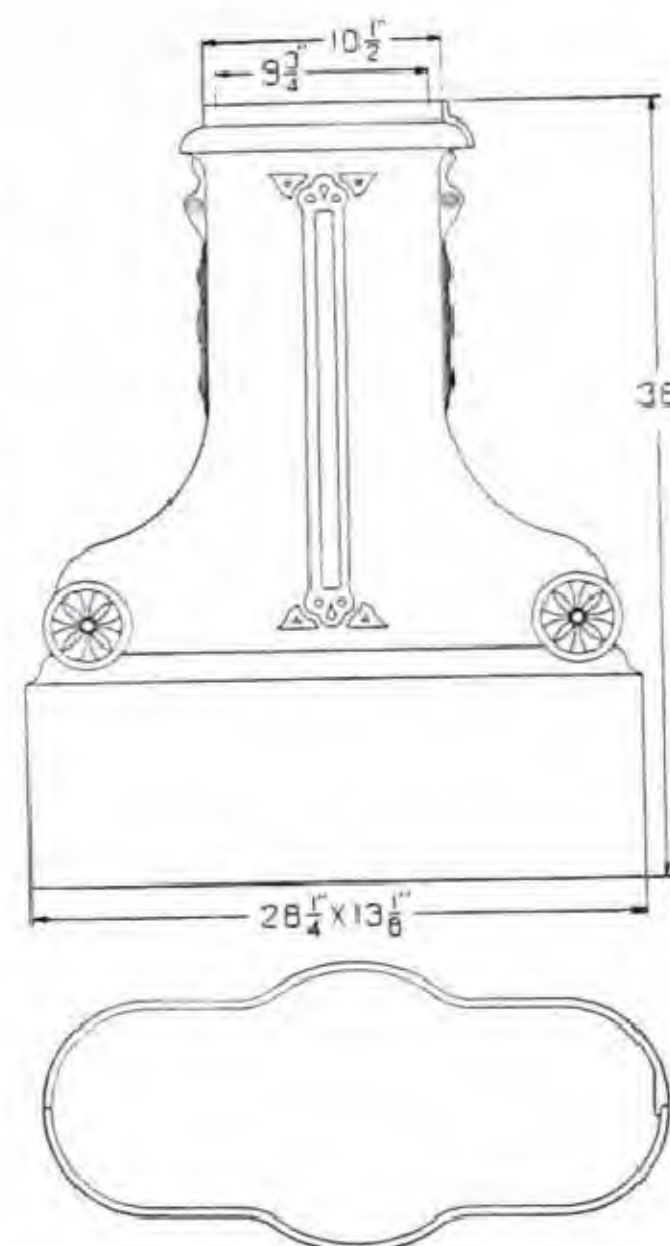


Hawthorne Trolley Base

WINSLOW TROLLEY BASES

Winslow trolley base is an ornamental base of attractive design which is made in two sections which can be easily bolted together. It has an interchangeable collar at the top which allows this base to be used with poles of different diameters. The bottom is eccentric in shape and has ample space for the installation of safety coils when required.

Description	Wt., Lb. Ship.	Style No.
For 7-inch pipe.....	225	352363
For 8-inch pipe.....	225	352364
For 9-inch pipe.....	225	352365



Winslow Trolley Base

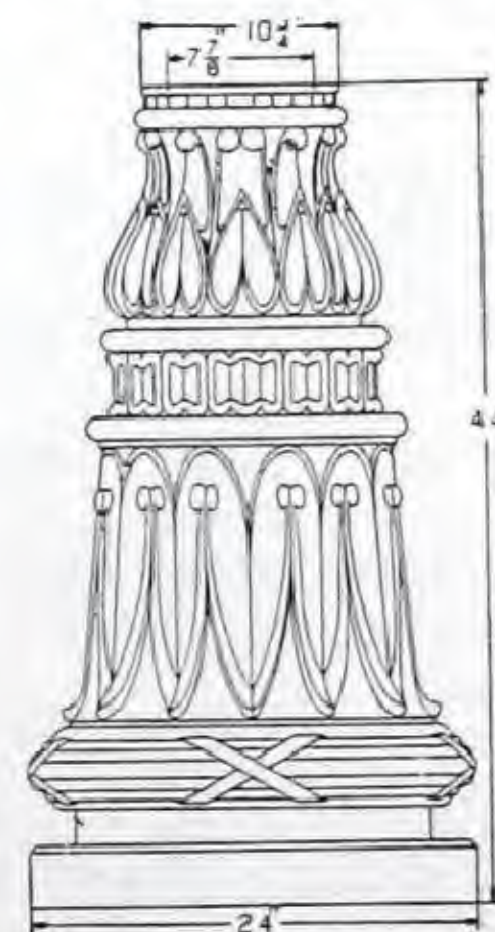
METROPOLIS TROLLEY BASES

Metropolis trolley base is for ornamenting tubular steel trolley poles. It is designed to slip over the pole during erection.

Description	Wt., Lb. Ship.	Style No.
For 5-inch pipe.....	375	353172
For 6-inch pipe.....	385	335597
For 7-inch pipe.....	410	335595
For 8-inch pipe.....	430	353173
For 9-inch pipe.....	450	335596



Metropolis Trolley Base



Metropolis Trolley Base

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting



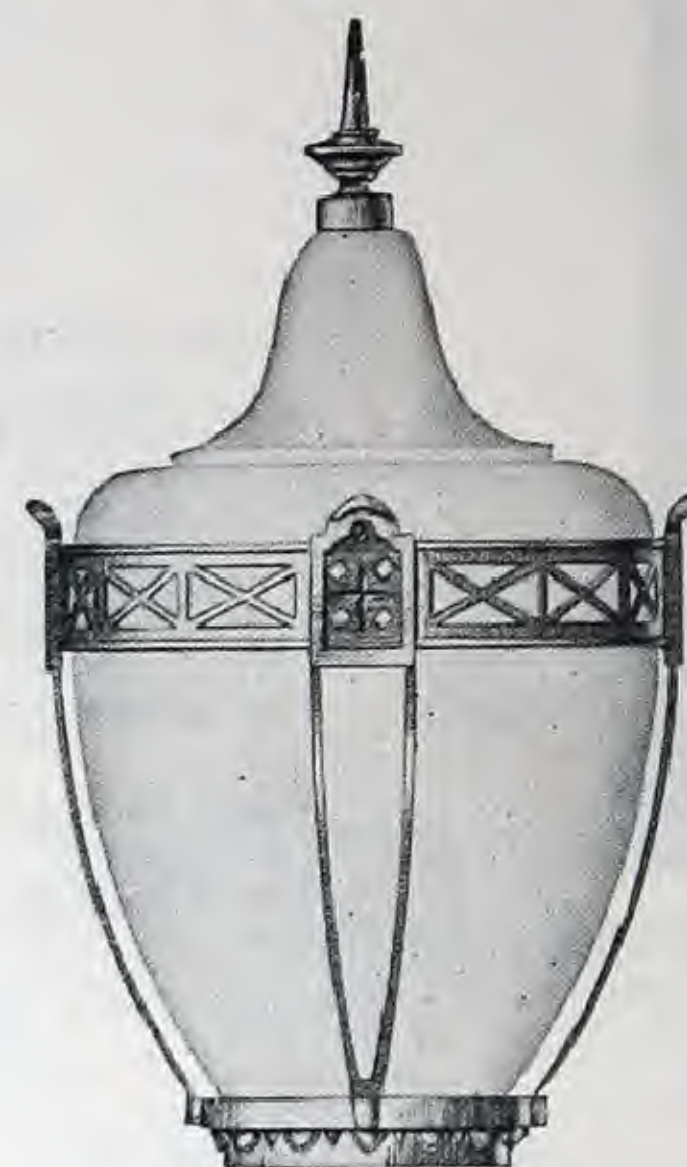
CRYSTALUX

Description	Lamp Rating	Approx. Wt., Lb. each Ship.	Style No.
Senior			
With rectilinear globe and canopy, standard series socket and Bi-lux refractor	10000 lumen	50	352379
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	50	352394
With rectilinear globe and canopy, standard series socket and Superlux refractor	10000 lumen	50	338198
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	50	338199
With rectilinear globe and canopy, standard series socket without refractor	15000 lumen	35	352557
With rectilinear globe and canopy, mogul multiple socket without refractor	750 watt	35	352558
Junior			
With rectilinear globe and canopy, standard series socket without refractor	6000 lumen	30	352559
With rectilinear globe and canopy, mogul multiple socket without refractor	300 watt	30	352560

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting



PARAGON

Description	Lamp Rating	Approx. Wt., Lb. Each Ship.	Style No.
Giant			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	95	35238
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	95	35238
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	95	33838
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	95	33838
With rectilinear globe and canopy, Standard series socket without refractor	25000 lumen	80	35238
With rectilinear globe and canopy, mogul multiple socket without refractor	1500 watt	80	35238
Senior			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	55	3524
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	55	3524
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	55	3383
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	55	3383
With rectilinear globe and canopy, Standard series socket without refractor	15000 lumen	40	3524
With rectilinear globe and canopy, mogul multiple socket without refractor	1000 watt	40	3524
With Monax globe and canopy, Standard series socket without refractor	15000 lumen	40	3524
With Monax globe and canopy, mogul multiple socket without refractor	1000 watt	40	3524
Junior			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	50	3523
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	50	3523
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	50	3383
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	50	3383
With rectilinear globe and canopy, Standard series socket without refractor	10000 lumen	35	3524
With rectilinear globe and canopy, mogul multiple socket without refractor	500 watt	35	3524
With Monax globe and canopy, Standard series socket without refractor	10000 lumen	35	3524
With Monax globe and canopy, mogul multiple socket without refractor	500 watt	35	3524

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting—Continued

OCTAGONAL



Octagonal

Description	Lamp Rating	Approx. Wt.	Style No.	Lamp Rating	Approx. Wt.	Style No.
		Lb., Ea. Ship. Senior			Lb., Ea. Ship. Junior	
With glass canopy, Standard series socket and Bi-lux refractor.....	{10000 lumen	125	351642	{10000 lumen	105	351711
With glass canopy, mogul multiple socket and Bi-lux refractor.....	{500 watt	125	351641	{500 watt	105	351713
With glass canopy, Standard series socket and Superlux refractor.....	{10000 lumen	120	338346	{10000 lumen	100	338354
With glass canopy, mogul multiple socket and Superlux refractor.....	{500 watt	120	338347	{500 watt	100	338355
With glass canopy, Standard series socket without refractor.....	{15000 lumen	110	351310	{10000 lumen	85	351719
With glass canopy, mogul multiple socket without refractor.....	{1000 watt	110	351311	{500 watt	85	351721
With metal canopy, Standard series socket and Bi-lux refractor.....	{10000 lumen	120	351742	{10000 lumen	80	351646
With metal canopy, mogul multiple socket and Bi-lux refractor.....	{500 watt	120	351744	{500 watt	80	351647
With metal canopy, Standard series socket and Superlux refractor.....	{10000 lumen	115	338348	{10000 lumen	75	338356
With metal canopy, mogul multiple socket and Superlux refractor.....	{500 watt	115	338349	{500 watt	75	338357
With metal canopy, Standard series socket without refractor.....	{15000 lumen	105	351745	{10000 lumen	60	351321
With metal canopy, mogul multiple socket without refractor.....	{1000 watt	105	351747	{500 watt	60	351323

OCTAGONAL WITH SPURS



Octagonal with Spurs

With glass canopy, Standard series socket and Bi-lux refractor.....	{10000 lumen	130	351706	{10000 lumen	110	351715
With glass canopy, mogul multiple socket and Bi-lux refractor.....	{500 watt	130	351707	{500 watt	110	351717
With glass canopy, Standard series socket and Superlux refractor.....	{10000 lumen	125	338350	{10000 lumen	105	338358
With glass canopy, mogul multiple socket and Superlux refractor.....	{500 watt	125	338351	{500 watt	105	338359
With glass canopy, Standard series socket without refractor.....	{15000 lumen	115	351709	{10000 lumen	90	351723
With glass canopy, mogul multiple socket without refractor.....	{1000 watt	115	351710	{500 watt	90	351725
With metal canopy, Standard series socket and Bi-lux refractor.....	{10000 lumen	125	351748	{10000 lumen	85	351728
With metal canopy, mogul multiple socket and Bi-lux refractor.....	{500 watt	125	351750	{500 watt	85	351730
With metal canopy, Standard series socket and Superlux refractor.....	{10000 lumen	120	338352	{10000 lumen	80	338360
With metal canopy, mogul multiple socket and Superlux refractor.....	{500 watt	120	338353	{500 watt	80	338361
With metal canopy, Standard series socket without refractor.....	{15000 lumen	110	351751	{10000 lumen	65	351732
With metal canopy, mogul multiple socket without refractor.....	{1000 watt	110	351753	{500 watt	65	351734

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting—Continued



SOL-LUX

Description	Lamp Rating	Approx. Wt. Lb. Ea. Ship.	Style No.
SENIOR			
With rectilinear globe and canopy, Standard series socket and Bi-Lux refractor	1000 lumen	50	352372
With rectilinear globe and canopy, mogul multiple socket and Bi-Lux refractor	500 watt	50	352374
With rectilinear globe, metal canopy, Standard series socket and Bi-Lux refractor	10000 lumen	50	352312
With rectilinear globe, metal canopy, mogul multiple socket and Bi-Lux refractor	500 watt	50	352314
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	50	338256
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	50	338257
With rectilinear globe, metal canopy, Standard series socket and Superlux refractor	10000 lumen	50	338258
With rectilinear globe, metal canopy, mogul multiple socket and Superlux refractor	500 watt	50	338259
With rectilinear globe and canopy, Standard series socket without refractor	15000 lumen	35	352373
With rectilinear globe and canopy, mogul multiple socket without refractor	750 watt	35	352375
With rectilinear globe, metal canopy, Standard series socket without refractor	15000 lumen	35	352313
With rectilinear globe, metal canopy, mogul multiple socket without refractor	750 watt	35	352315
With Monax globe and canopy, Standard series socket without refractor	15000 lumen	35	352376
With Monax globe and canopy, mogul multiple socket without refractor	750 watt	35	352377
With Monax globe, metal canopy, Standard series socket without refractor	15000 lumen	35	351275
With Monax globe, metal canopy, mogul multiple socket without refractor	750 watt	35	351271
JUNIOR			
With rectilinear globe and canopy, Standard series socket without refractor	6000 lumen	32	352368
With rectilinear globe and canopy, mogul multiple socket without refractor	300 watt	32	352369
With rectilinear globe, metal canopy, Standard series socket without refractor	6000 lumen	32	352318
With rectilinear globe, metal canopy, mogul multiple socket without refractor	300 watt	32	352319
With Monax globe and canopy, Standard series socket without refractor	6000 lumen	32	352370
With Monax globe and canopy, mogul multiple socket without refractor	300 watt	32	352371
With Monax globe, metal canopy, Standard series socket without refractor	6000 lumen	32	351283
With Monax globe, metal canopy, mogul multiple socket without refractor	300 watt	32	351285

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting—Continued



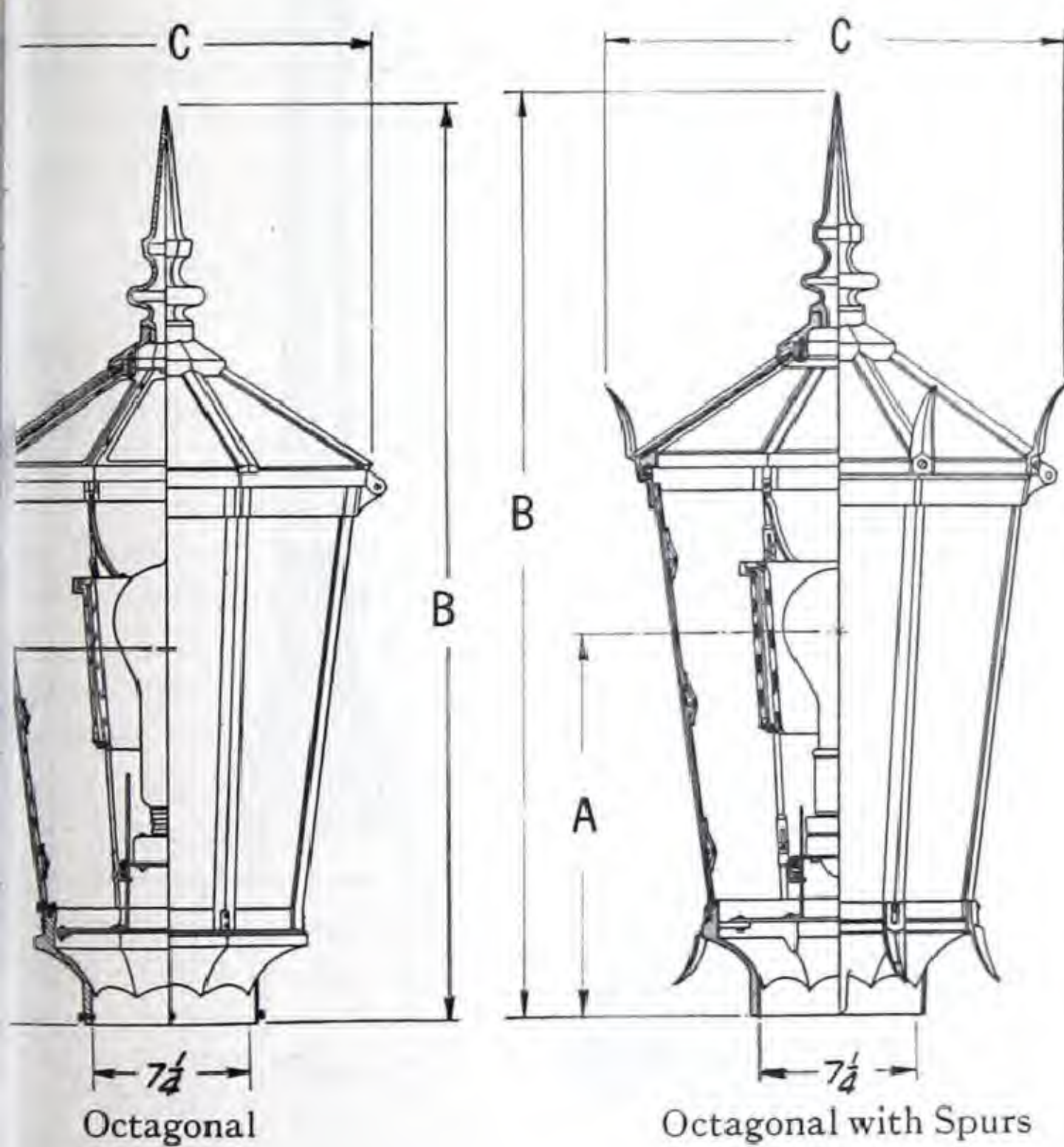
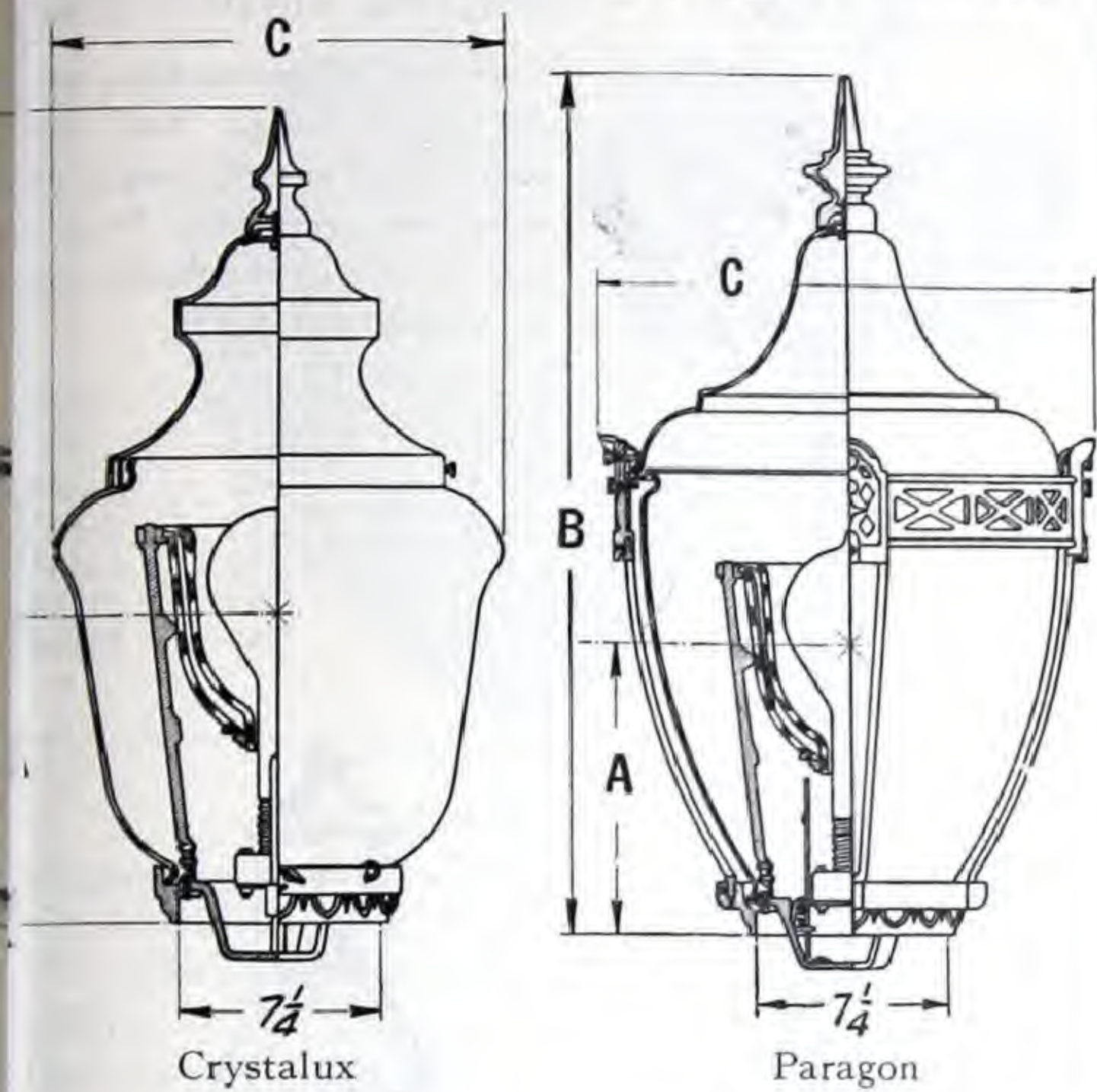
WASHINGTON

Description	Lamp Rating	Approx. Wt., Lb. Each Ship.	Style No.
Giant			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	90	338366
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	90	338369
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	90	338377
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	90	338377
With rectilinear globe and canopy, Standard series socket without refractor	25000 lumen	75	338377
With rectilinear globe and canopy, mogul multiple socket without refractor	1500 watt	75	338377
Large			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	55	352366
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	55	352369
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	55	338377
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	55	338377
With rectilinear globe and canopy, Standard series socket without refractor	15000 lumen	40	352366
With rectilinear globe and canopy, mogul multiple socket without refractor	1000 watt	40	352369
Medium			
With rectilinear globe and canopy, Standard series socket and Bi-lux refractor	10000 lumen	50	352366
With rectilinear globe and canopy, mogul multiple socket and Bi-lux refractor	500 watt	50	352369
With rectilinear globe and canopy, Standard series socket and Superlux refractor	10000 lumen	50	338377
With rectilinear globe and canopy, mogul multiple socket and Superlux refractor	500 watt	50	338377
With rectilinear globe and canopy, Standard series socket without refractor	10000 lumen	35	352366
With rectilinear globe and canopy, mogul multiple socket without refractor	500 watt	35	352369
Small			
With rectilinear globe and canopy, Standard series socket without refractor	6000 lumen	30	352366
With rectilinear globe and canopy, mogul multiple socket without refractor	300 watt	30	352369

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting—Continued



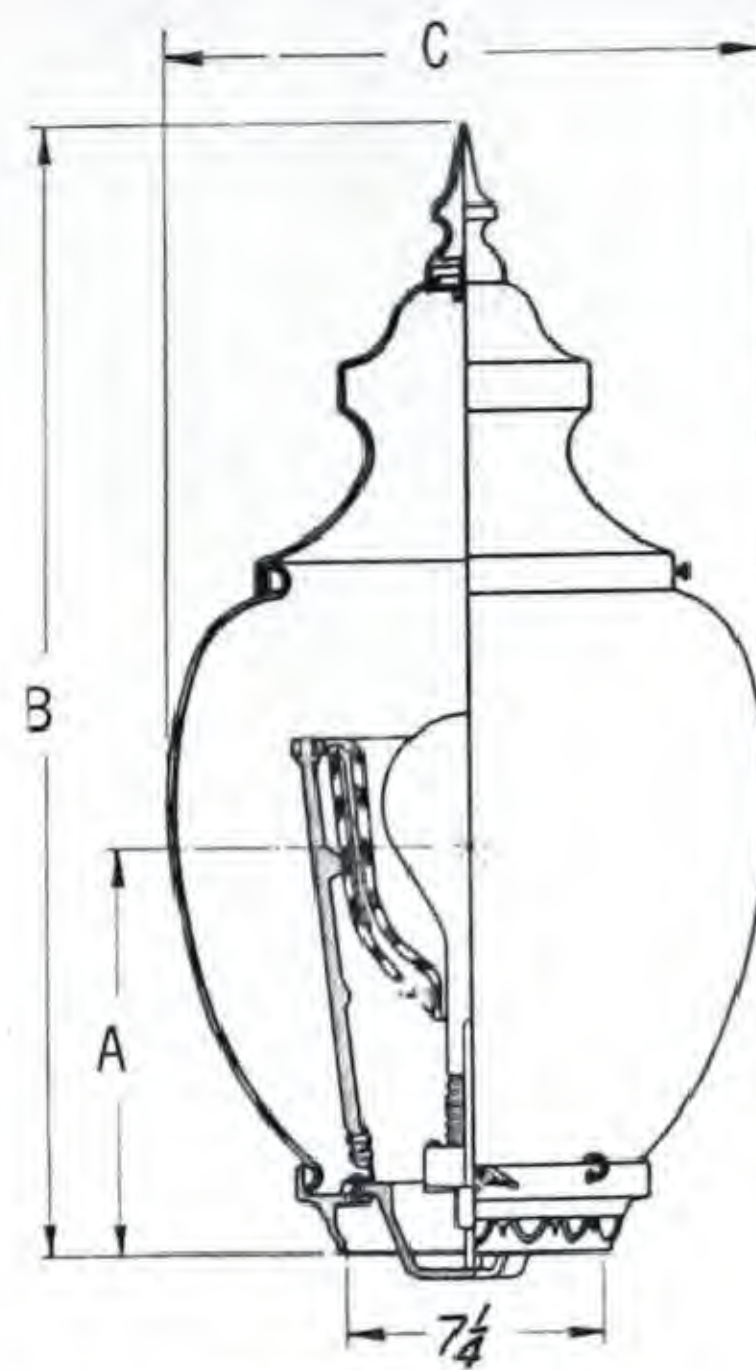
Description	Dimensions in inches		
	A	B	C
Crystalux Senior.....	12	29	16
Crystalux Junior.....	12	25	13
Paragon Giant.....	14	41	21 1/2
Paragon Senior.....	12	32 1/2	18 3/8
Paragon Junior.....	12	29 1/2	16 3/8
Octagonal Senior.....	17	42	19
Octagonal Junior.....	12	33	16
Octagonal Senior with Spurs	17	42	21
Octagonal Junior with Spurs	12	33	18

Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

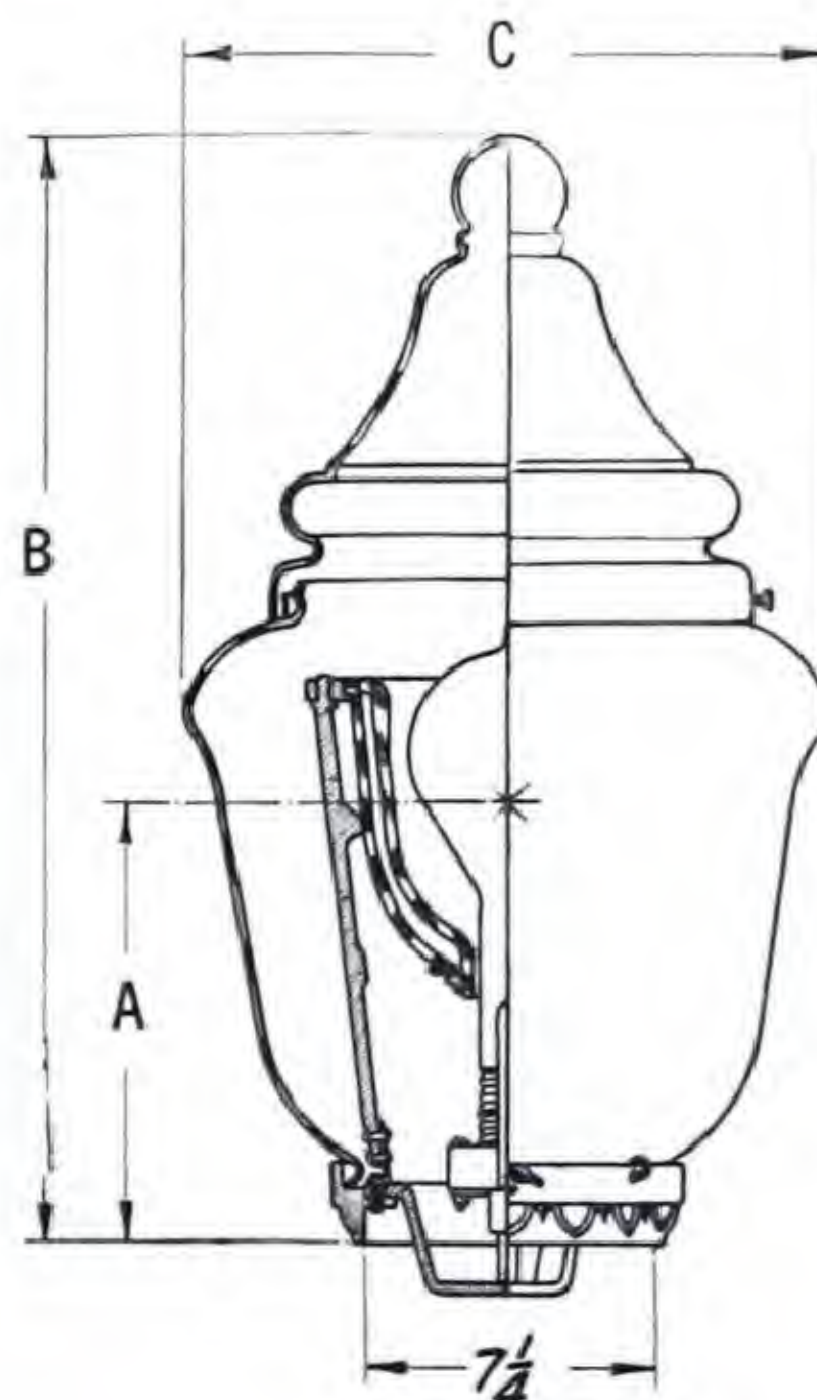
WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Luminaires for Street Lighting—Continued



WASHINGTON

Description	Dimensions in Inches		
	A	B	C
Sol-Lux Senior.....	12	27 1/4	16
Sol-Lux Junior.....	12	22 1/2	13



SOL-LUX

Description	Dimensions in Inches		
	A	B	C
Washington Giant.....	17 1/2	39 1/2	18 1/2
Washington Large.....	12	32	17
Washington Medium.....	12	29	15 3/4
Washington Small.....	12	27	14 1/2

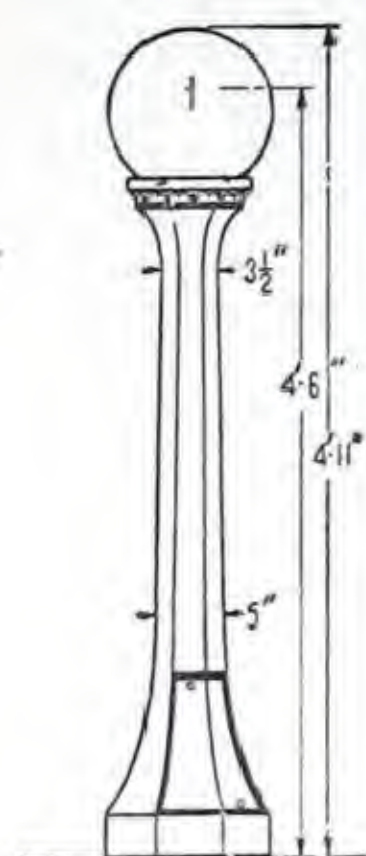
Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Ornamental Cast Iron Newels—Continued

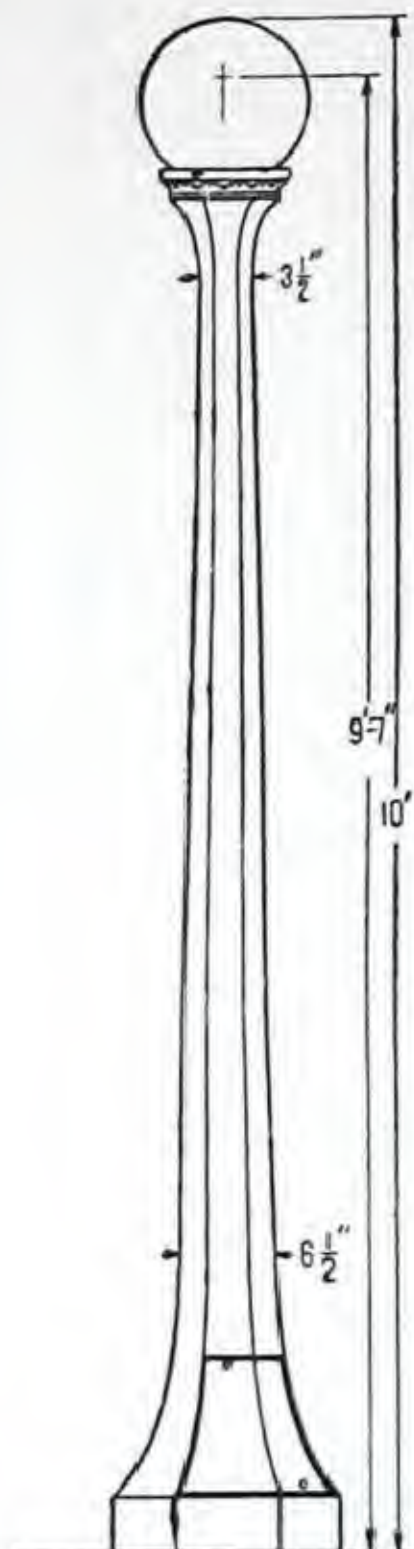
DIMENSIONS IN FEET AND INCHES



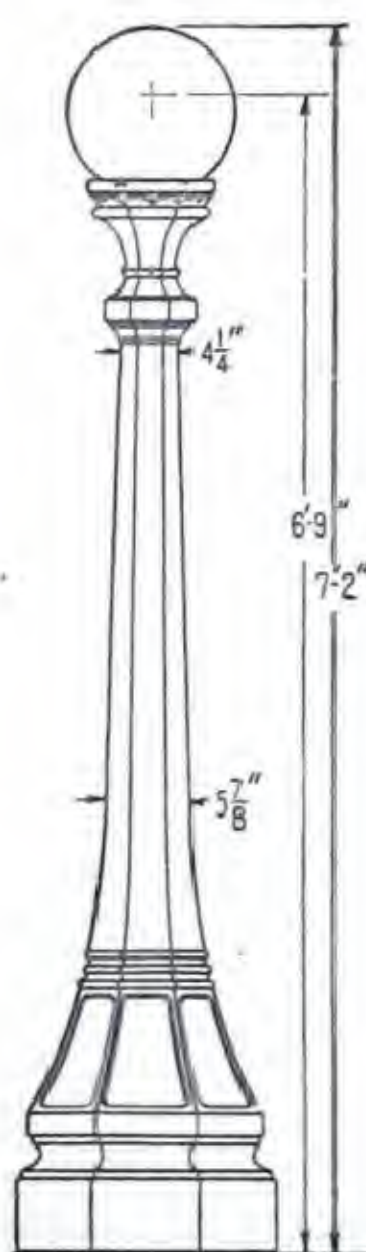
Arcadian 4 Newel



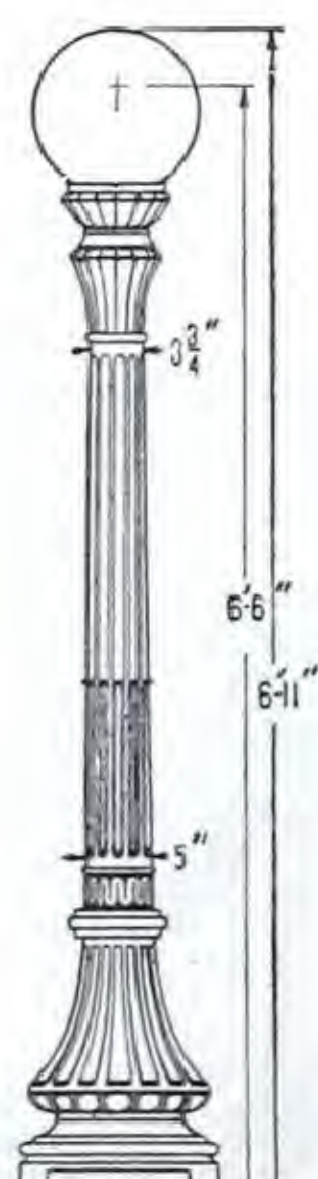
Arcadian 6 Newel



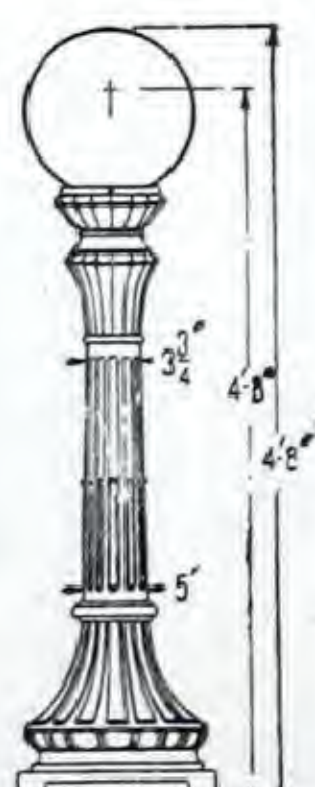
Arcadian 8 Newel



Edgewater 6 Newel



Sol-Lux 5 Newel



Sol-Lux 3 Newel

Dimensions are for reference only. For official dimensions apply to the nearest district office.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Ornamental Cast-Iron Newels—Continued

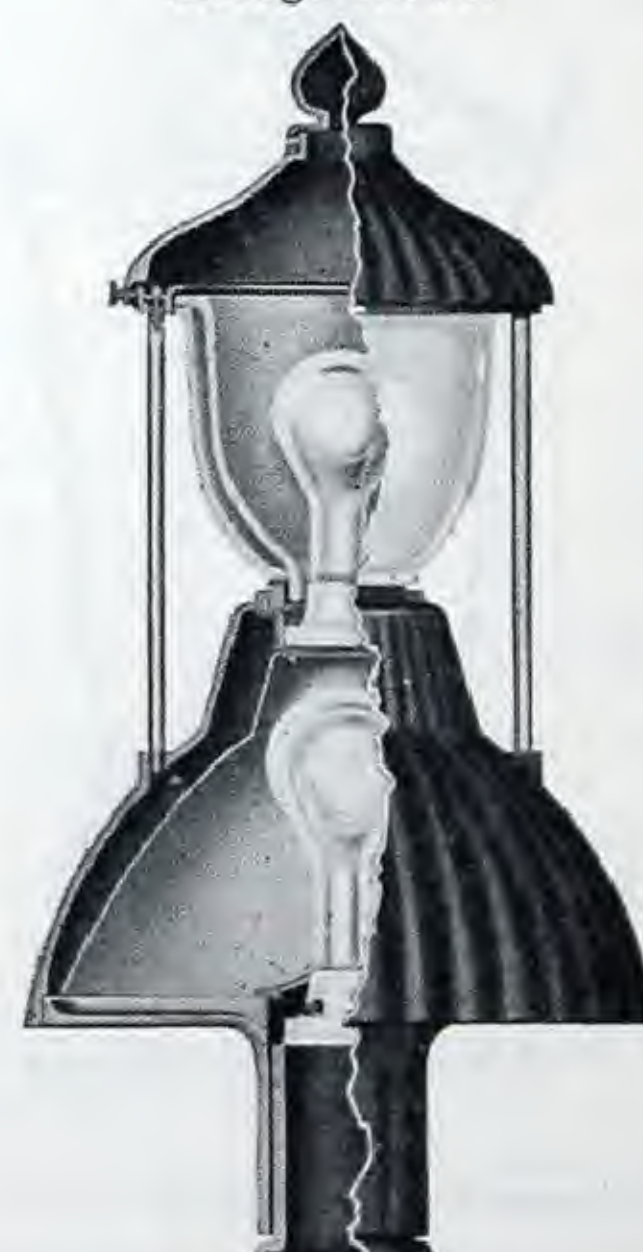
SOL-LUX BRIDGE NEWELS

Prices include medium sockets for side lamps and mogul sockets for center lamps, unless otherwise specified. Price does not include globes, lamps, wiring or foundation bolts.

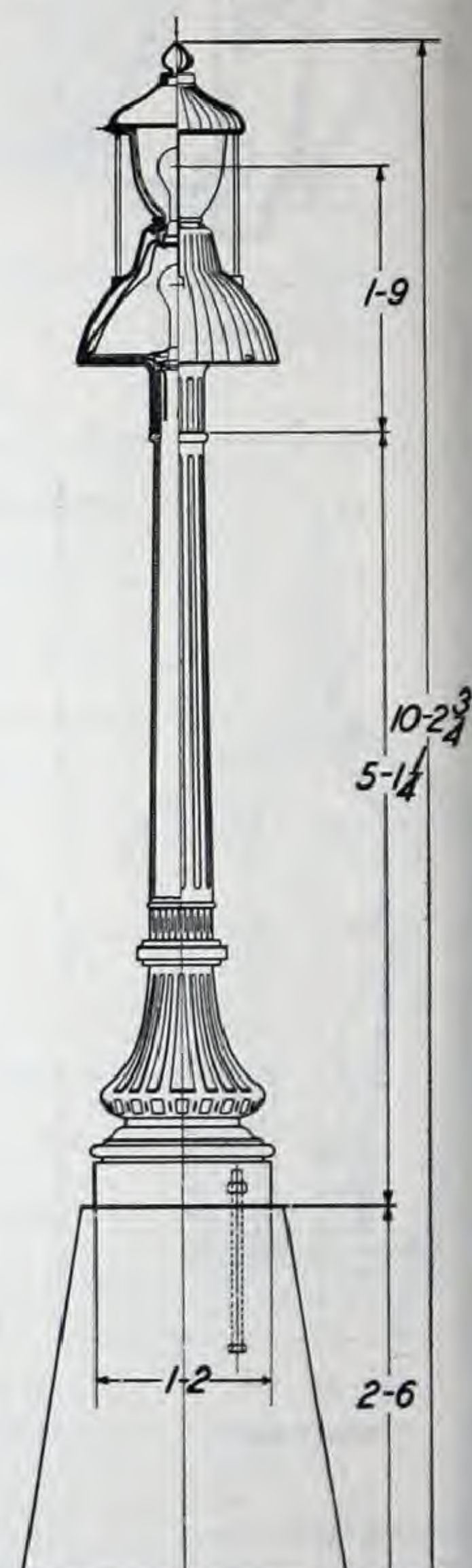
No. of Lights	Wt., Lb. Each	Style No.
1	175	341445
2	215	341446
3	230	341447
4	260	341448
5	295	341449



Sol-Lux 5-Light Bridge Newel



Interior View of Red-Head Beacon



Red-Head Beacon Mounted on a Sol-Lux 5 Newel

RED-HEAD WARNING BEACONS

Distinctive Features

1. Low current consumption—300-400 watts.
2. Illumination of standard and surroundings enable driver to estimate his distance from the point of danger.
3. Red head serves as daytime warning.
4. Adaptable to present traffic newels.
5. May be operated on either multiple or series alternating-current circuits with a safety coil.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Street Lighting Glassware

GENERAL



Luxsolite Rectilinear Globe

RECTILINEAR GLASS

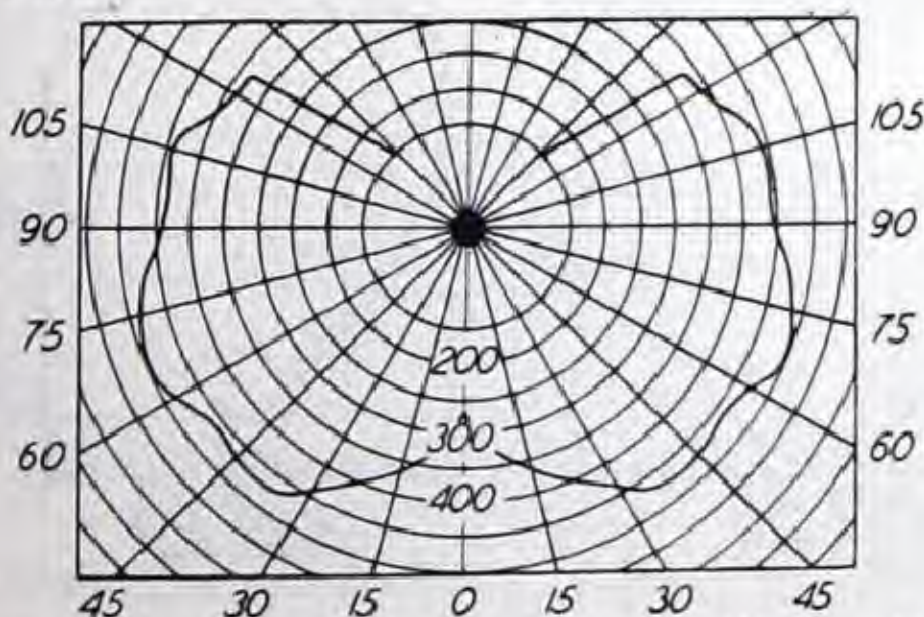
Rectilinear glassware is blown in carefully prepared moulds by the most skillful glass blowers. The outer surface is made up of a series of horizontal and vertical prisms so arranged as to produce a diffusing and sparkling effect. The prisms are so arranged that the globe can be cleaned easily with a damp cloth.

Rectilinear globes have been designed to diffuse the light by means of the opalescence of the glassware, and by the arrangement of the prisms. Its sparkling appearance is very attractive and since the absorption of light is very small the efficiency is correspondingly high.

Rectilinear glass is of medium density, is uniform in color and texture and is designed to possess high mechanical strength.

Experience has shown that glare from a street lighting unit is not only unpleasant but extremely dangerous, blinding alike to pedestrians and vehicle drivers. Glare has sometimes been defined as misdirected light. A light source of high intrinsic brilliancy, such as an unshielded arc or the filament of a type C lamp unshielded by diffusing glassware invariably produces glare, and the pupil of the human eye becomes so attracted by the intensity of the light source that it cannot, with any degree of precision, discern objects, either stationary or in motion, between it and the point where the lamp is located.

The primary purpose of diffusing glassware on a street lighting unit is to convert the piercing glare of high-powered lamps into useful, comfortable, and properly distributed light. It is a well known fact that more unmodified light is required to see objects clearly than is necessary when the glare is eliminated. Consequently, the use of diffusing glassware increases the utility of the light produced by the lamps, the percentage of increase depending upon the efficiency of the glassware itself.

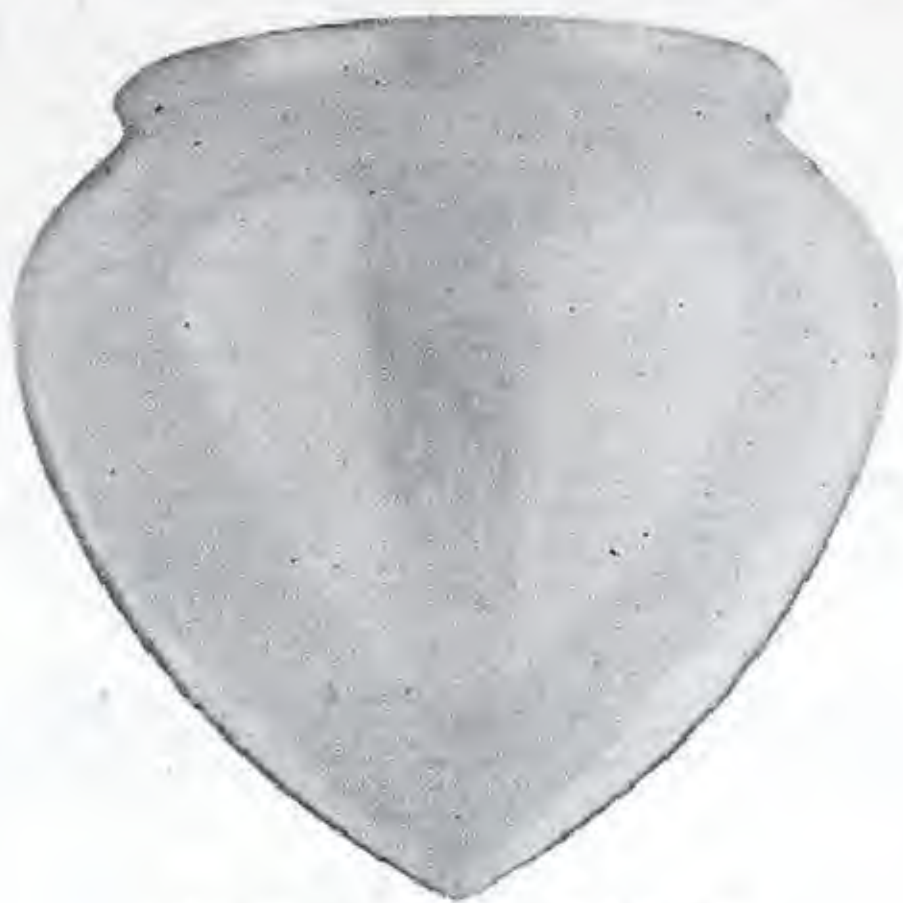


Typical Distribution from a Rectilinear Globe

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Street Lighting Glassware



Luxsolite Monax Globe

MONAX GLASS

Monax glassware is the result of many years of development in the glassmaking art.

The diffusing effect provided by Monax glass is obtained without loss of light, because of the care taken in manufacture. By reflected light Monax glass has an appearance by day fully as attractive as it appears by transmitted light at night. It is blown as thin as is consistent with strength; thus glare is entirely absent and the lamp filament is not visible through the globe.

GLOBES AND CANOPIES FOR LIGHTING UNITS

Description	Globe			Canopy		
	Fig. No.	Ship. Lb., Ea.	Wt. Style No.	Fig. No.	Ship. Lb., Ea.	Wt. Style No.
Crystalux Junior rectilinear.....	27	15	341026	4	7	341019
Crystalux Senior rectilinear.....	26	18	341028	2	7	341023
Paragon Junior Monax.....	18	16	353224	13	9	345909
Paragon Junior rectilinear.....	18	18	341086	13	9	341085
Paragon Senior Monax.....	17	18	352914	12	9	354329
Paragon Senior rectilinear.....	17	18	341088	12	9	341087
Paragon Giant rectilinear.....	16	50	341090	11	15	341089
Sol-lux Junior Monax.....	27	15	336148	22	8	354490
Sol-lux Junior rectilinear.....	27	15	341026	22	8	341025
Sol-lux Senior Monax.....	26	18	336150	21	9	354491
Sol-lux Senior rectilinear.....	26	18	341028	21	9	341027
Sol-lux Senior rectilinear with 9 3/8-inch bottom fitter	25	18	341074	21	9	341027
Washington, giant, rectilinear.....	6	50	341048	1	10	341047
Washington, large, rectilinear.....	7	20	341024	2	7	341023
Washington, medium, rectilinear...	8	16	341022	3	7	341021
Washington, small, rectilinear.....	10	16	341018	5	6	341017

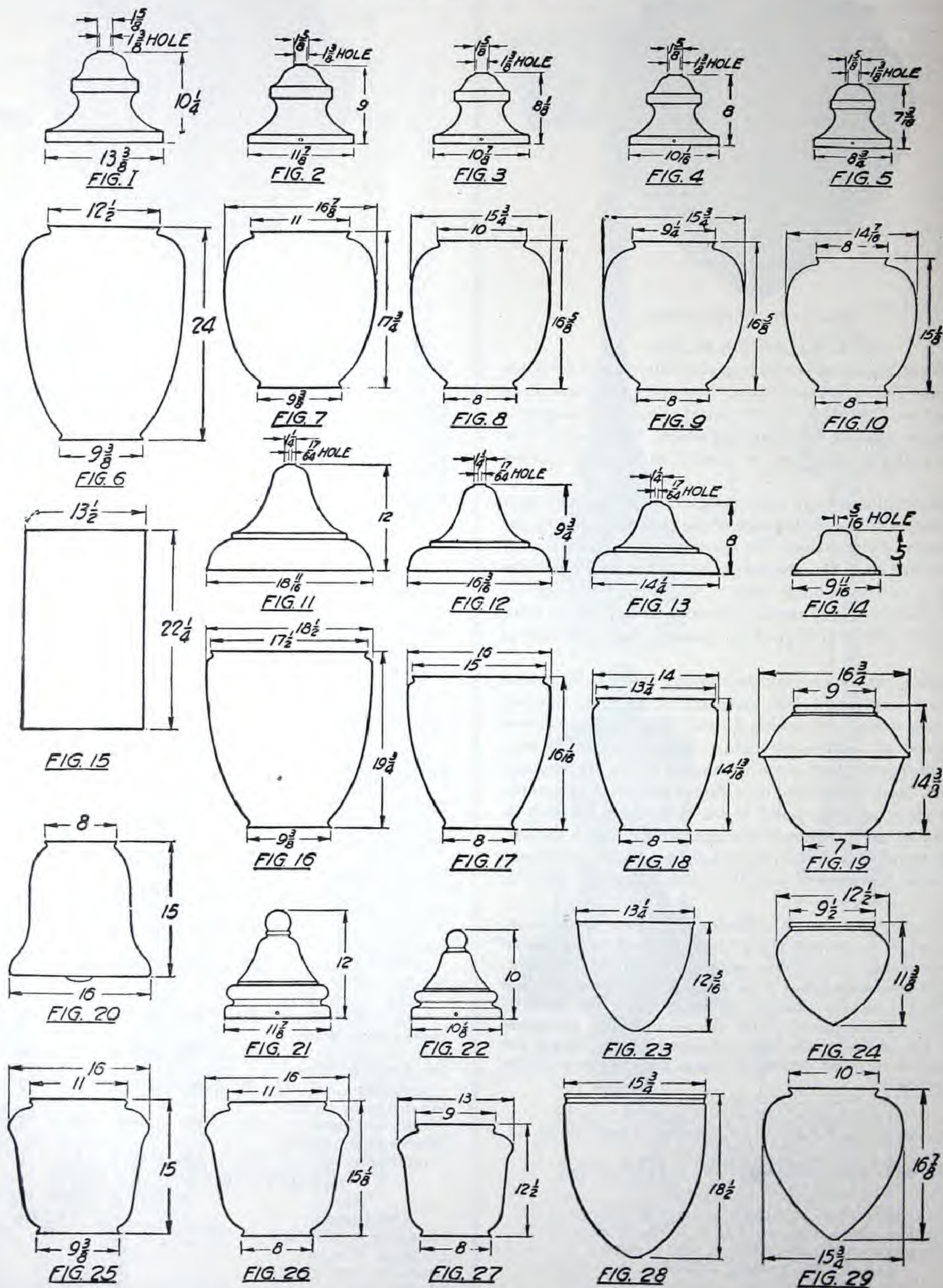
GLOBES FOR PENDANT UNITS

Description	Fig. No.	Ship. Wt.		Style No.
		Lb., Ea.		
Delaware rectilinear.....	28	50		341063
Luxsolite Monax.....	24	7		220260
Luxsolite rectilinear.....	24	9		341029
Mission Bell.....	20	20		341766
Polaris rectilinear.....	23	18		352499
Titan Monax.....	29	17		336900
Titan rectilinear.....	29	20		340051

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Street Lighting Glassware—Continued

DIMENSIONS IN INCHES



Dimensions are for reference only. For official dimensions apply to the nearest district office.
Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Holophane Refractors

GENERAL

The flux from any light source naturally radiates in all directions. One of the most important requirements of street lighting is a uniform intensity upon the roadway and sidewalks so that pedestrians and drivers may proceed in safety and comfort.

Uniform intensity may be obtained either by close spacing of the units or by controlling the light. Light may be controlled by reflection or refraction. Reflection is the method generally adopted in interior lighting, but in street lighting where the light-sources must be spaced at wider intervals, reflectors would produce a condition of spotty illumination or glare. Refraction, which is the bending of a ray of light as it passes from one medium to another medium of different density, is universally used for the directional control of light for street illumination.

APPLICATION

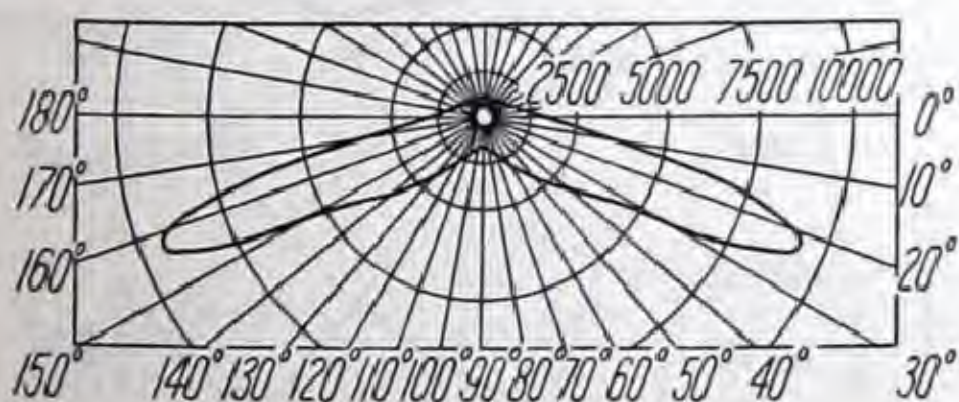
Westinghouse-Holophane refractors have been designed for use with street lighting units to efficiently control the light in several ways depending upon the results desired and the local conditions. Refractors may be used with or without an enclosing rectilinear globe to fit local conditions. The various types of refractors available are described below.



Bi-Lux Refractor, Bowl Type

BOWL BI-LUX REFRACTOR

The Bowl Bi-lux Refractor is similar in character to the cylindrical Bi-lux but instead of being cylindrical in shape, the lower portion is drawn in to form a bowl. It is used with pendant units and in the globe type of ornamental units. As in the case of the Cylindrical Bi-lux the Bowl Bi-lux is designed for use in ornamental units placed on or adjacent to the curb line.



Distribution from Bowl Bi-Lux Refractor

Prices on application.



WHATEVER your problem may be in Residential, Commercial, Industrial, Church, School or even Street Lighting, you will find in this catalogue a representative selection of the best and latest in lighting equipment to choose from.

Experienced Lighting Specialists are located at our many distributing centres, alert to assist you with your lighting problems. We want you to take full advantage of their services.

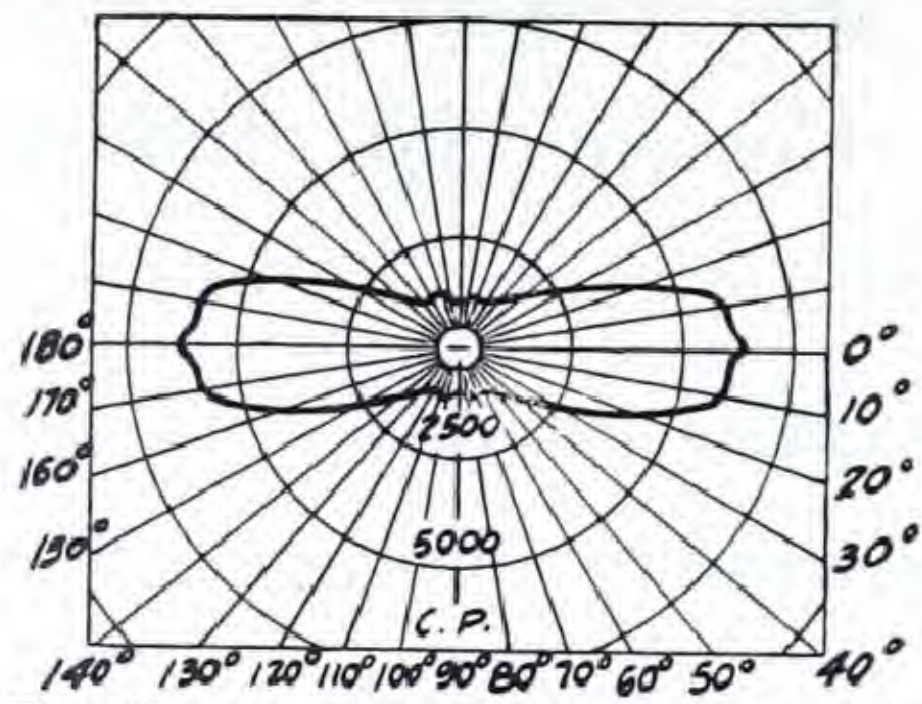


WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Holophane Refractors



Holophane Two-Way Refractor



Distribution from Two-Way Refractor

TWO-WAY

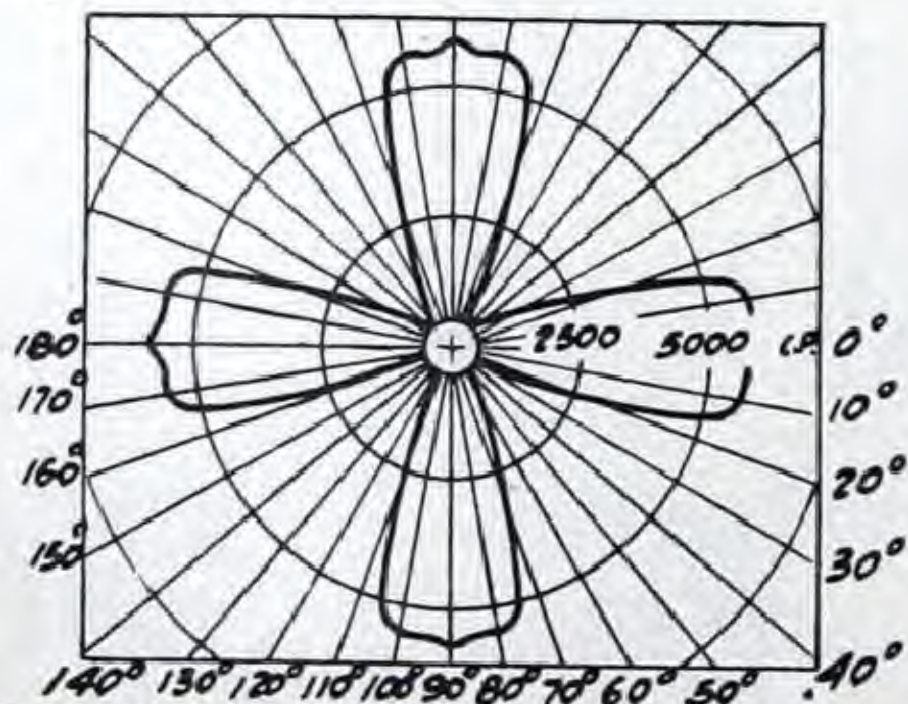
The Two-Way Refractor, as the name indicates, is designed to throw two beams of light in opposite directions 180 degrees apart. This refractor is principally used on suspension units mounted over the center line of the street.



Holophane Four-Way Refractor

FOUR-WAY

The Four-Way Refractor is designed for use in units mounted over street intersections. Its prism construction is such as to divide the light into four beams laterally 90 degrees apart instead of two beams 180 degrees apart as in the case of the Two-Way Refractor.



Distribution from Four-Way Refractor

Price on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

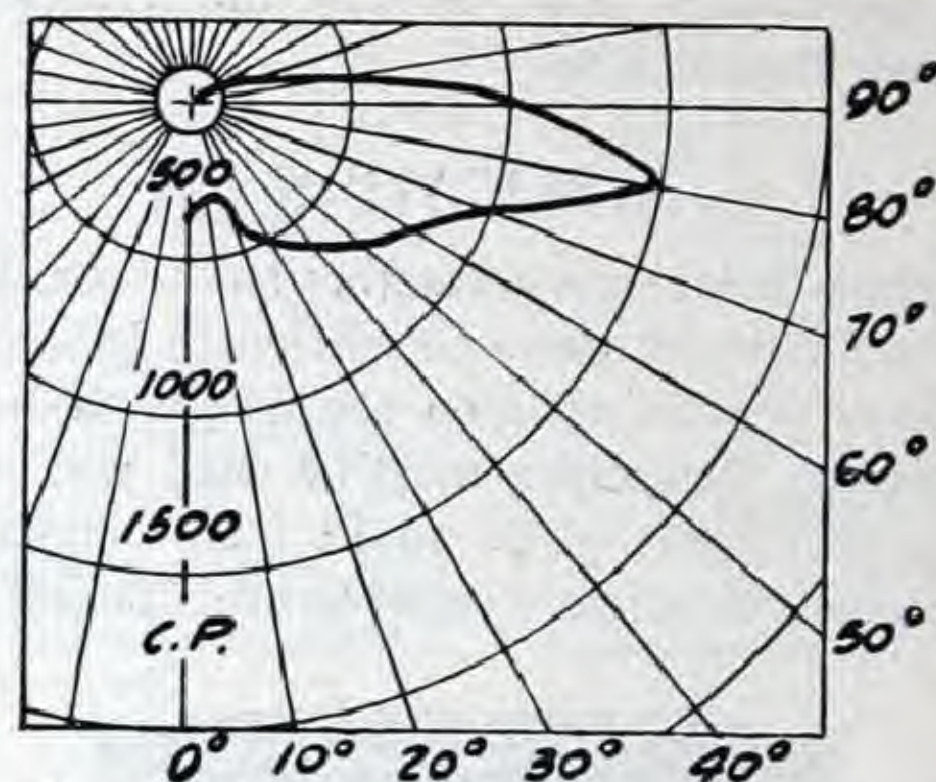
Holophane Refractors



Superlux Refractor

SUPERLUX

The Superlux Refractor prisms are designed to give uniform brightness over the entire surface of the refractor and to distribute light in the area immediately below the unit.



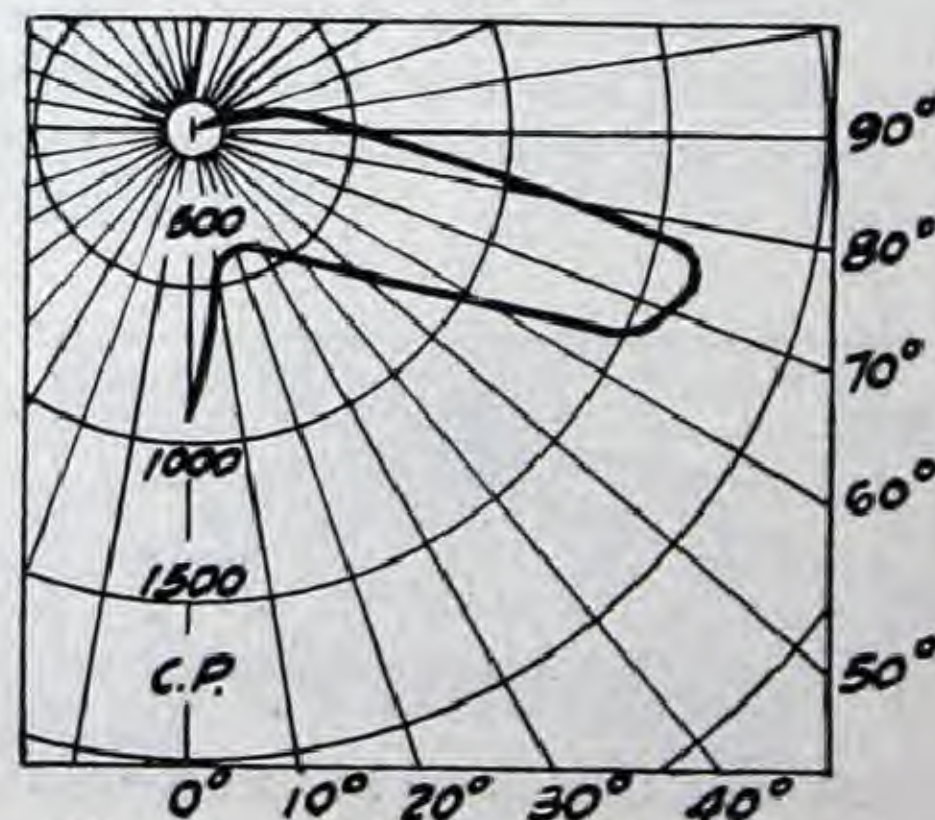
Distribution From Superlux Refractor



Bowl Refractor

BOWL

The Bowl Refractor was the first refractor designed for modern street lighting service and was developed for general service requirements. In this refractor the horizontal prisms extend over the entire surface of the inner envelope producing a wide distribution of illumination.



Distribution From Bowl Refractor

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

Holophane Refractors



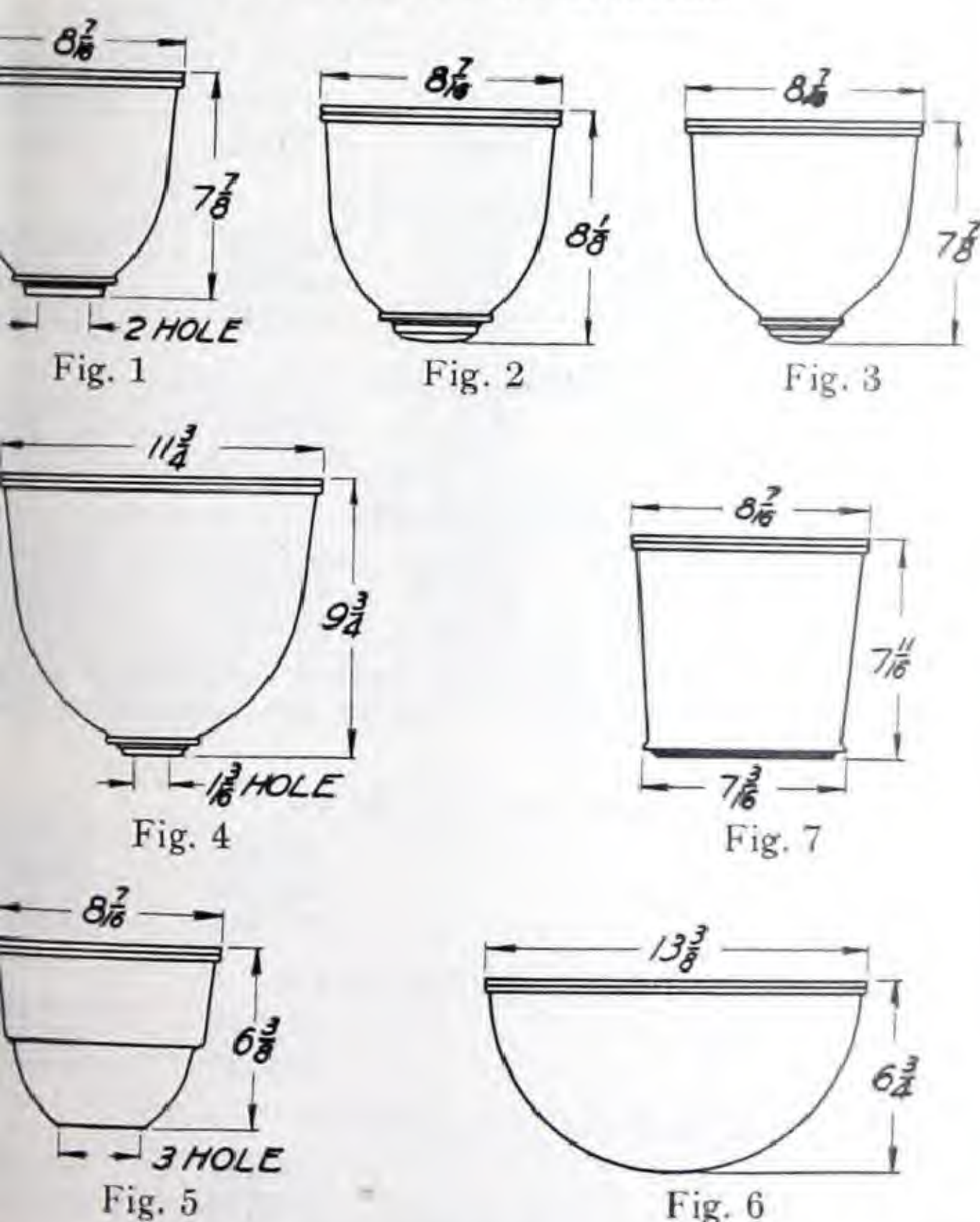
Hi-Lux Refractor

HI-LUX

The Westinghouse-Holophane Hi-lux Refractor is designed for use in the Westinghouse highway lighting unit. Its distribution is similar to the Holophane Highway Refractor but an increase in efficiency is obtained in combination with a hemispherical reflector. The complete unit distributes a uniform glareless illumination on the highway.

Description	Fig. No.	Wt., Lb. Ea. Ship.	Style No.
Hi-lux open bowl type.....	1	9	354160
Hi-lux closed bowl type (velvet finish) ..	2	9	354665
Hi-lux (large opening—3 7/8-inch hole) ..	3	10	354686
Hi-perlux open type.....	1	9	352939
Hi-perlux closed type.....	2	9	352940
Hi-way.....	3	9	353974
Hi-way.....	3	9	353975
Large bowl type.....	4	15	351761
Hi-lux refractor.....	6	40	343228

DIMENSIONS IN INCHES



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WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

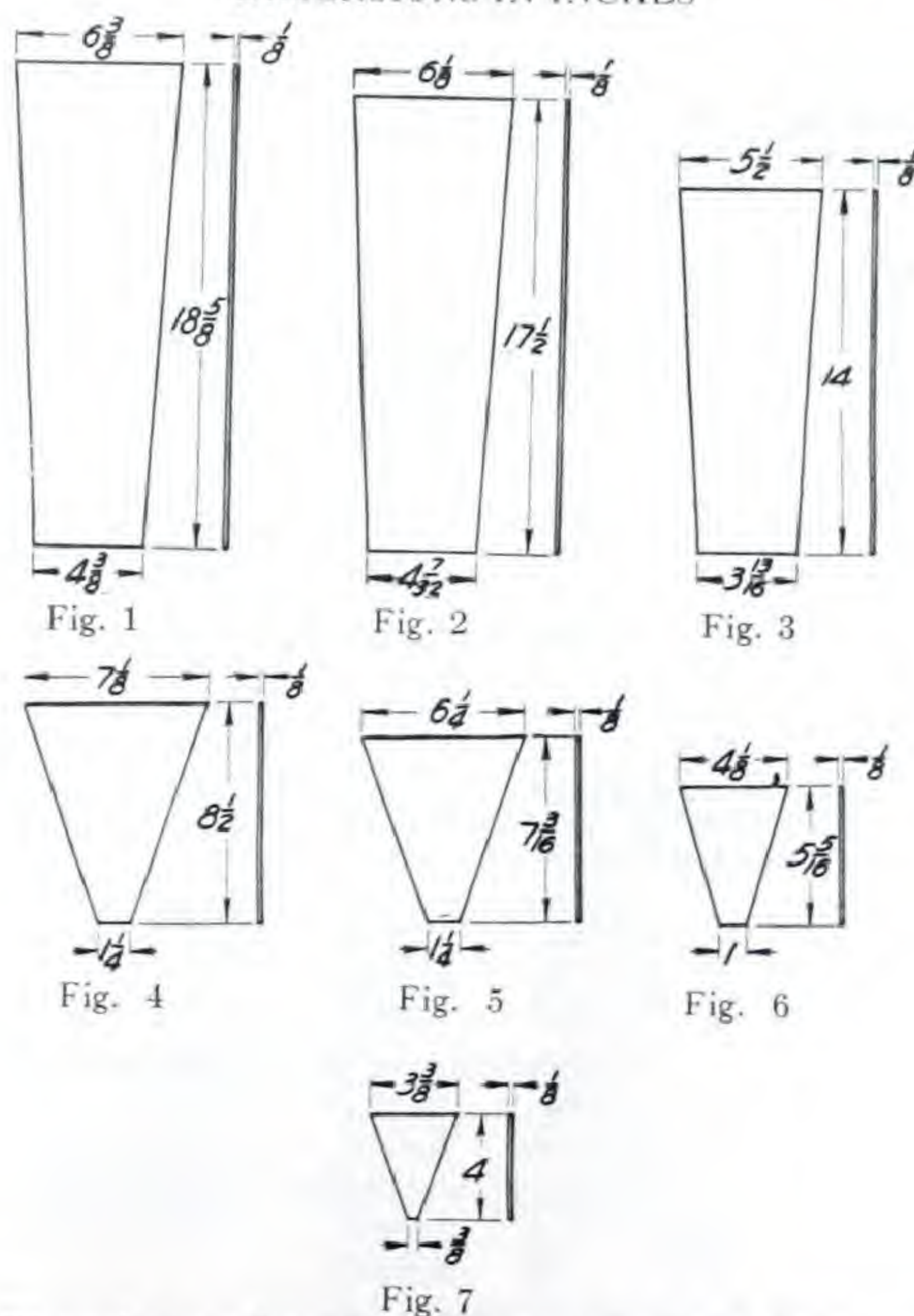
Glass Panels

The Octagonal Luminaires are equipped with Syenite glass panels as standard. Syenite glass is an efficient clear glass with a pebbled finish which diffuses the light. It is particularly well suited for use with refractors.

It may be desirable in some cases to use a glass with somewhat more color than the Syenite in which case Colonial opal glass is recommended but must be specified in ordering.

Description	Fig. No.	Wt., Lb. Each Ship.	Style No.
Syenite side panel for Octagonal Junior luminaires.....	3	1	353331
Syenite top panel for Octagonal Junior luminaires.....	5	1/2	351737
Colonial opal side panel for Octagonal Junior luminaires.....	3	1 1/2	351548
Colonial opal top panel for Octagonal Junior luminaires.....	5	1	351738
Syenite side panel for Octagonal Senior luminaires.....	1	1 1/2	351375
Syenite top panel for Octagonal Senior luminaires.....	4	1	351377
Colonial opal side panel for Octagonal Senior luminaires.....	1	1 1/2	353332
Colonial opal top panel for Octagonal Senior luminaires.....	4	1	353333
Lower Syenite glass panel for Octagonal Junior Lantern.....	7	1/2	351645
Lower Colonial opal glass panel for Octagonal Junior Lantern.....	7	1/2	351655
Lower Syenite glass panel for Octagonal Senior Lantern.....	6	1/2	351490
Lower Colonial opal glass panel for Octagonal Senior Lantern.....	6	1/2	353334

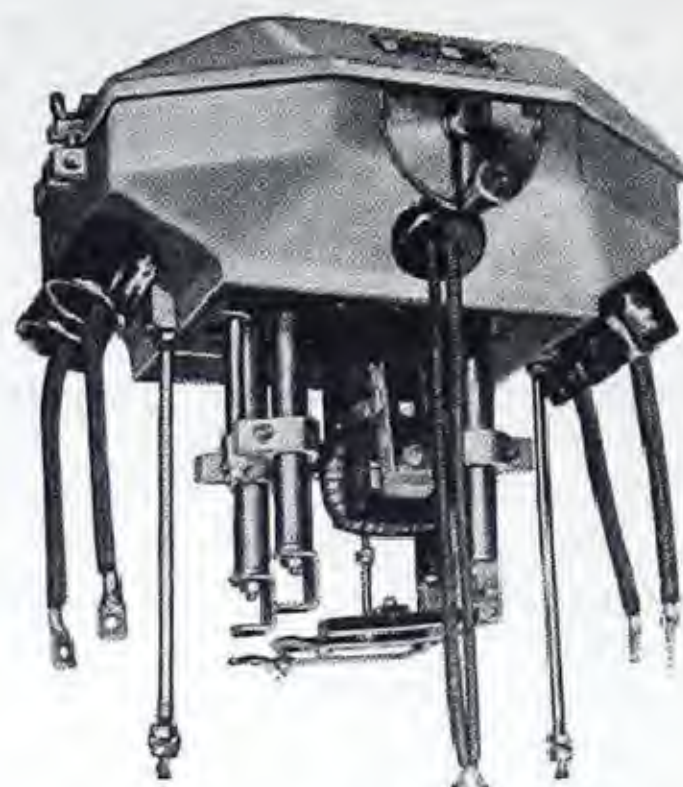
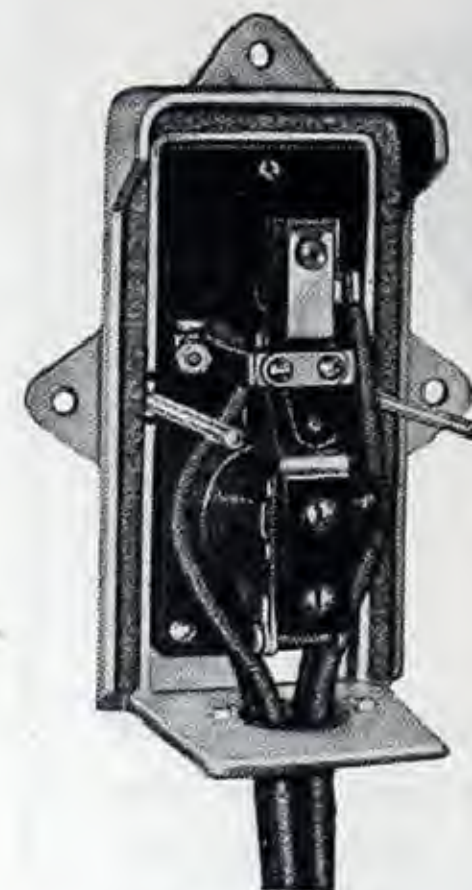
DIMENSIONS IN INCHES



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WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

R-C-O-C Remote Control Oil Switches and Relays

Fig. 1
Form AN SwitchFig. 2
Form RM SwitchFig. 3
Form MR RelayFig. 4—Form MR
Relay with Fuses and
Lightning ArresterFig. 5
Form SR Relay

R-C-O-C electrically operated remote control oil switches and relays provide an economical means of control for lighting circuits of either series or multiple types. The switches and relays are solenoid operated from pilot circuits controlled by time switches, manually operated switches, adjacent series circuits, or by combination of any of these methods. By the use of these switches and relays practically any desired scheme of control may be obtained, assuring economical and positive operation.

The switches and relays are carefully designed, manufactured of the best materials and workmanship and each

unit is carefully tested to meet the exacting requirements of exterior lighting control.

Switches and relays can be supplied with control solenoids for practically any desired voltage, current or frequency rating. The series operating coils of the switches listed below are designed for d-c. or a-c. at any frequency, while the multiple coils are for 60-cycle operation only. When special types are required, the voltage or current and frequency rating of the control coil should be clearly specified to insure correct interpretation.

SWITCHES

The All-night Remote Control oil switch is used principally to cascade a constant current transformer from a multiple or series street lighting circuit. This switch is of the normally open or circuit closing type. The switch contacts are always closed and load connected when operating coils are energized.

No. Poles	Gal. Oil	Approx. Wt., Lb., Ea. Ship.	R-C-O-C Form	STYLE No. Series Operating Coils				R-C-O-C Form	STYLE No. Shunt Operating Coils	
				4 Amp.	5.5 Amp.	6.6 Amp.	7.5 Amp.		110-125 Volts	220-250 Volts
10000-Volt Switch* to control constant current regulators up to and including 80 kw.										
One	3	180	AN-1	343283	343284	343285	343286	AN-1	343287	343288
Two	4	195	AN-2	343289	343290	343291	343292	AN-2	343293	343294
Three	4	200	AN-3	343295	343296	343297	343298	AN-3	343299	343300
4600-Volt Switch† to control constant current regulators up to and including 40 kw.										
One	3	180	AN-1	343301	343302	343303	343304	AN-1	343305	343306
Two	3	180	AN-2	343307	343308	343309	343310	AN-2	343311	343312
2500-Volt Switch‡ to control constant current regulators up to and including 25 kw.										
One	2½	57	RMS-1	343329	343330	343331	343332	RM-1	343323	343324
Two	2½	60	RMS-2	343333	343334	343335	343336	RM-2	343325	343326
Three	2½	70	RMS-3	343337	343338	343339	343340	RM-3	343327	343328

The All-night Remote Control switch is used extensively to control the primary of a constant current transformer or other load from a multiple pilot circuit. This switch is of the normally closed or circuit opening type. The switch contacts are always closed and the load connected when the operating coils are de-energized.

10000-Volt Switch* to control constant current regulators up to and including 80 kw.										
One	3	180	ANR-1	.....	.....	.....	.....	.....	343313	343314
Two	4	200	ANR-2	.....	.....	.....	.....	.....	343315	343316
Three	4	205	ANR-3	.....	.....	.....	.....	.....	343317	343318
4600-Volt Switch† to control constant current regulators up to and including 40 kw.										
One	5	185	ANR-1	.....	.....	.....	.....	.....	343319	343320
Two	5	185	ANR-2	.....	.....	.....	.....	.....	343321	343322
2500-Volt Switch‡ to control constant current regulators up to and including 25 kw.										
One	2½	57	RMR-1	.....	.....	.....	.....	.....	343341	343342
Two	2½	60	RMR-2	.....	.....	.....	.....	.....	343343	343344

*Add \$80.00 list for subway case.

†Add \$40.00 list for subway case.

‡At 2300 volts to control constant current regulators up to and including 80 kw.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

R-C-O-C Remote Control Oil Switches and Relays—Continued

SWITCHES—Continued

The Part-night Remote Control switch is used to operate a part-night street lighting load controlled from a multiple or series set lighting circuit. The two-pole switch is used to cut off an entire circuit while the single-pole switch is used to cut off a part of a series circuit. This switch is operated by interrupting the control circuit at midnight, automatically locking it open.

Poles	R-C-O-C- Form	Gal. Oil	Approx. Wt. Lb., Ea. Ship.	STYLE No. —————				STYLE No. —————	
				Series Operating Coils				Shunt Operating Coils	
				4 Amp.	5.5 Amp.	6.6 Amp.	7.5 Amp.	110-125 Volts	220-250 Volts
10000-Volt Switch* to control constant current regulators up to and including 80 kw.									
	MNS-1	4	200	343345	343346	343347	343348		
	MN-2	4	200	343349	343358	343359	343360	343361	343362
4600-Volt Switch†† to control constant current regulators up to and including 40 kw.									
	MNS-1	4	180	343363	343364	343365	343366		
	MN-2	3	180	343367	343368	343369	343370	343371	343372

The All-night automatic latching type remote control switch is used principally to operate a constant current transformer, distribution transformer or other load from a multiple pilot circuit where it is unnecessary to have the pilot circuit energized except the instant it is desired to operate the switch. The first impulse to switch will close contacts and connect load. Second impulse will release contacts and disconnect load.

10000-Volt Switch* to control constant current regulators up to and including 80 kw.									
	ANAL	4	200	.....	.....	.....	.....	343373	343374
4600-Volt Switch†‡ to control constant current regulators up to and including 40 kw.									
	ANAL	3	180	.....	.....	.....	.....	343375	343376

RELAYS

The Remote Control multiple relay is used principally to control a small multiple load. This relay can be furnished with contacts normally open and load disconnected when operating coil is de-energized or with contacts normally closed and load connected when operating coil is de-energized.

Description	Volts Operating Coils	No. Poles	Approx. Wt., Lb., Ea. Ship.	Open Type Style No.	Open Type R-C-O-C Form	Closed Type Style No.	Closed Type R-C-O-C Form
3500-Watt A.C. Relay							
Unfused.....	110-125	1	5	343385	MR-A	343397	MRR-A
Unfused.....	220-250	1	5	343386	MR-C	343398	MRR-C
Fused control.....	110-125	1	5	343387	MR-K	343399	MRR-K
Fused control.....	220-250	1	5	343388	MR-M	343400	MRR-M
Fused load.....	110-125	1	5	343389	MR-T	343401	MRR-T
Fused load.....	220-250	1	5	343390	MR-U	343402	MRR-U
Fused load and control.....	110-125	1	5½	343391	MR-X	343403	MRR-X
Fused load and control.....	220-250	1	5½	343392	MR-Y	343404	MRR-Y
Lightning arrester and fused control..	110-125	1	5	343393	MR-AB	343405	MRR-AB
Lightning arrester and fused control..	220-250	1	5	343394	MR-AC	343406	MRR-AC
Lightning arrester, fused control and fused load.....	110-125	1	6	343395	MR-AF	343407	MRR-AF
Lightning arrester, fused control and fused load.....	220-250	1	6	343396	MR-AG	343408	MRR-AG
5000-Watt A.C. Relay							
Unfused.....	110-125	1	8	343409	MR-CA	343444	MRR-CA
Unfused.....	220-250	1	8	343410	MR-CC	343445	MRR-CC
Unfused.....	110-125	2	8	343411	MR-CB	343446	MRR-CB
Unfused.....	220-250	2	8	343412	MR-CD	343447	MRR-CD
Fused control.....	110-125	1	8	343413	MR-CI	343448	MRR-CI
Fused control.....	220-250	1	8	343414	MR-CK	343449	MRR-CK
Fused control.....	110-125	2	8	343415	MR-CJ	343450	MRR-CJ
Fused control.....	220-250	2	8	343416	MR-CL	343451	MRR-CL

*Add \$80.00 list for subway case.

†Add \$40.00 list for subway case.

‡At 2300 volts to control constant current regulators up to and including 80 kw.

Prices on application.

WESTINGHOUSE ORNAMENTAL STREET LIGHTING EQUIPMENT

R-C-O-C Remote Control Oil Switches and Relays—Continued

RELAYS—Continued

Description	Volts Operating Coils	No. Poles	Approx. Wt. Lb., Each. Ship.	Open Type Style No. R-C-O-C Form	Closed Type Style No. R-C-O-C Form
5000-Watt A-C. Relays—Continued					
Fused load.....	110-125	1	8	343417 MR-CQ	343452 MRR-CQ
Fused load.....	220-250	1	8	343418 MR-CS	343453 MRR-CS
Fused load.....	110-125	2	8½	343419 MR-CR	343454 MRR-CR
Fused load.....	220-250	2	8½	343420 MR-CT	343455 MRR-CT
Fused load and control.....	110-125	1	8	343421 MR-CY	343456 MRR-CY
Fused load and control.....	220-250	1	8	343422 MR-DA	343457 MRR-DA
Fused load and control.....	110-125	2	8½	343423 MR-CZ	343458 MRR-CZ
Fused load and control.....	220-250	2	8½	343435 MR-DB	343459 MRR-DB
Lightning arrester and fused control.....	110-125	1	8	343436 MR-DG	343460 MRR-DG
Lightning arrester and fused control.....	220-250	1	8	343437 MR-DI	343461 MRR-DI
Lightning arrester and fused control.....	110-125	2	8	343438 MR-DH	343462 MRR-DH
Lightning arrester and fused control.....	220-250	2	8	343439 MR-DJ	343463 MRR-DJ
Lightning arrester, fused load and fused control.....	110-125	1	8½	343440 MR-DO	343464 MRR-DO
Lightning arrester, fused load and fused control.....	220-250	1	8½	343441 MR-DQ	343465 MRR-DQ
Lightning arrester, fused control and fused load.....	110-125	2	8½	343442 MR-DP	343466 MRR-DP
Lightning arrester, fused control and fused load.....	220-250	2	8½	343443 MR-DR	343467 MRR-DR
5000-Watt D-C. Relay					
Unfused.....	110-125	1	9	343468 MR-DW	343480 MRR-DW
Unfused.....	220-250	1	9	343469 MR-DY	343481 MRR-DY
Fused control.....	110-125	1	9	343470 MR-EI	343482 MRR-EI
Fused control.....	220-250	1	9	343471 MR-EK	343483 MRR-EK
Fused load.....	110-125	1	9	343472 MR-EU	343484 MRR-EU
Fused load.....	220-250	1	9	343473 MR-EW	343485 MRR-EW
Fused load and control.....	110-125	1	9	343474 MR-FG	343486 MRR-FG
Fused load and control.....	220-250	1	9	343475 MR-FI	343487 MRR-FI
Lightning arrester and fused control.....	110-125	1	9	343476 MR-FS	343488 MRR-FS
Lightning arrester and fused control.....	220-250	1	9	343477 MR-FU	343489 MRR-FU
Lightning arrester, fused control and fused load.....	110-125	1	9½	343478 MR-GE	343490 MRR-GE
Lightning arrester, fused control and fused load.....	220-250	1	9	343479 MR-GG	343491 MRR-GG

The series multiple relay is used principally to cascade a small multiple load from a series circuit. The relay can be furnished with contacts normally open with load disconnected when operating coil is de-energized or with contacts normally closed with load connected when operating coils are de-energized.

Description	Amperes Operating Coils	No. Poles	Approx. Wt. Lb., Each. Ship.	Open Type Style No. R-C-O-C Form	Closed Type Style No. R-C-O-C Form
5000-Watt Relay					
Unfused.....	4	1	11	343655 SR-1	343667 SRR-1
Unfused.....	4	2	12	343656 SR-2	343668 SRR-2
Unfused.....	5.5	1	11	343657 SR-1	343669 SRR-1
Unfused.....	5.5	2	12	343658 SR-2	343670 SRR-2
Unfused.....	6.6	1	11	343659 SR-1	343671 SRR-1
Unfused.....	6.6	2	12	343660 SR-2	343672 SRR-2
Unfused.....	7.5	1	11	343661 SR-1	343673 SRR-1
Unfused.....	7.5	2	12	343662 SR-2	343674 SRR-2
Unfused.....	15	1	11	343663 SR-1	343675 SRR-1
Unfused.....	15	2	12	343664 SR-2	343676 SRR-2
Unfused.....	20	1	11	343665 SR-1	343677 SRR-1
Unfused.....	20	2	12	343666 SR-2	343678 SRR-2

The protective primary cutout relay is used to automatically cut off the primary supply to a constant current transformer when an open circuit occurs on the secondary circuit of the transformer.

Control Circuit Coil	Protective Circuit Coil	App. Wt., Lb., Ea. Ship.	Style No.	R-C-O-C Form
6.6 amperes (series)	6.6 amperes	30	343679	PC
6.6 amperes (series)	7.5 amperes	30	343680	PC
7.5 amperes (series)	7.5 amperes	30	343681	PC
7.5 amperes (series)	6.6 amperes	30	343682	PC
110-125 volts (multiple)	6.6 amperes	30	343683	PC
110-125 volts (multiple)	7.5 amperes	30	343684	PC

Prices on application.

WELDLESS STEEL TUBULAR POLES

Electric Traction and Transmission
Lighting—Telegraph—Telephone
Masts for Wireless Aerials
Lamp Posts—Signal Posts—Flag Staffs

INTRODUCTION

Economy and correct design in line construction are of paramount importance, and these objects are best achieved by the adoption of British Mannesmann Weldless One-Piece Stepped Poles manufactured from High Tensile Steel 5/40 tons per square inch.

The tensile strength of this material being so much higher than that employed in the lapwelded process enables us to supply lighter poles—that is, with smaller diameters or of the same diameters with thinner shells—and still maintain the same degree of resistance with a factor of safety equal to that of heavier lapwelded poles. Such reduction in size and weight is a matter of considerable importance, especially when poles have to be shipped to a far destination and transport costs assume large proportions.

When transport difficulties arise which prevent the adoption of the one-piece pole, we are able to supply poles in two, three or more sections as required, with a loose taper or other type of joint suitable for assembling on site.

The design of the British Mannesmann One-Piece Stepped Pole, free from joints, or welds of any kind, is based on scientific principles. Being in one piece, there is no redundant material due to overlap at joints as is the case with the built-up pole; this fact tends to make the one-piece pole lighter without in any way sacrificing considerations of strength. The absence of joints also ensures the maximum degree of stability and gives a neat appearance to the pole. The attachment of Channel Iron Cross Arms and other fittings by means of back straps and clamps is a simple matter; operation is most easily carried out whilst the pole is in one position.

Weldless One-Piece Poles stepped down to the required dimensions have no ledges, pockets or traps where moisture can accumulate and set up corrosion, and all surfaces are regularly inspected, cleaned and painted.

The evil effects of corrosion on a jointed pole are clearly illustrated hereinafter. The action of moisture at and around the joints, aggravated by the inevitable vibration, has the effect of causing the upper sections to loosen and to cant from the perpendicular. Cases have come to our notice where a pole has failed completely at a joint and has seriously endangered human life.

When the integrity of the joint is impaired in this manner it is customary to resort to welding round the joint to prevent further corrosion and to form a ridge from which the paint will run off. This operation on the two joints of each pole involves a large expenditure of time and money which can be obviated by the installation of our weldless One-Piece Stepped Pole.

It has been clearly proved that the presence of decorative ornaments on poles facilitates the collection of moisture, thus increasing corrosion. The trend of modern practice is therefore to dispense with these embellishments whenever possible. The illustrations of poles in service appearing in this catalogue clearly indicate this tendency and serve to demonstrate that the British Mannesmann One-Piece Pole, with its neat and symmetrical appearance, inherent in its method of manufacture, which renders such adornments unnecessary. The poles supplied by us are treated on the inside throughout and over the ground portion outside with a good coat of special preservative solution applied hot, the remainder of the outside surface receiving a good coat of red oxide paint. If extra protection is required for the outside ground portion this surface can be wrapped with jute cloth heavily impregnated with our special preservative solution or a protective sleeve can be shrunk on.

British Mannesmann One-Piece High Tensile Weldless Poles have been successfully installed for upwards of a quarter of a century, and their widespread use, not only in Great Britain but in all quarters of the globe, provides convincing testimony to the efficiency and popularity of this method of construction.

WELDLESS STEEL TUBULAR POLES

Electric Traction and Transmission
Lighting—Telegraph—Telephone
Masts for Wireless Aerials
Lamp Posts—Signal Posts—Flag Staffs

CUSTOMER ENQUIRIES

When sending enquiries customers are requested to supply the information indicated below.

LIGHTING POLES

Particulars of Pole

1. Number of poles.
2. Type.
3. Weight of lamp in lbs.
4. Outreach to center of lamp.
5. Point of suspension from end of pole to lamp center.
6. Height of lamp center above ground.
7. Distance of post in ground.

Particulars of Fittings

8. Base flange or buckled plate.
9. Base and type.
10. Door in base.
11. Size and position of slot hole.
12. Size and position of drilled holes.
13. Ladder rest. Position to be given.
14. Cast iron collars.
15. Scroll work desired. (Send sketch or denote type).

ELECTRIC TRAMWAY POLES

1. Base flange or buckled plate.
2. Cast iron or pole base.
3. Cast iron collar.
4. Bracket arm.
5. Cast iron finials.
6. Height above ground.
7. Height below ground.

SPAN WIRE SUSPENSION POLES

1. Height of pole above ground.
2. Distance of pole in ground.
3. Distance between poles.
4. Height above ground at which suspension is fixed.
5. Weight of lamp or fixture.
6. Weight per foot run of suspension wires in lbs.
7. Minimum sag of wires in feet.

Alternatively to the last three questions give the tension in the span wire.

POWER TRANSMISSION POLES

Write for questionnaire of particulars required and conditions to be met with.

WELDLESS STEEL TUBULAR POLES

Electric Traction and Transmission, Lighting, Telegraph, Telephone, Masts for Wireless Aerials, Lamp Posts, Signal Posts, Flag Staffs



Joint on a Built-up Pole showing corrosion which takes place under service conditions.



Step on British Mannesmann One-Piece Weldless Steel Pole.



Joint on Built-up Pole showing Welding carried out on site.



Operator Welding round a Joint on a Built-up Pole.

The above illustrations clearly demonstrate the superiority of the British Mannesmann method of reducing by stepping, compared with the result obtained by shrinking together tubes of different diameters.



Close up view, cast iron pillar damaged by passing car.



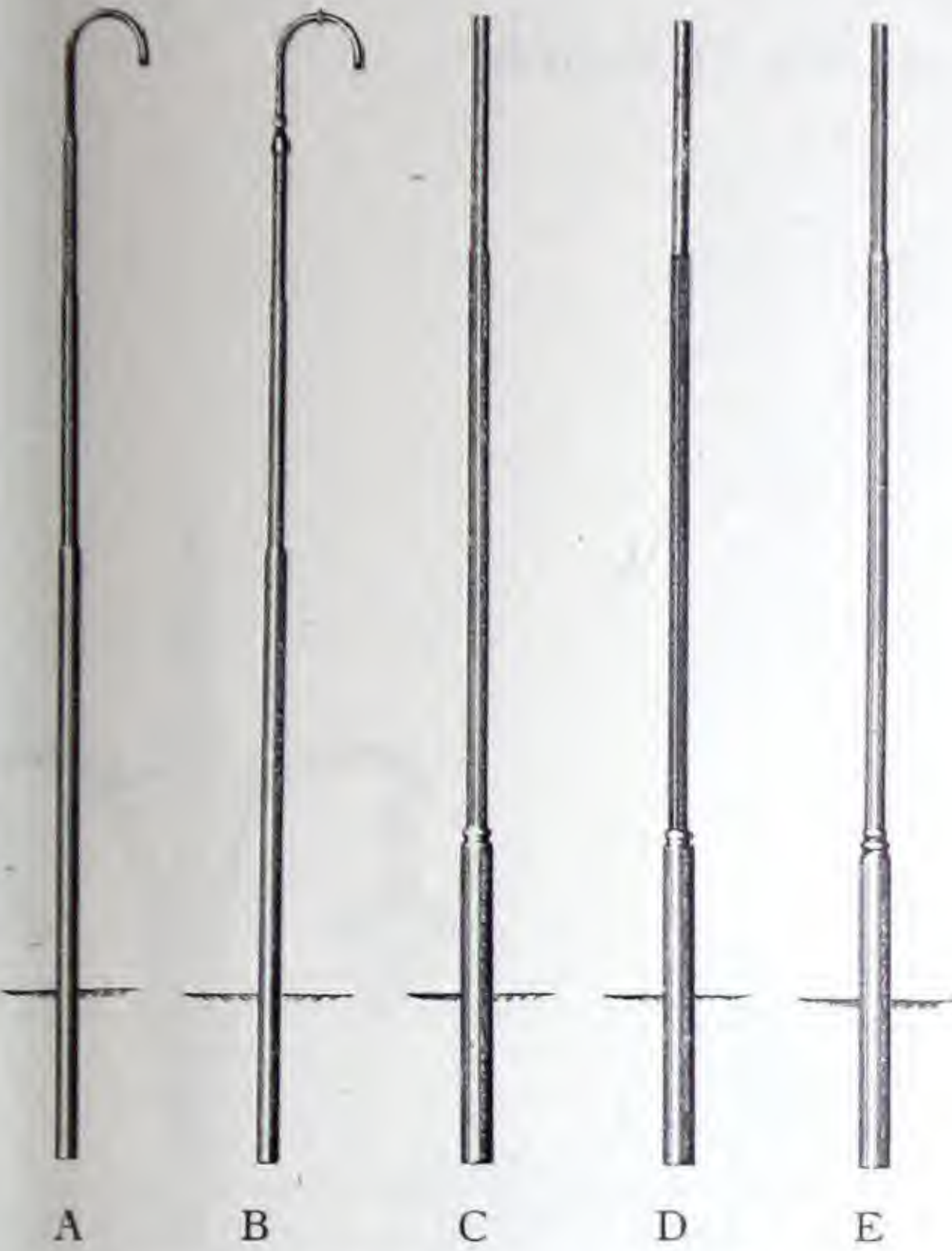
Showing how Weldless Steel Pole was hit but did not collapse.



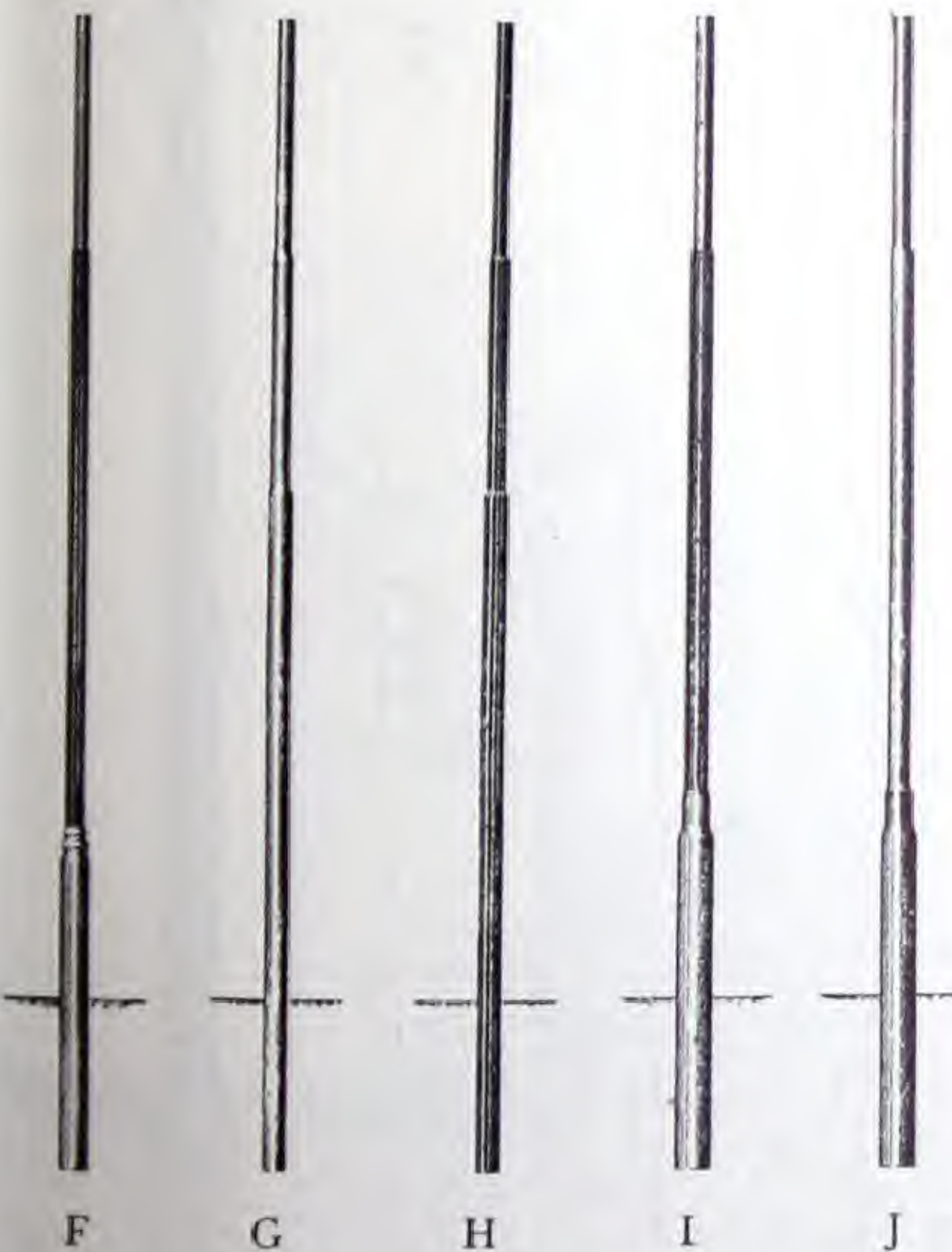
Showing cast iron pillar damaged by passing car.

WELDED STEEL TUBULAR POLES Lamp Standards

Fittings and ornaments can be supplied to customers' requirements.



- A. Three-stepped pole with swan neck, all in one piece.
- B. Three-stepped pole with separate swan neck.
- C. One-piece pole with moulded base.
- D. One-piece fluted pole with moulded base.
- E. One-piece pole with double moulded base.

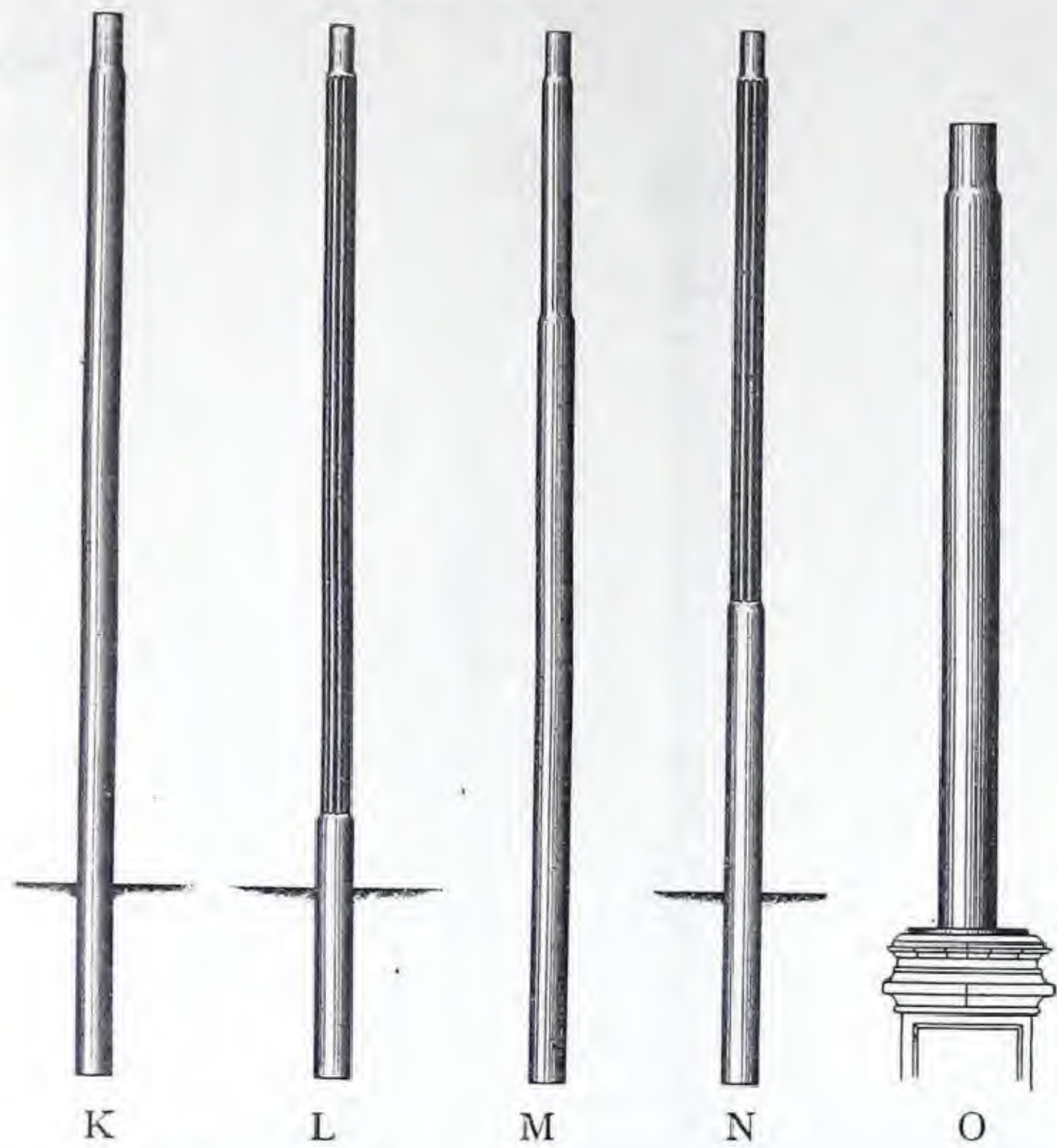


- F. One-piece fluted pole with double moulded base.
- G. One-piece three stepped plain pole.
- H. One-piece all fluted three-stepped pole.
- I. Fluted pole with shrunk on steel base.
- J. Plain-stepped pole with shrunk on steel base.

Prices on application.

WELDED STEEL TUBULAR POLES LAMP STANDARDS

Fittings and ornaments can be supplied to customers' requirements.



- K. Plain Column.
- L. Fluted Column.
- M. Two Step Plain Column.
- N. Two Step Fluted Column.
- O. Parapet Column, Plain.

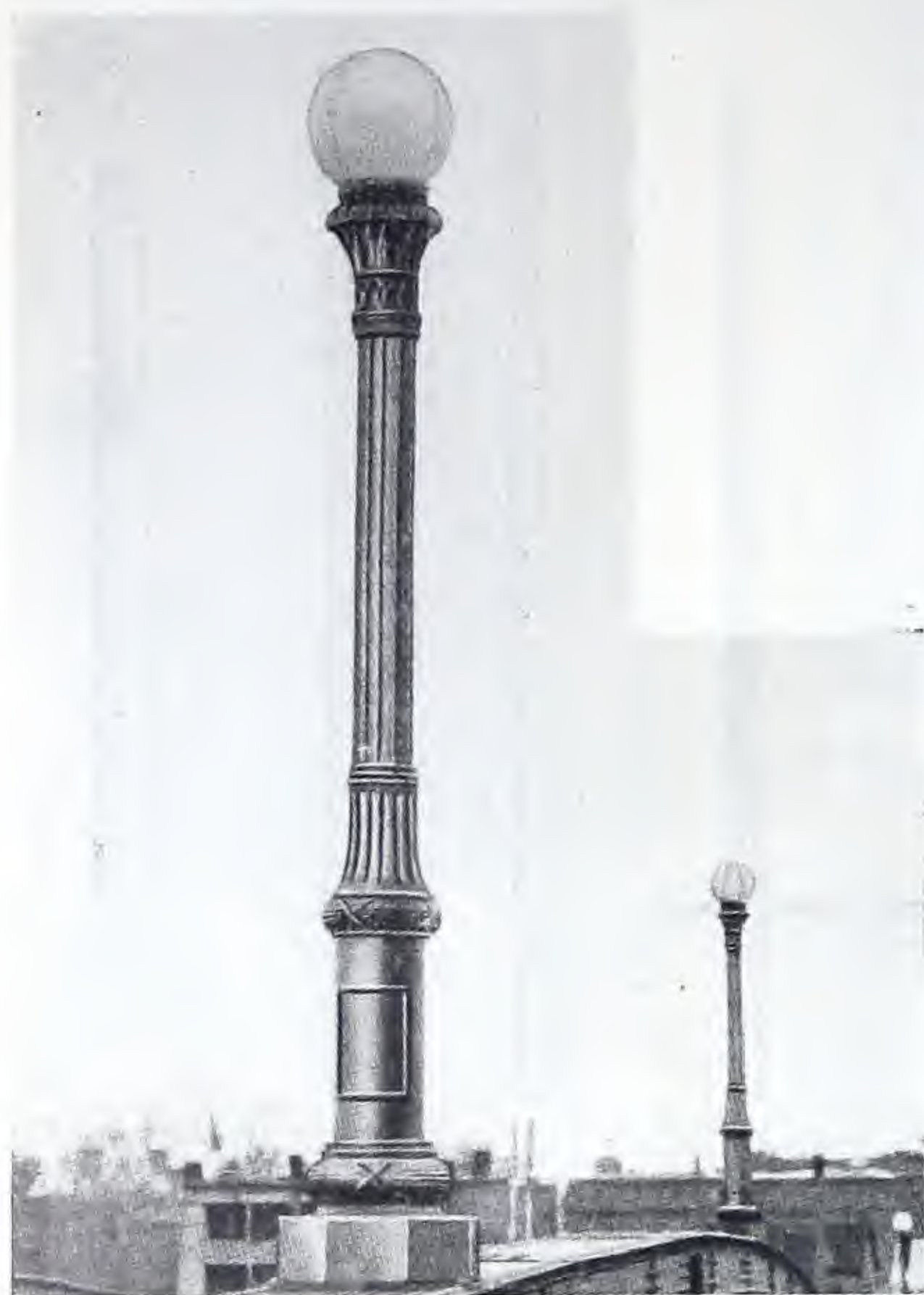


- P. Parapet Column, Fluted.
- Q. Plain Column, Single Moulded Base.
- R. Fluted Column, Single Moulded Base.
- S. Plain Column, Double Moulded Base.
- T. Fluted Column, Double Moulded Base.

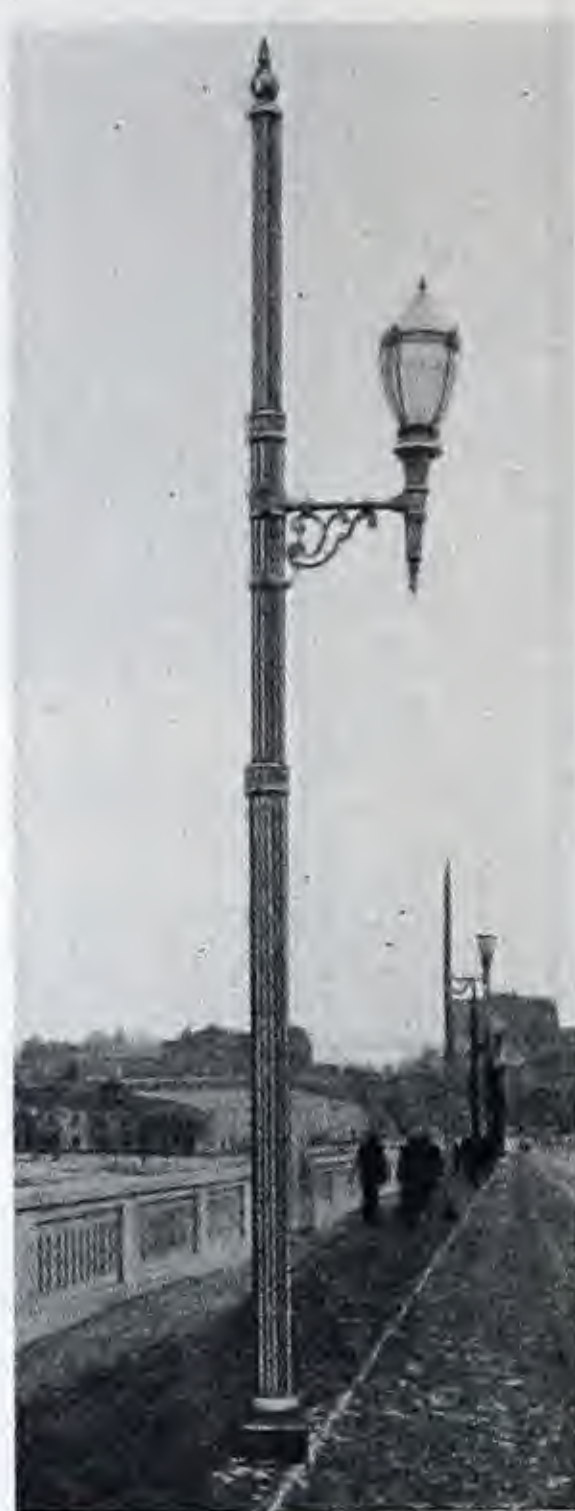
Prices on application.

WELDLESS STEEL TUBULAR POLES

Decorative Lighting Standards



British Mannesmann Steel Poles erected on the parapet of the Sorel Bridge, Quebec. Fittings and Lighting units by The Northern Electric Company of Canada



Saskatoon Bridge



Etienne Cartier Memorial, Montreal

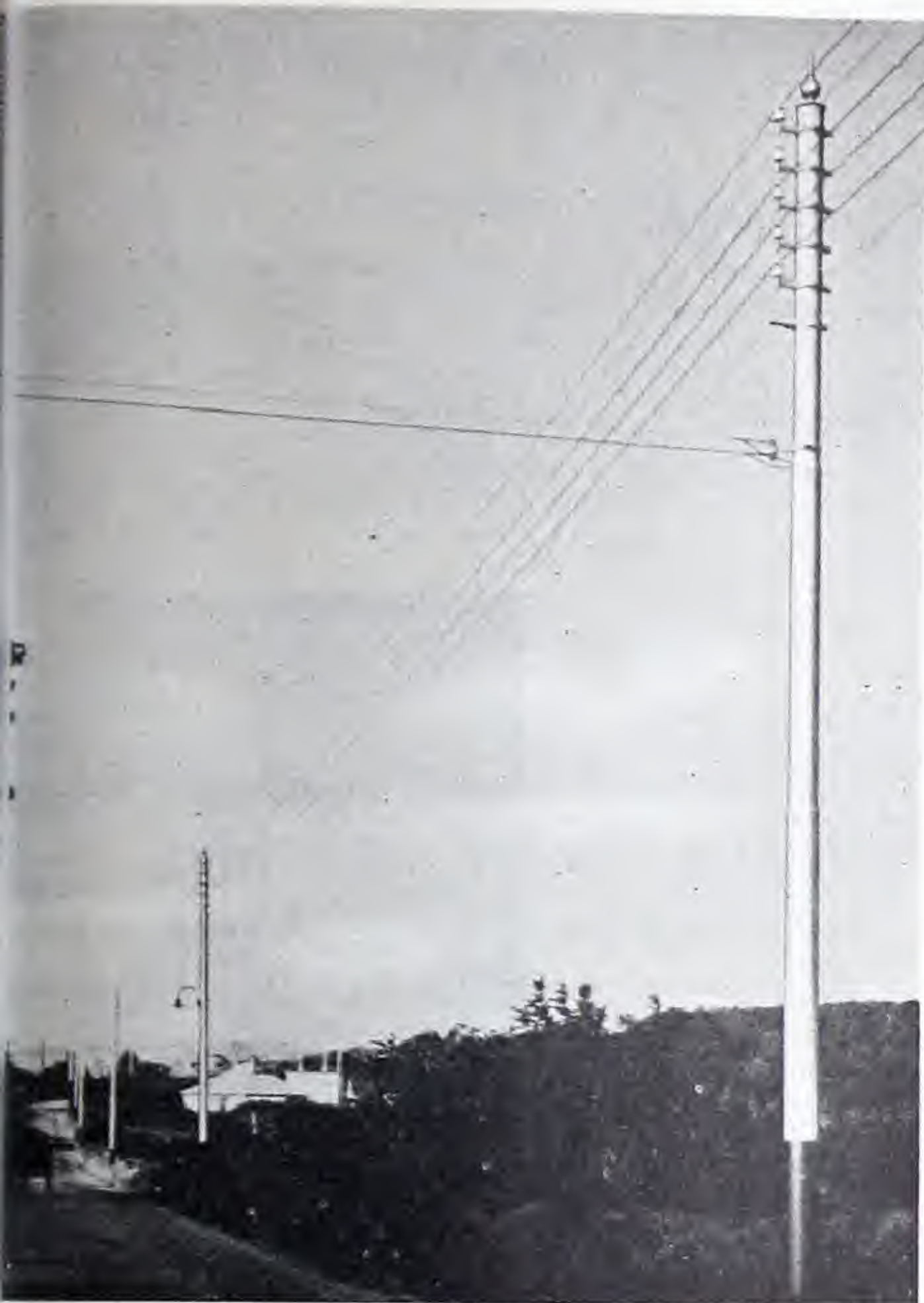


British Mannesmann Steel Poles in Montreal.

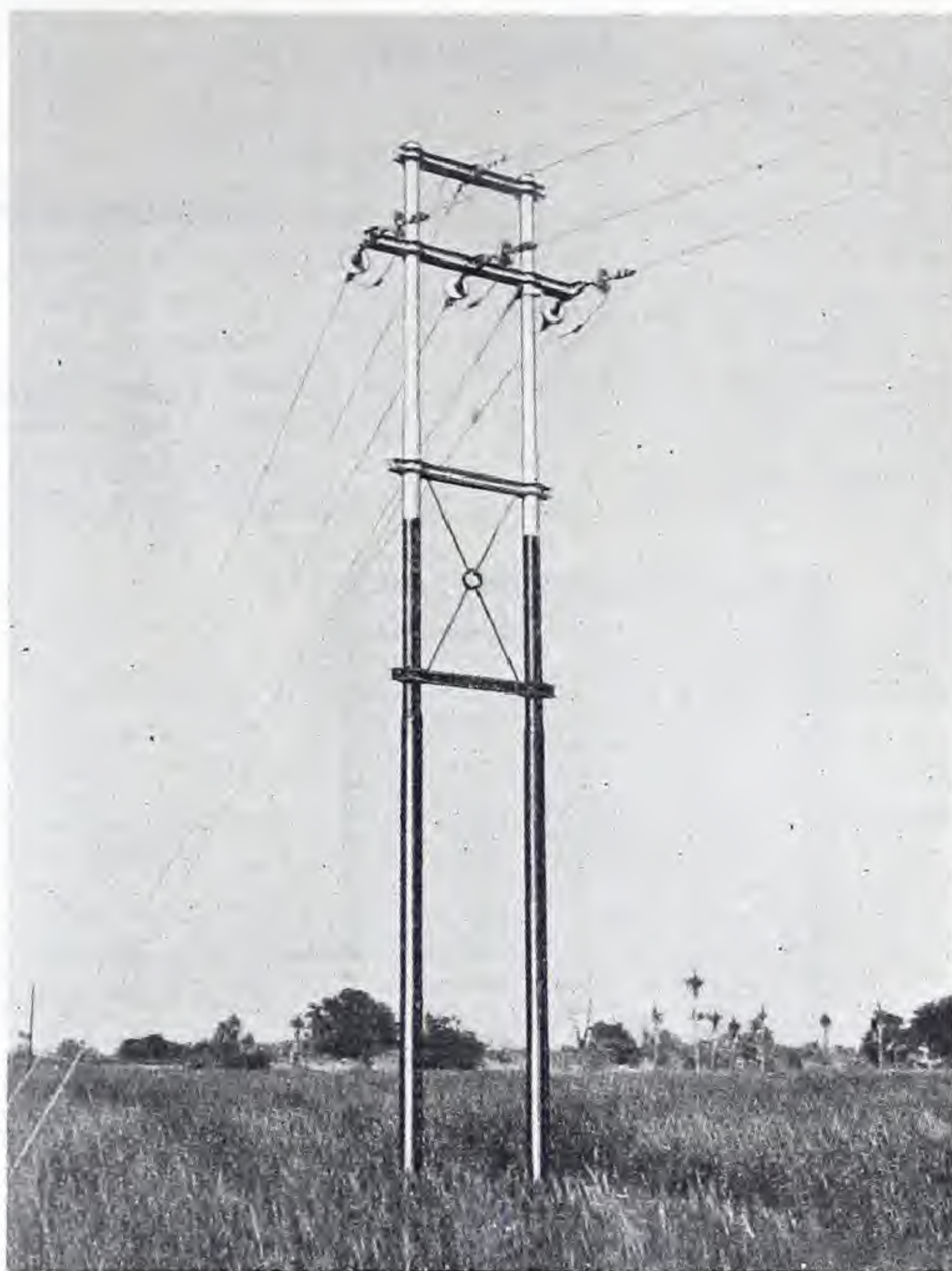


Park Avenue Montreal

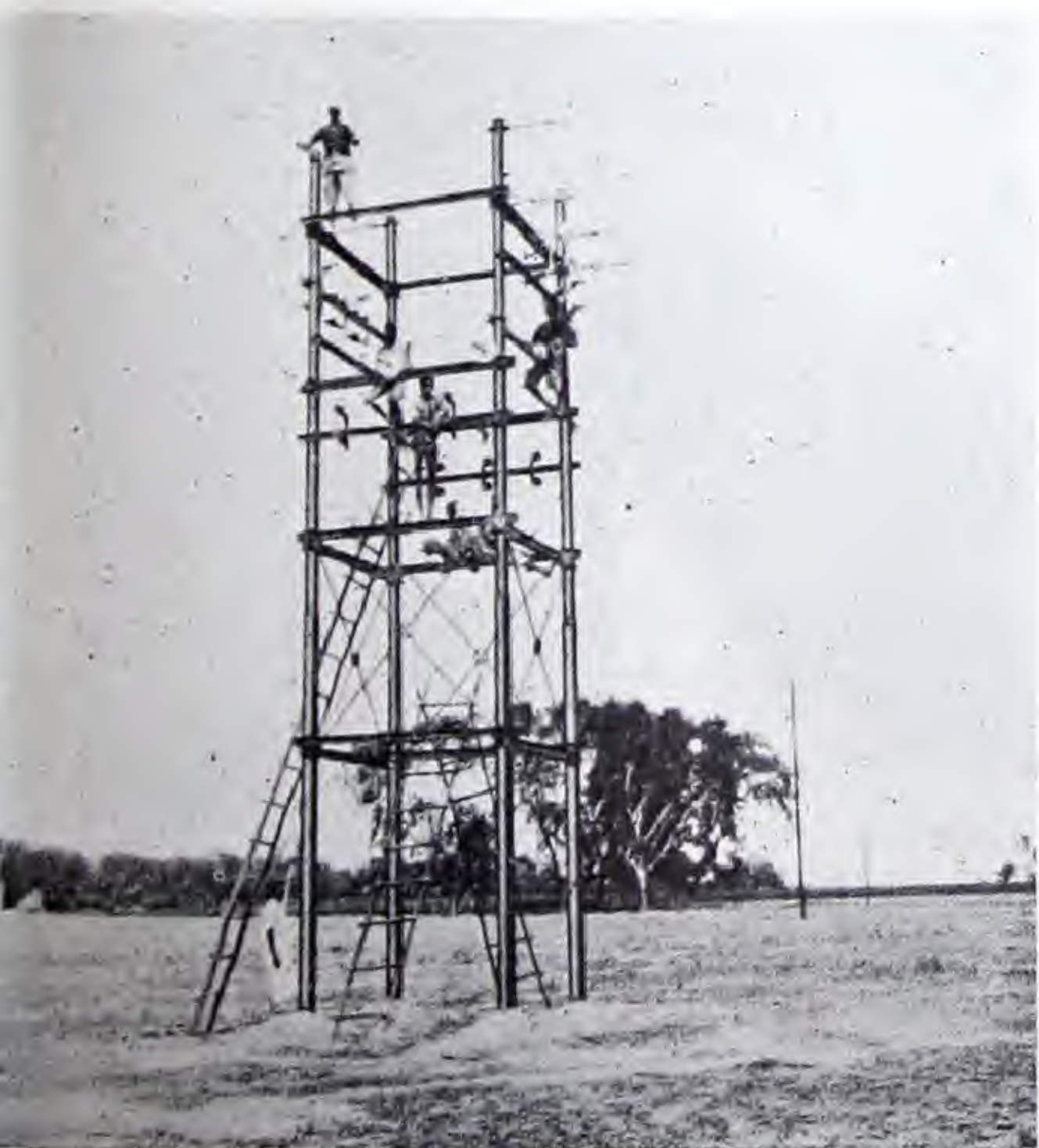
WELDLESS STEEL TUBULAR POLES
For Transmission Lines



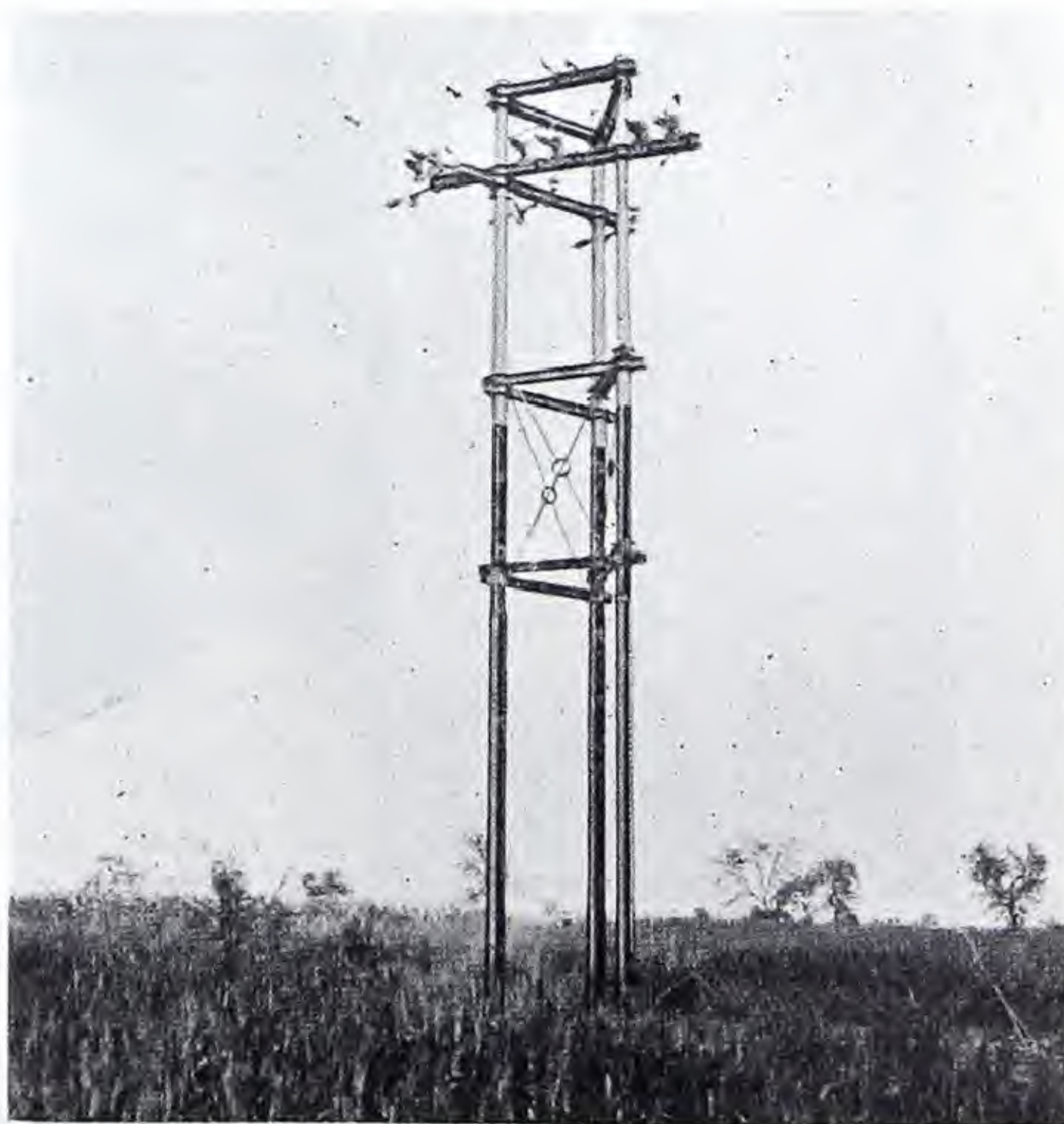
British Mannesmann Transmission Poles.
Plympton Electrical Distribution Co.



The above illustration shows a Double Member "H" Structure composed of two British Mannesmann Single Poles braced together, placed at an Angle Point in the Transmission Line. Ganges Canal Hydro-Electric Grid Scheme.



The above photograph shows a Transmission Tower composed of Four British Mannesmann Single Poles braced together, placed at a take-off Point in the Transmission Line. Ganges Canal Hydro-Electric Grid Scheme.



The above photograph shows a Triple Member Triangular Structure composed of three British Mannesmann Single Poles braced together, placed at an Angle Point in the Transmission Line. Ganges Canal Hydro-Electric Grid Scheme.

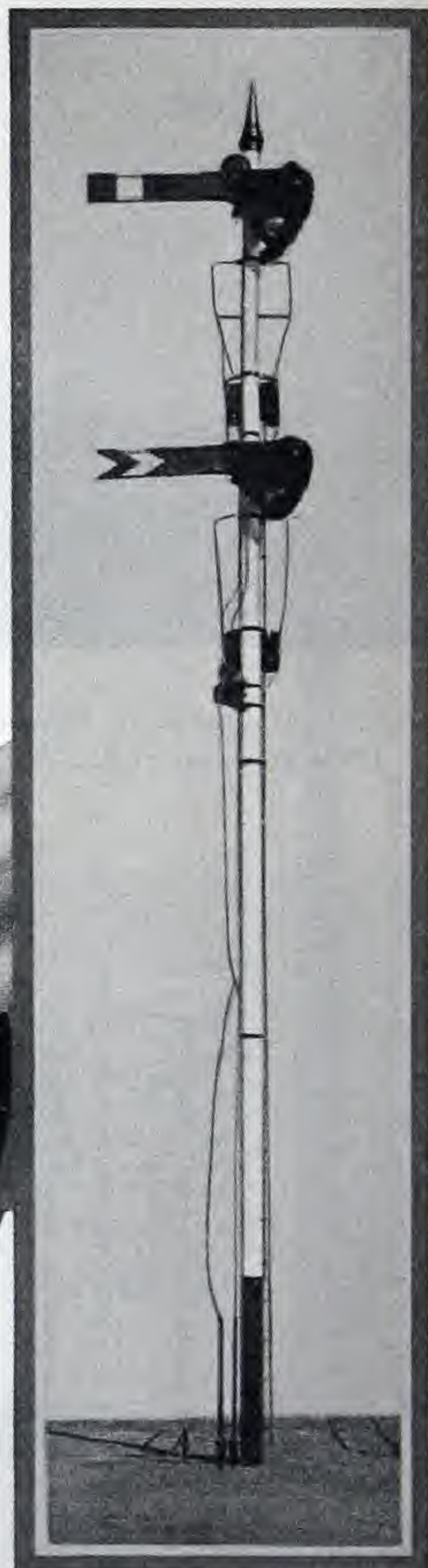
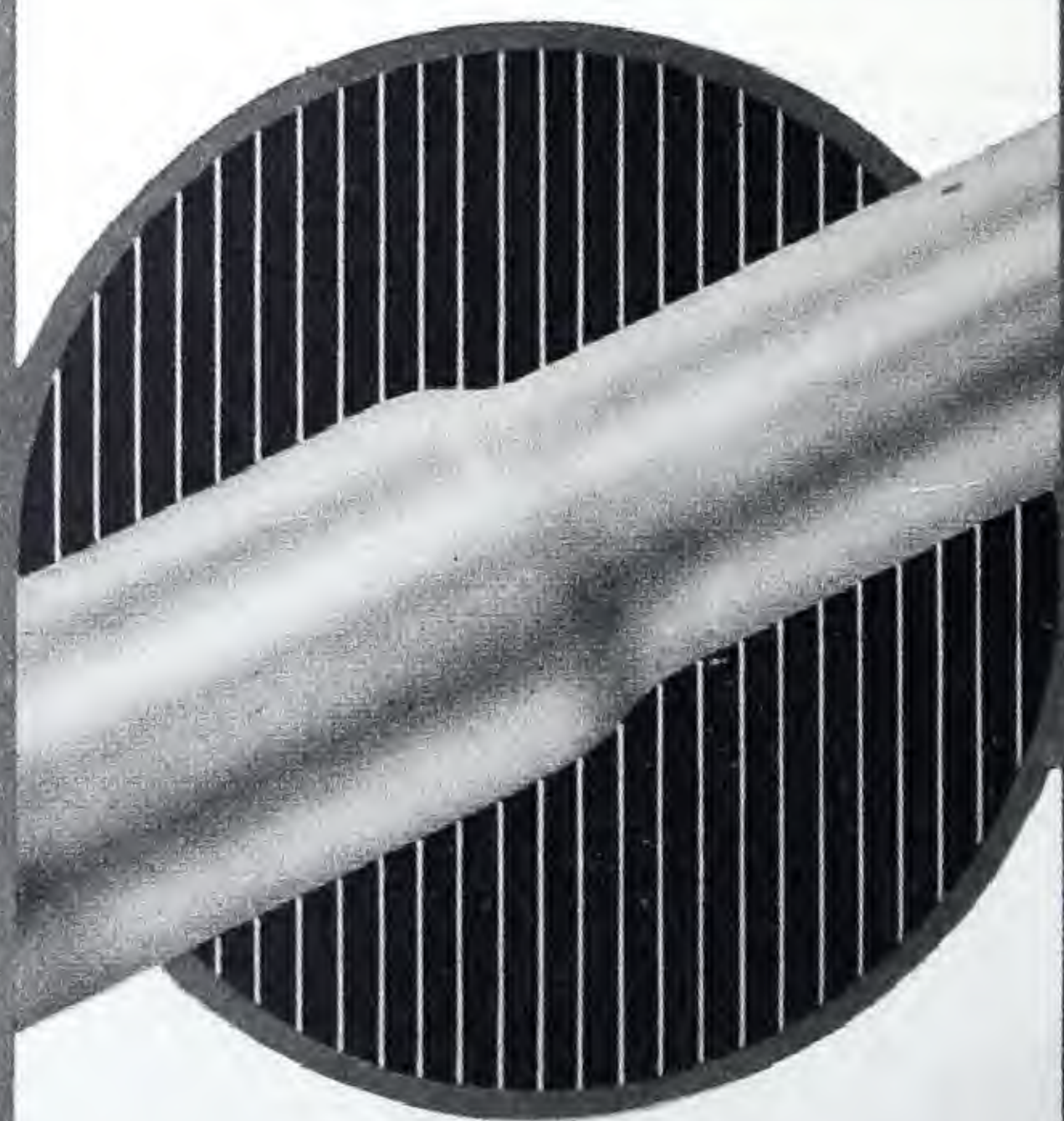
WELDLESS STEEL TUBULAR POLES

Signal Poles

●

For Easy Handling, Erection,
and
Low Maintenance Cost

●



For a number of years Signal Poles of tubular steel construction have been standardised by certain railways in America and in other countries they are gradually superseding the wood and lattice steel poles.

These clearly illustrate their neat appearance, accessibility for purposes of painting, and the ease with which the necessary fittings may be secured.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Applications

TWENTY-FOUR INCH FLOODLIGHTS

Floodlighting to increase speed and safety in railroad yards, bring out the architectural beauty of buildings, to maintain steady output during the night in open surface mines, to give bright light on the small airport, or to draw interest and new customers to evening sports—such uses come within the application of the Westinghouse floodlights Type CSAG-24 and CSA-24. Their large lumen output qualifies them to be used in a station where a great amount of light is needed from a minimum of units.

TWENTY INCH FLOODLIGHTS

Unusual beam concentration at long ranges give these floodlights a diversity of uses. In railroad yards, industrial yards, strip mines, baseball parks, football fields, or to floodlight buildings, monuments, docks and construction work these units find service. Where long throw and large light volume are necessary CAG-20 and CA-20 floodlights are applicable.

SIXTEEN INCH FLOODLIGHTS

These sixteen inch floodlights have an unlimited number of uses. To light buildings, towers, stacks, monuments, playgrounds, athletic fields, railroad and industrial yards, construction work, open surface mines, oil fields, and countless other applications either in white or colored light, these 16 inch units find service. They are as versatile as they are dependable.

FOURTEEN INCH FLOODLIGHTS

Sturdy construction and convenient size make these floodlights suitable to many applications. Buildings, monuments, memorials, signs, service stations, barbecues, industrial yards, construction work, tennis courts, bathing beaches, public squares—these are some of the uses of Types CAG-14 and A-14. In addition, these units have a number of special uses such as display and exhibit lighting, emergency equipment installed on cars to be driven from place to place, attachment to cranes and shovels for night work, etc. Westinghouse manufactures a 130-pound gas electric unit which furnishes sufficient power to operate two or three 14-inch floodlights. In emergencies this set can be placed in a car or truck, on which floodlights are temporarily mounted, and driven to the scene of action.

TWELVE INCH FLOODLIGHTS

Where light weight and small size are necessary advantages, these generally useful floodlights find service. They light signs, parking areas, real estate lots and houses for sale, service stations, roadside restaurants, tourist camps, playgrounds, athletic fields, fountains, gardens, flags, statues, oil derricks, loading platforms, scales and numerous other useful and well-known floodlighting applications.

TEN INCH FLOODLIGHTS

Severe service conditions and limited space are no handicap to these small, sturdy floodlights. Beside their regular service in lighting signs, statues, parking areas, exhibits, entrances, viaducts, small excavations, and round houses, they find many special uses where larger units are impossible or impractical.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Applications

UNIVERSAL FLOODLIGHT

For economical and effective illumination of both commercial and industrial building interiors, such as show windows, speakers' platforms, spotlighting, fine assembly work, inspection work, or wherever a small floodlight is needed these type I-12 floodlights find application. The same effective illumination is obtainable outdoors, in rose or flower gardens, on small signs, barbecue stands, gasoline filling stations, garages and the like.

OPEN TYPE

The Type AF-20 floodlight was specially designed to fulfill the requirements for an open type unit suitable for the illumination of football fields, baseball fields, golf courses, tennis courts, service stations, parking areas, barbecue stands, etc.

The AF-16 floodlight was designed primarily for the illumination of smaller tennis courts, service stations, parking areas, barbecue stands, golf courses, etc.

SIXTEEN INCH SEARCHLIGHT

This searchlight is for floodlighting domes of buildings, smoke stacks, and any other applications where high candlepower and accurate beam control are required.

Sometimes it is necessary to mount floodlights a long distance away from the subject to be lighted. In these applications the sixteen inch searchlight serves best. It can be mounted wherever convenient, and its long range beam of light will reach the object. This is an important advantage in applications where no place to mount the lighting equipment is available and the equipment must be hidden from view.

DIOLUX UNITS

The Westinghouse Diolux Floodlighting Unit has been designed to meet the requirements of floodlighting large areas such as parking spaces, bathing beaches, industrial yards, storage yards, building excavations, etc.

DUOLUX UNITS

The Duolux floodlight offers the ideal means of floodlighting banks, hotels, pavilions, theatres, monuments, swimming pools, office and public buildings, suburban store fronts, and filling stations which are difficult to floodlight, when there is no place to conceal floodlighting units.

The Duolux floodlight units are mounted on top of attractive street lighting standards. They consist of an ornamental luminaire inside which is a 500 to 1500-watt lamp and reflector that throws its light on the building, while a 100 to 500-watt lamp below the reflector reduces the shadow cast by the reflector and lights the street and sidewalk. This makes it possible to floodlight low buildings or wall areas near the street level at the same time providing street lighting.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Applications

DESCRIPTION

Billboards	
Buildings:	
Banks	Office Buildings
Churches	Power Stations
Dairies	Public Buildings
Factories	Schools
Hotels	Stores
Mortuaries	Theatres
Circuses	
Construction Work	
Docks	
Expositions	
Fairs	
Fountains	
Fire Equipment	
Gasoline Filling Stations	
Light-Houses	
Mines	
Monuments:	
Historic Places	Memorials
Landscapes	Statues
Natures Scenic Monuments	
Real Estate Developments	
Roadside Stands	
Signs	
Smokestacks	
Sports:	
Bathing Beaches	Croquet
Badminton	Rose Racks
Baseball Parks	Box Lacrosse
Bowling-on-the-Green	Skating Rinks
Football Stadiums	Soccer Fields
Golf Course (Major)	Swimming Pools
Golf Course (Miniature)	Tennis Courts
Golf Driving Range	Toboggan Slides
Hockey Rinks	Trap Shooting
Playgrounds	Winter Carnivals
Tourists' Camps	
Water Tanks	
Yards:	
Industrial	Railroad
Parking Spaces	Residences
Prison	



Huron and Erie Bank—the Contrast of White Light Against Velvet Blackness

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Twenty-four Inch Floodlights



Type CSA-24 with Chromium Plated Reflector

Approximate weight, Type CSA-24. Net, 110 pounds shipping, 200 pounds.

Type CSA-24 with Chromium Plated Reflectors

Style No.	Lens	Reflector
349126	Plain.....	Narrow Beam
349128	Plain.....	Wide Beam
349127	Narrow Horizontal Rectilinear Spread.....	Narrow Beam
349136	Narrow Horizontal Rectilinear Spread.....	Wide Beam
349135	Medium Horizontal Rectilinear Spread.....	Narrow Beam
349137	Medium Horizontal Rectilinear Spread.....	Wide Beam
349893	Wide Horizontal Rectilinear Spread.....	Narrow Beam
349894	Wide Horizontal Rectilinear Spread.....	Wide Beam
342897	Heavily Stippled.....	Narrow Beam
342898	Heavily Stippled.....	Wide Beam
349138	Plain.....	Narrow Beam

Style No.	Beam* Lumens	Beam Spread, Degrees* Horizontal	Beam Spread, Degrees* Vertical	Lamps† Watts	Bulb
349126	12100	19	16	2000	PS-
349128	12200	25	22	2000	PS-
349127	12400	35	16	2000	PS-
349136	12500	42	22	2000	PS-
349135	12600	55	16	2000	PS-
349137	12700	65	22	2000	PS-
349893	12800	110	16	2000	PS-
349894	12900	115	22	2000	PS-
342897	12600	42	39	2000	PS-
342898	12700	48	45	2000	PS-
349138	7200	8	8	1500	G-

Description	Wt., Lb. Net	Wt., Lb. Ship.	Style No.
Visor.....	7	11	3491
Socket Stilt for G-Bulb Lamp.....	1	1½	3498
Railroad Base with Rotation Stop....	14	20	3481
Plain Lens and Felt Gasket.....	15	25	3480
Narrow Rectilinear Spread Lens and Felt Gasket.....	15	25	3482
Medium Rectilinear Spread Lens and Felt Gasket.....	15	25	3482
Heavily Stippled Lens and Felt Gasket.....	15	25	3480
Connector for Flexible Cable.....	1½	2	3491
Wide Rectilinear Spread Lens and Felt Gasket.....	15	25	3482
Narrow Beam Chromium Reflector....	8	15	3491
Wide Beam Chromium Reflector.....	8	15	3491

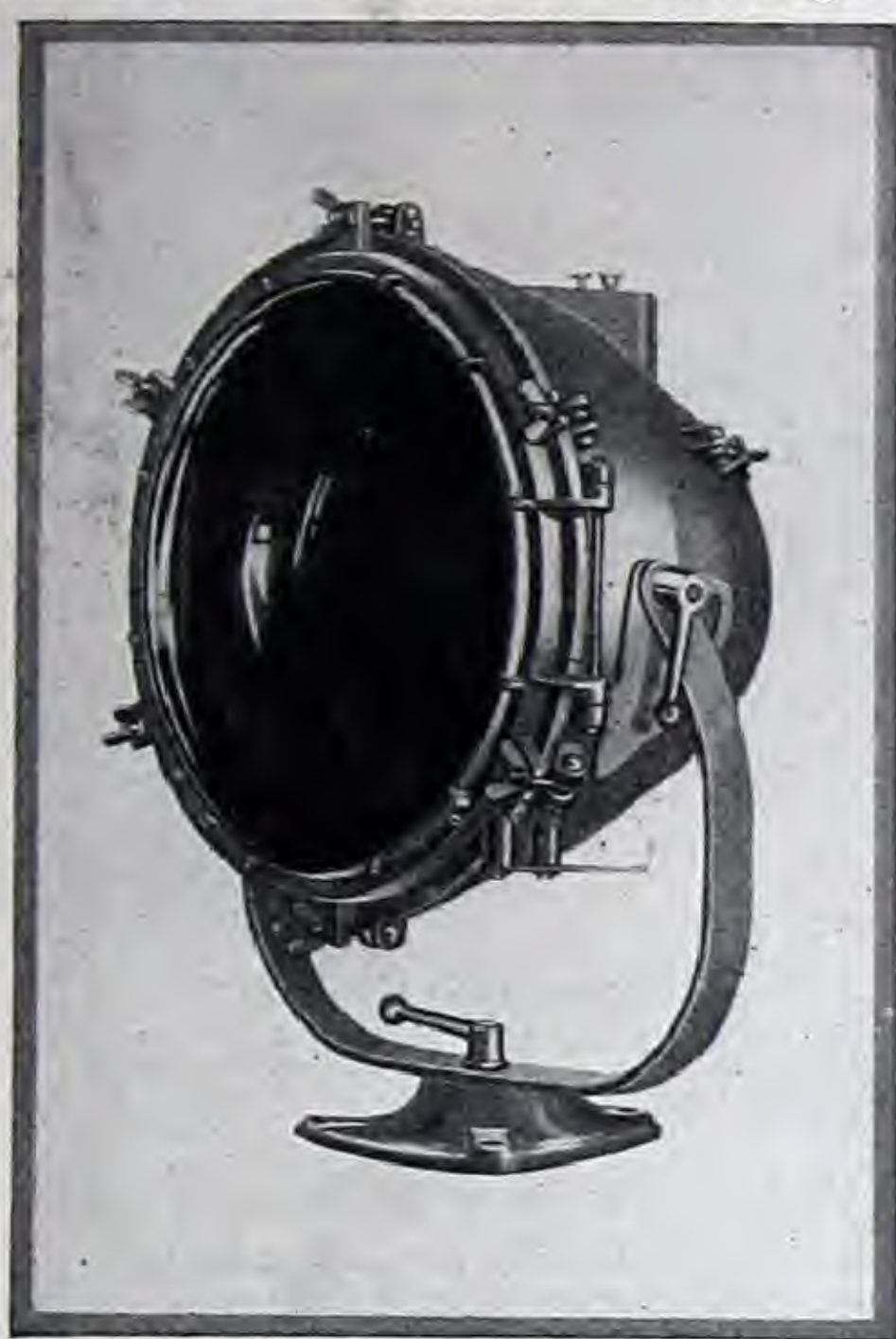
*For estimating purposes only.

†Two Kw. PS and 1500-watt G-48 lamps are special.

Prices on application.

WESTINGHOUSE FLOODLIGHTING
EQUIPMENT

Twenty-four Inch Floodlights



Type CSAG-24 with Silvered Glass Reflector

Approximate weight, Type CSAG-24. Net, 120 pounds; shipping, 175 pounds.

TYPE CSAG-24 WITH SILVERED GLASS REFLECTORS

e No.		Lens		Reflector	
e CSAG-24 Floodlights with Silvered Glass Reflectors					
49	Plain.....			Narrow Beam	
67	Plain.....			Narrow Beam	
55	Narrow Horizontal Rectilinear Spread.....			Narrow Beam	
56	Narrow Horizontal Rectilinear Spread.....			Narrow Beam	
57	Medium Horizontal Rectilinear Spread.....			Narrow Beam	
58	Medium Horizontal Rectilinear Spread.....			Narrow Beam	
59	Wide Horizontal Rectilinear Spread.....			Narrow Beam	
60	Wide Horizontal Rectilinear Spread.....			Narrow Beam	
61	Heavily Stippled.....			Narrow Beam	
		Beam Beam Spread, Degrees*		Lamps†	
	Lumens	Horizontal	Vertical	Watts	Bulb
49	20700	20	18	2000	PS-52
67	12700	10	10	1500	G-48
55	20900	45	18	2000	PS-52
56	12800	35	10	1500	G-48
57	21200	55	18	2000	PS-52
58	13000	48	10	1500	G-48
59	21400	90	18	2000	PS-52
60	13200	80	10	1500	G-48
61	21400	47	45	2000	PS-52

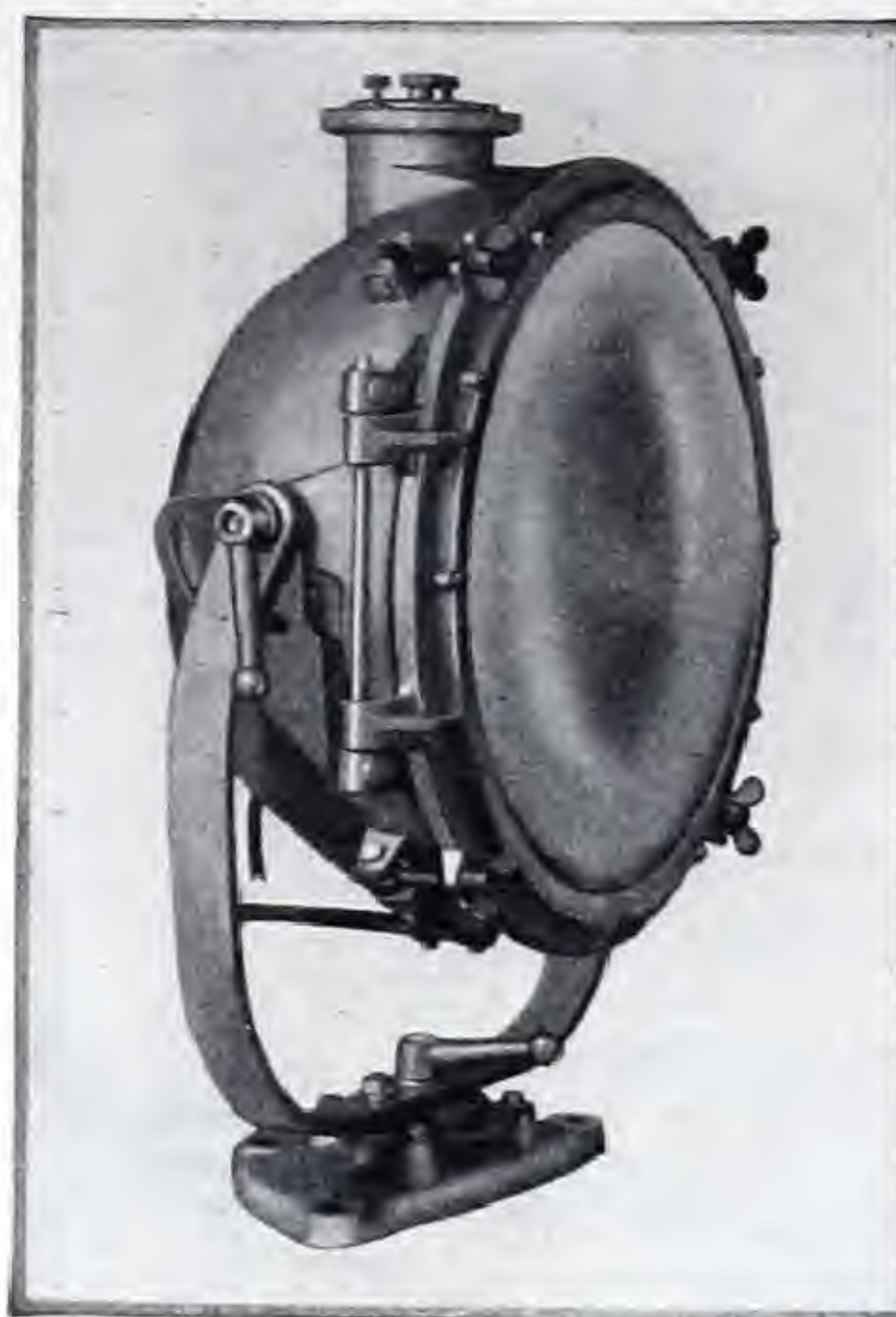
ACCESSORIES

Description	Approx. Wt., Lb.	Style No.
Net	Ship.	
Type CSAG-24 Floodlights with Silvered Glass Reflectors	8 12	348662
Net Stilt for G-Bulb Lamp.....	1 1½	349304
Load Base with Rotation Stop....	14 20	348106
Plain Lens and Felt Gasket.....	18 30	348663
Narrow Rectilinear Spread Lens and Felt Gasket.....	18 30	348664
Medium Rectilinear Spread Lens and Felt Gasket.....	18 30	348665
Wide Rectilinear Spread Lens and Felt Gasket.....	18 30	348666
Heavily Stippled Lens and Felt Gasket.....	18 30	348667
Narrow Beam Silvered Glass Reflector	16 25	348668

*For estimating purposes only.
Two Kw. PS and 1500-watt G-48 lamps are special.
Prices on application.

WESTINGHOUSE FLOODLIGHTING
EQUIPMENT

Twenty Inch Floodlights



Type CAG-20 Floodlights with Silvered Glass Reflectors

Style No.	Lens	Base	Reflector
348550	Plain.....	Standard	Narrow Beam
348551	Plain.....	Standard	Narrow Beam
348552	Lightly Stippled.....	Standard	Narrow Beam
348553	Lightly Stippled.....	Standard	Narrow Beam
348554	Heavily Stippled.....	Standard	Narrow Beam
348555	Heavily Stippled.....	Standard	Narrow Beam
348556	Horizontal Rectilinear	Standard	Narrow Beam
348557	Horizontal Rectilinear	Standard	Narrow Beam
348558	Vertical Rectilinear	Standard	Narrow Beam
348559	Vertical Rectilinear	Standard	Narrow Beam
348560	Plain.....	Railroad	Narrow Beam
348561	Plain.....	Railroad	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Horizontal	Degrees Vertical	Lamps Watts	Bulb
348550	14200	23	17.5	1500	PS-52
348551	11900	11	11	1500	G-48
348552	14500	43	38	1500	PS-52
348553	12200	30	30	1500	G-48
348554	14700	50	44	1500	PS-52
348555	12400	35	35	1500	G-48
348556	14350	60	17.5	1500	PS-52
348557	12100	48	11	1500	G-48
348558	14350	23	55	1500	PS-52
348559	12100	11	48	1500	G-48
348560	14200	23	17.5	1500	PS-52
348561	11900	11	11	1500	G-48

Type CA-20 Floodlights with Chromium Plated Reflectors

Style No.	Lens	Base	Reflector
348077	Narrow Beam.....	Standard	Narrow Beam
348078	Medium Beam.....	Standard	Narrow Beam
348079	Wide Beam.....	Standard	Narrow Beam
348080	Horizontal Rectilinear	Standard	Narrow Beam
348082	Narrow Beam.....	Standard	Narrow Beam
342893	Railroad.....	Railroad	Narrow Beam
348571	Railroad.....	Railroad	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Horizontal	Degrees Vertical	Lamps Watts	Bulbs
348077	9300	26	18.5	1500	PS-52
348078	9600	34	30	1500	PS-52
348079	10200	55	47	1500	PS-52
348080	9400	62	18.5	1500	PS-52
348082	7215	15	13	1500	G-48
342893	9300	26	18.5	1500	PS-52
348571	7215	15	13	1500	G-48

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Twenty Inch Floodlights

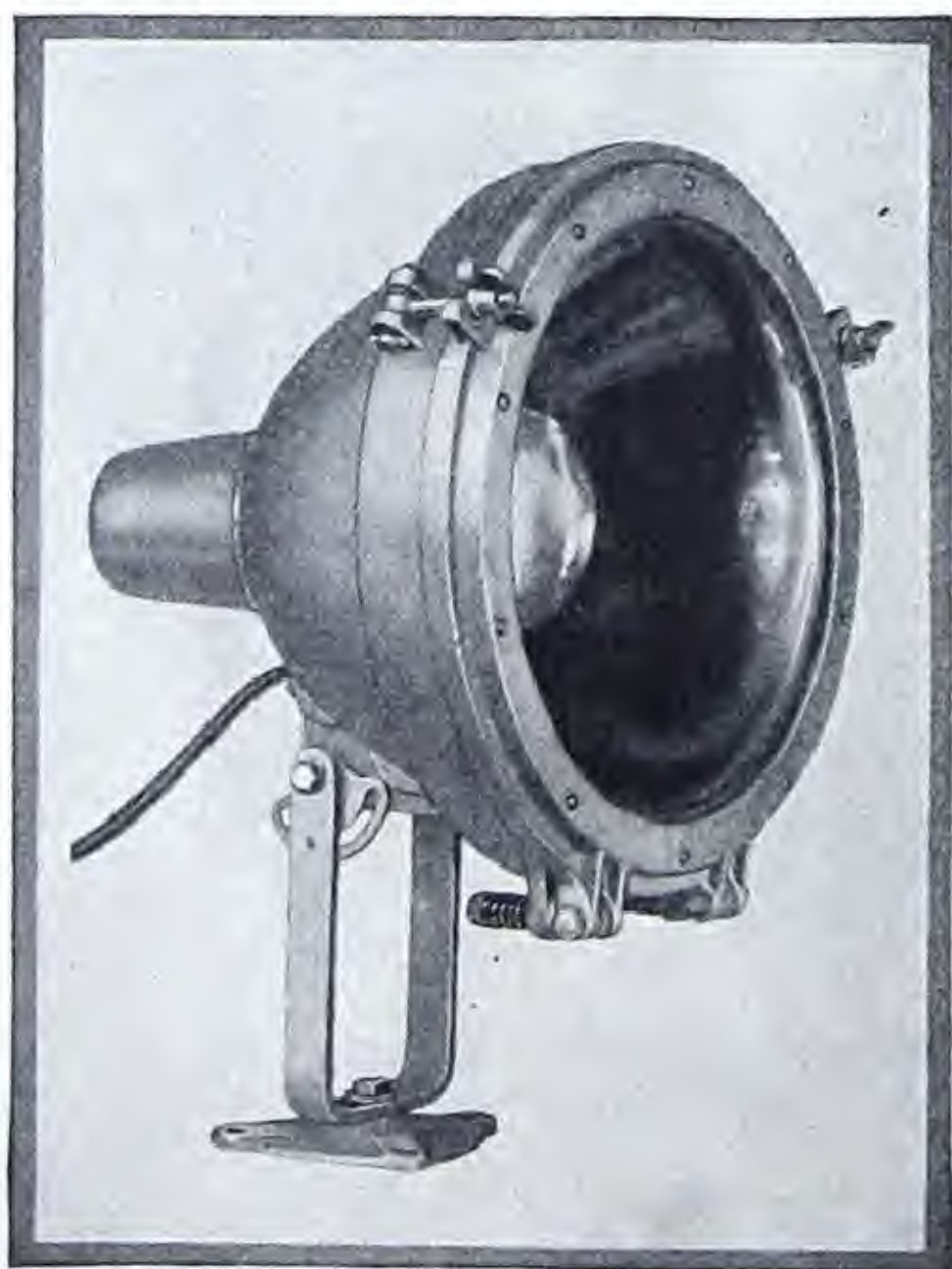
Description	Approx. Wt., Lb.		Style No.
	Net	Shipg.	
Accessories for Type CAG-20 Floodlights with Silvered Glass Reflectors			
Amber Inner Lens Assembly.....	15	27	348277
Red Inner Lens Assembly.....	15	27	348274
Green Inner Lens Assembly.....	15	27	348276
Blue Inner Lens Assembly.....	15	27	348275
Blue-Green Inner Lens Assembly.	15	27	348278
Socket Stilt for G-Bulb Lamp....	1	1½	349304
Visor.....	6	9	348091
Circular Louvers.....	3	5	348572
Plain Lens and Felt Gasket.....	12	24	348641
Lightly Stippled Lens and Felt Gasket.....	12	24	348642
Heavily Stippled Lens and Felt Gasket.....	12	24	348643
Rectilinear Spread Lens and Felt Gasket.....	12	24	348644
Narrow Beam Silvered Glass Reflector.....	10	18	348671
Railroad Base with Rotation Stop	14	20	348106

Accessories for Type CA-20 Floodlights with Chromium Plated Reflectors

Amber Inner Lens Assembly.....	15	27	348277
Red Inner Lens Assembly.....	15	27	348274
Green Inner Lens Assembly.....	15	27	348276
Blue Inner Lens Assembly.....	15	27	348275
Blue-Green Inner Lens Assembly..	15	27	348278
Socket Stilt for G-Bulb Lamp....	1	1½	349304
Visor.....	6	9	348091
Circular Louvers.....	3	5	339997
Narrow Beam Lens and Felt Gasket.....	12	24	348645
Medium Beam Lens and Felt Gasket.....	12	24	348646
Wide Beam Lens and Felt Gasket	12	24	348643
Rectilinear Spread Lens and Felt Gasket.....	12	24	348647
Railroad Lens and Felt Gasket..	12	24	348648
Narrow Beam Chromium Reflector.....	7	14	348104
Railroad Base with Rotation Stop	14	20	348106

Sixteen Inch Floodlights

Type CAG-16 with Silvered Glass Reflectors
Type CA-16 with Chromium Plated Reflectors



Type CAG-16 with Silvered Glass Reflector

Approximate Weight, Type CAG-16—Net, 48 pounds; shipping, 70 pounds.

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT



Sixteen Inch Floodlights



Type CA-16 Projector

Approximate weight, Type CA-16—Net, 52 pounds shipping, 90 pounds.

Type CAG-16 Floodlights with Silvered Glass Reflector

Style No.	Lens	Reflector
348522	Plain.....	Narrow Beam
348523	Plain.....	Narrow Beam
348524	Lightly Stippled.....	Narrow Beam
348525	Lightly Stippled.....	Narrow Beam
348526	Heavily Stippled.....	Narrow Beam
348527	Heavily Stippled.....	Narrow Beam
348635	Horizontal Rectilinear Spread....	Narrow Beam
348636	Horizontal Rectilinear Spread....	Narrow Beam
348528	Vertical Rectilinear Spread.....	Narrow Beam
348529	Vertical Rectilinear Spread.....	Narrow Beam

Type CA-16 Floodlights with Chromium Plated Reflector

349306	Plain.....	Narrow Beam
349311	Plain.....	Narrow Beam
349309	Plain.....	Wide Beam
342455	Lightly Stippled.....	Narrow Beam
349308	Heavily Stippled.....	Narrow Beam
342889	Heavily Stippled.....	Narrow Beam
342890	Heavily Stippled.....	Wide Beam
349307	Horizontal Rectilinear Spread....	Narrow Beam
347506	Horizontal Rectilinear Spread....	Narrow Beam
347504	Vertical Rectilinear Spread.....	Narrow Beam
347507	Vertical Rectilinear Spread.....	Narrow Beam
349345	Horizontal Rectilinear Spread....	Wide Beam
349310	Heavily Stippled.....	Wide Beam
342456	Lightly Stippled.....	Wide Beam

Style No.	Beam Lumens	Beam Spread, Degrees		Lamps†	
		Horizontal	Vertical	Watts	Bulb
348522	8350	21	20	1000	PS-5
348523	7860	14	14	1000	G-4
348524	8750	40	40	1000	PS-5
348525	8220	33	33	1000	G-4
348526	8850	45	45	1000	PS-5
348527	8400	38	38	1000	G-4
348635	8550	60	20	1000	PS-5
348636	8050	52	14	1000	G-4
348528	8550	21	58	1000	PS-5
348529	8050	14	52	1000	G-4
349306	4950	17	14	1000	PS-5
349311	4300	10	10	1000	G-4
349309	6900	30	27	1000	PS-5
342455	5560	37	34	1000	PS-5
349308	5760	42	38	1000	PS-5
342889	5050	34	34	1000	G-4
342890	6800	47	47	1000	G-4
349307	5250	55	14	1000	PS-5
347506	4600	48	10	1000	G-4
347504	5250	17	52	1000	PS-5
347507	4600	10	48	1000	G-4
349345	7100	65	27	1000	PS-5
349310	7500	54	50	1000	PS-5
342456	7300	48	45	1000	PS-5

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Sixteen Inch Floodlights

ACCESSORIES

Description	Approx. Net Wt., Lb.	Ship.	Style No.
Type CAG-16 Floodlights with Silvered Glass Reflectors			
or Lens Mounting Clips (5 Required).....	3/4	1	349510
er Inner Lens.....	8	15	349717
Inner Lens.....	8	15	349714
en Inner Lens.....	8	15	342247
Inner Lens.....	8	15	347998
Green Inner Lens.....	8	15	342229
et Stilt for G-Bulb Lamp....	1	1 1/2	348530
or.....	4	7	349305
ular Louver.....	3	5	348531
n Lens and Felt Gasket.....	8	15	348637
itly Stippled Lens and Felt asket.....	8	15	348638
ily Stippled Lens and Felt asket.....	8	15	348639
tilinear Spread Lens and Felt asket.....	8	15	348640
row Beam Silvered Glass Re- ector.....	7	12	344573
de CA-16 Floodlights with Chromium Plated Reflectors			
Accessories are the same for the CA-16 floodlights as for G-16 floodlights listed above, except for the Socket Stilt G-Bulb Lamp and the Circular Louver, the reflectors, and tion of Inclination Stop listed below.			
row Beam Chromium Re- ector.....	3	8	349858
de Beam Chromium Reflector	3	8	349343
ket Stilt for G-Bulb Lamp....	1	1 1/2	349304
ular Louver.....	3	5	349739
ination Stop.....	1 1/2	2 1/2	349095

Fourteen Inch Floodlights

Type CAG-14 with Silvered Glass Reflectors
Type CA-14 with Chromium Plated Reflectors



Type CAG-14 with Silvered
Glass Reflector

Approximate weight, Type CAG-14. Net, 37 pounds;
Shipping, 52 pounds.

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Fourteen Inch Floodlights



Type CA-14 Projector

Approximate weight, Type CA-14—Net, 40 pounds;
shipping, 55 pounds.

Type CAG-14 Floodlights with Silvered Glass Reflectors

Style No.	Lens	Reflector
348532	Plain.....	Narrow Beam
348533	Plain.....	Narrow Beam
348534	Lightly Stippled.....	Narrow Beam
348535	Lightly Stippled.....	Narrow Beam
348536	Heavily Stippled.....	Narrow Beam
348537	Heavily Stippled.....	Narrow Beam
348538	Vertical Rectilinear Spread.....	Narrow Beam
348539	Vertical Rectilinear Spread.....	Narrow Beam
348629	Horizontal Rectilinear Spread....	Narrow Beam
348630	Horizontal Rectilinear Spread....	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Degrees Horizontal	Vertical	Lamps Watts	Bulb
348532	4100	25	23	500	PS-40
348533	3400	15	15	500	G-40
348534	4240	45	42	500	PS-40
348535	3570	35	35	500	G-40
348536	4350	50	47	500	PS-40
348537	3620	40	40	500	G-40
348538	4150	25	60	500	PS-40
348539	3490	15	52	500	G-40
348629	4150	62	23	500	PS-40
348630	3490	52	15	500	G-40

Type CA-14 Floodlights with Chromium Plated Reflectors

Style No.	Lens	Reflector
349326	Plain.....	Narrow Beam
349329	Plain.....	Wide Beam
349331	Plain.....	Narrow Beam
348366	Lightly Stippled.....	Narrow Beam
342885	Lightly Stippled.....	Narrow Beam
341014	Lightly Stippled.....	Wide Beam
342886	Lightly Stippled.....	Wide Beam
349327	Horizontal Rectilinear Spread....	Narrow Beam
341900	Horizontal Rectilinear Spread....	Narrow Beam
349344	Horizontal Rectilinear Spread....	Wide Beam
341891	Vertical Rectilinear Spread.....	Narrow Beam
341901	Vertical Rectilinear Spread.....	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Degrees Horizontal	Vertical	Lamps Watts	Bulb
349326	2550	21	19	500	PS-40
349329	3240	31	29	500	PS-40
349331	2070	12	12	500	G-40
348366	2740	40	38	500	PS-40
342885	2240	27	27	500	G-40
341014	3400	50	48	500	PS-40
342886	2900	37	37	500	G-40
349327	2640	58	19	500	PS-40
341900	2160	50	12	500	G-40
349344	3300	65	30	500	PS-40
341891	2640	21	55	500	PS-40
341901	2160	12	50	500	G-40

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Fourteen Inch Floodlights

Description	Approx. Wt., Lb.	Style No.
Accessories for Type CAG-14 Floodlights with Silvered Glass Reflectors		
Clips for Color Lens Mounting (4 Required).....	$\frac{3}{4}$ 1	349510
Amber Inner Lens.....	6 11	349713
Red Inner Lens.....	6 11	349710
Green Inner Lens.....	6 11	342233
Blue Inner Lens.....	6 11	347999
Blue-Green Inner Lens.....	6 11	342228
Socket Stilt for G-Bulb Lamp.....	1 $1\frac{1}{2}$	349324-A
Visor.....	3 5	349325
Circular Louver.....	3 5	348568
Plain Lens and Felt Gasket.....	6 11	348631
Lightly Stippled Lens and Felt Gasket.....	6 11	348632
Heavily Stippled Lens and Felt Gasket.....	6 11	348633
Rectilinear Spread Lens and Felt Gasket.....	6 11	348634
Narrow Beam Glass Reflector.....	5 9	348672

Accessories for Type CA-14 Floodlights with Chromium Plated Reflectors

Accessories are the same for the CA-14 floodlights as for CAG-14 floodlights listed above, except for the Socket Stilt for G-Bulb lamp, the Circular Louver, the reflectors and addition of inclination stop all of which are listed below.

Socket Stilt for G-Bulb Lamp.....	1 $1\frac{1}{2}$	349324
Circular Louver.....	3 5	349738
Narrow Beam Chromium Reflector.....	$2\frac{1}{2}$ 7	349883
Wide Beam Chromium Reflector.....	$2\frac{1}{2}$ 7	349342
Inclination Stop.....	$1\frac{1}{2}$ $2\frac{1}{2}$	349095

Twelve Inch Floodlights

Type CAG-12 with Silvered Glass Reflectors
Type SA-12 with Chromium Plated Reflectors
Type SC-12 with Chromium Plated Reflectors



Type SA-12 with Chromium Plated Reflector

Approximate weight, Type SA-12. Net, 10 pounds; shipping, 13 pounds.

Approximate weight, Type SC-12. Net, 12 pounds; shipping, 15 pounds.



Type CAG-12 with Silvered Glass Reflector

Approximate weight, Type CAG-12. Net, 12 pounds; shipping, 15 pounds.

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Twelve Inch Floodlights

Type CAG-12 Floodlights with Silvered Glass Reflector		
Style No.	Lens	Reflector
348562	Plain.....	Narrow Beam
348563	Lightly Stippled.....	Narrow Beam
348564	Heavily Stippled.....	Narrow Beam
348565	Horizontal Rectilinear Spread....	Narrow Beam
348566	Vertical Rectilinear Spread.....	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Degrees		Watts	Lamps
		Horizontal	Vertical		Bulb
348562	1460	24	21	200	PS-3
348562	1560	14	13	250	G-3
348563	1510	43	40	200	PS-3
348563	1610	34	33	250	G-3
348564	1540	50	46	200	PS-3
348564	1650	38	36	250	G-3
348565	1490	50	21	200	PS-3
348565	1590	38	13	250	G-3
348566	1490	24	46	200	PS-3
348566	1590	13	38	250	G-3

Type SA-12 Floodlights with Chromium Plated Reflector		
Style No.	Lens	Reflector
349550	Plain.....	Narrow Beam
349551	Lightly Stippled.....	Narrow Beam
349536	Horizontal Rectilinear Spread....	Narrow Beam
349591	Circular Spread.....	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Degrees		Lamps	
		Horizontal	Vertical	Watts	Bulb
349550	1180	10	10	250	G-3
349551	1250	20	20	250	G-3
349536	1285	32	18	250	G-3
349591	1390	28	28	250	G-3

Type SC-12 Floodlights with Chromium Plated Reflector		
Style No.	Lens	Reflector
348279	Plain.....	Narrow Beam
348280	Lightly Stippled.....	Narrow Beam
348281	Horizontal Rectilinear Spread....	Narrow Beam
348282	Circular Spread.....	Narrow Beam

Style No.	Beam Lumens	Beam Spread, Degrees		Watts	Lamps
		Horizontal	Vertical		Bulb
348279	1180	10	10	250	G-3
348280	1250	20	20	250	G-3
348281	1285	32	18	250	G-3
348282	1390	28	28	250	G-3

Description	Wt., Lb.	Net	Ship.	Style No.
ACCESSORIES FOR TYPE CAG-12 FLOODLIGHT				
Color Lens Holder.....	$\frac{1}{2}$ 1			3486
Amber Inner Lens.....	2 4			3486
Red Inner Lens.....	2 4			3486
Green Inner Lens.....	2 4			3486
Blue Inner Lens.....	2 4			3486
Circular Louver.....	2 3			3486
Plain Lens Only.....	3 8			3486
Lightly Stippled Lens Only.....	3 8			3486
Heavily Stippled Lens Only.....	3 8			3486
Rectilinear Spread Lens Only.....	3 8			3486
Narrow Beam Silvered Glass Reflector	3 6			3465

Description	Wt., Lb.	Net	Ship.	Style No.
ACCESSORIES FOR TYPE SA-12 FLOODLIGHTS				
Color Lens Holder.....	$\frac{1}{2}$ 1			3495
Amber Inner Lens.....	2 4			3493
Red Inner Lens.....	2 4			3493
Green Inner Lens.....	2 4			3495
Blue Inner Lens.....	2 4			3493
Circular Louver.....	2 3			3497
Plain Lens Only.....	3 8			3493
Lightly Stippled Lens Only.....	3 8			3493
Rectilinear Spread Lens Only.....	3 8			3495
Circular Spread Lens Only.....	3 8			3495
$1\frac{1}{4}$ -inch Pipe Mounting Base.....	1 2			3494
Narrow Beam Chromium Reflector...	2 6			3493

ACCESSORIES FOR TYPE SC-12 FLOODLIGHTS
Accessories are the same for the SC-12 floodlights as for the SA-12 floodlights listed above, except for the $1\frac{1}{4}$ -in Pipe Mounting Base listed below.

$1\frac{1}{4}$ -inch Pipe Mounting Base.....	2 3			3482
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Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Ten Inch Floodlights

Type CAG-10 with Silvered Glass Reflectors.
Type CA-10 with Chromium Plated Reflectors.



Type CAG-10 With Silvered Glass Reflector
Approximate Weight, Type CAG-10—Net, 22 pounds;
shipping, 34 pounds.



Type CA-10 Projector
Approximate Weight, Type CA-10—Net, 26 pounds;
shipping, 40 pounds.

TYPE CAG-10 FLOODLIGHTS WITH SILVERED GLASS REFLECTORS

Lens			Reflector		
Plain.....			Narrow Beam		
Plain.....			Narrow Beam		
Light Stippled.....			Narrow Beam		
Light Stippled.....			Narrow Beam		
Heavily Stippled.....			Narrow Beam		
Heavily Stippled.....			Narrow Beam		
Horizontal Rectilinear Spread.....			Narrow Beam		
Horizontal Rectilinear Spread.....			Narrow Beam		
Vertical Rectilinear Spread.....			Narrow Beam		
Vertical Rectilinear Spread.....			Narrow Beam		
Beam Spread, Degrees			Lamps		
Beam	Hori-	Vertical	Watts	Bulb	Style No.
Lumens	zontal				
1380	26	23	200	PS-30	348540
1450	16	15	250	G-30	348541
1440	45	42	200	PS-30	348542
1510	36	35	250	G-30	348543
1480	52	48	200	PS-30	348544
1540	40	38	250	G-30	348545
1420	52	23	200	PS-30	348546
1475	40	15	250	G-30	348547
1420	26	48	200	PS-30	348548
1475	15	40	250	G-30	348549

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Ten Inch Floodlights

Type CA-10 Floodlights with Chromium Plated Reflectors

Style No.	Lens		Reflector	
349100	Plain.....		Narrow Beam	
349386	Plain.....		Narrow Beam	
349301	Lightly Stippled.....		Narrow Beam	
348304	Lightly Stippled.....		Narrow Beam	
349415	Heavily Stippled.....		Narrow Beam	
348618	Heavily Stippled.....		Narrow Beam	
349515	Horizontal Rectilinear Spread....		Narrow Beam	
348303	Horizontal Rectilinear Spread....		Narrow Beam	
348619	Vertical Rectilinear Spread.....		Narrow Beam	
348620	Vertical Rectilinear Spread.....		Narrow Beam	

Style No.	Beam* Lumens	Beam Spread, Degrees*		Lamps	
		Horizontal	Vertical	Watts	Bulbs
349100	835	21	18	200	PS-30
349386	890	12	12	250	G-30
349301	885	40	37	200	PS-30
348304	950	32	32	250	G-30
349415	900	45	42	200	PS-30
348618	965	36	36	250	G-30
349515	850	44	18	200	PS-30
348303	910	37	12	250	G-30
348619	850	21	43	200	PS-30
348620	910	12	37	250	G-30

ACCESSORIES FOR TYPE CAG-10 FLOODLIGHTS

Description	Approx. Wt., Lb.		Style No.
	Net	Ship.	
Visor.....	2	3	340743
Socket Stilt for G-Bulb Lamp.....	1	1½	348569
Clips for Color Lens Mounting (3 Required).....	¾	1	350490
Blue-Green Inner Lens.....	3	8	348506
Amber Inner Lens.....	3	8	348504
Red Inner Lens.....	3	8	348502
Green Inner Lens.....	3	8	348505
Blue Inner Lens.....	3	8	348503
Circular Louver.....	2	3	348570
Plain Lens and Felt Gasket.....	3	8	348613
Lightly Stippled Lens and Felt Gasket	3	8	348614
Heavily Stippled Lens and Felt Gasket	3	8	348615
Rectilinear Spread Lens and Felt Gasket.....	3	8	348616
Narrow Beam Silvered Glass Reflector	2½	5	344629

ACCESSORIES FOR TYPE CA-10 FLOODLIGHTS

Accessories are the same for CA-10 floodlights as for CAG-10 floodlights listed above, except for the Socket Stilt for G-Bulb Lamp, the Circular Louver and Reflector listed below.

Socket Stilt for G-Bulb Lamp.....	1	1½	349121
Circular Louver.....	2	3	350604
Narrow Beam Chromium Reflector...	1½	5	337549

*For estimating purposes only.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Universal Floodlight

TYPE I-12, 150 or 200-watt Floodlight



Type I-12 Universal Floodlight

Distinctive Features

1. Specially designed, chromium plated brass reflector.
2. Adjustable socket from outside of projector.
3. Universal swivel.
4. Ease of operation and maintenance.
5. Low cost.

Construction

The reflector is of spun brass, beaded to a spun steel housing, which holds the socket in position, and makes a dust-tight housing. To the bottom of the housing is attached an adjustable swivel or base which gives universal adjustment of the floodlight. The swivel base is arranged to fit a standard 4-inch outlet box for table or pole mounting, and can be inner wired if desired. Each unit is complete with ten feet of wiring cable to permit easy installation.

Lens—Either heat resisting clear or lightly stippled, or non heat resisting clear or stippled glass disc. If clear lens is desired in either heat resisting or non heat resisting the reflector will be stippled.

Lamps—The I-12 floodlight uses either 150 or 200-Watt PS clear or frosted lamps. A 100-Watt inside frost lamp may be used by adding a standard medium socket extension.

The floodlights weatherproof cover can be readily removed for relamping.

Finish—The floodlight has an electrolytic protective coating on all ferrous parts and all other surfaces are protected by a green baking enamel.

TYPE I-12 FLOODLIGHT FOR CONDUIT MOUNTING

Description	Approx. Ship. Wt.	Style No.
With plain stippled lens.....	8	343074
With plain clear lens.....	8	347650
With heat resisting stippled lens.....	8	347651
With heat resisting clear lens.....	8	347652
Plain stippled lens with holder.....	2	343071
Heat resisting stippled lens with holder.....	3	347649

TYPE I-12 FLOODLIGHT WITH BASE

With plain stippled lens.....	10	347653
With plain clear lens.....	10	347654
With heat resisting stippled lens.....	10	347655
With heat resisting clear lens.....	10	347656

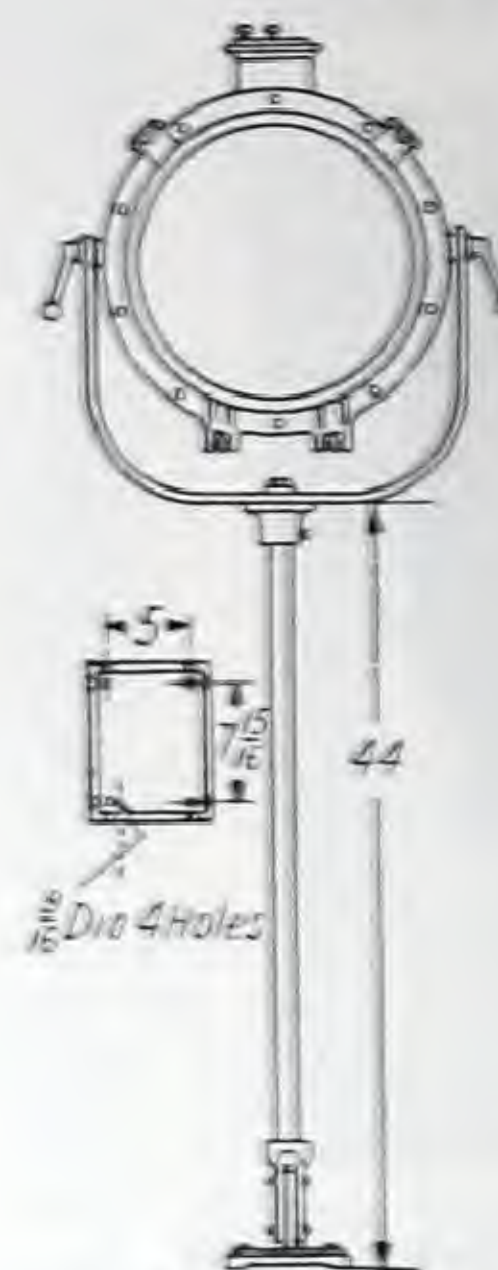
ACCESSORIES

Plain clear lens with holder.....	2	347657
Heat resisting clear lens with holder.....	3	347658

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Mounting Accessories



Pipe Stand

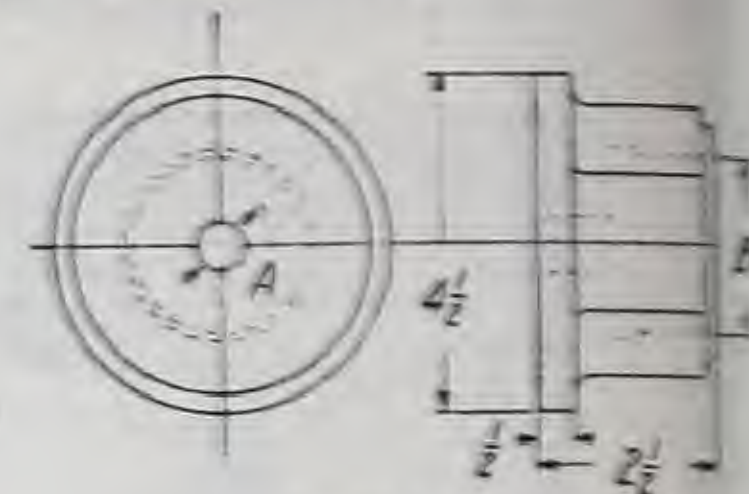
Slip Fitter



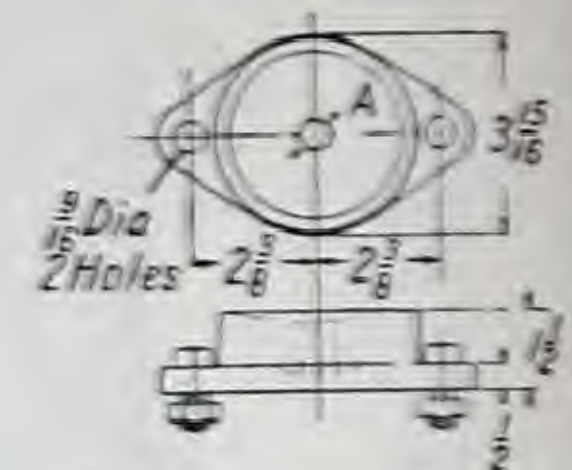
Slip Fitter Base



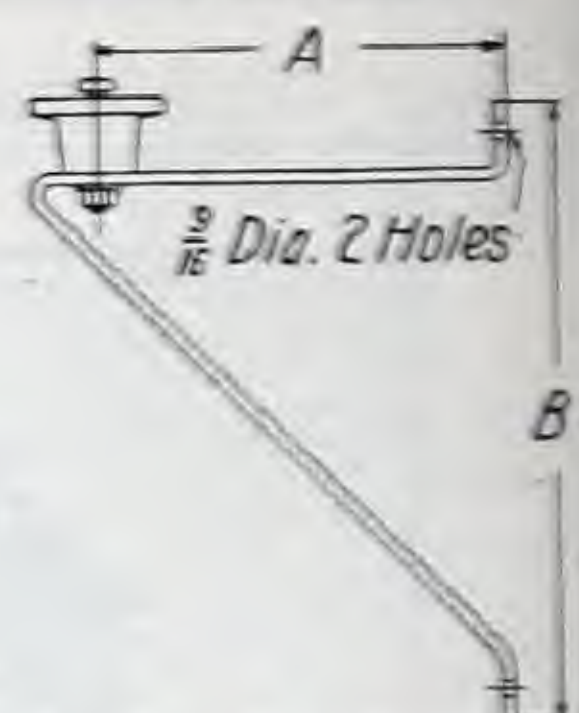
Shank Adapter
for Type U Fitter



Pipe Base



Beam Base



Wall or Pole Bracket



Floodlight Mounted on Standard

Style No.	Description	For use with Floodlights	Shipping Wt., Lbs.
345142	Pipe Stand.....	CA-10, 14, 16 and CAG-10, 14 and 16.....	20
340235	1 1/2" pipe base.....	CA-10, 14, 16 and CAG-10, 14 and 16.....	8
349487	2" pipe base.....	CA-20, CAG-20, CSA-24 and CSAG-24.....	8
340236	1 1/2" pipe base.....	CA-20, CAG-20, CSA-24 and CSAG-24.....	8
349488	2" pipe base.....	CA-20, CAG-20, CSA-24 and CSAG-24.....	8
339239	Steel or channel-iron beam mounting.....	CA-10, 14, 16 and CAG-10, 14, 16.....	8
339240	Steel or channel-iron beam mounting.....	CA-20, CAG-20, CSA-24 and CSAG-24.....	8
347997	Slip Fitter base for 2 1/4" pipe.....	CA-10, 14, 16 and CAG-10, 14, 16.....	6
340512	Slip Fitter base for 4" pipe.....	CA-10, 14, 16 and CAG-10, 14, 16.....	6
342436	Slip Fitter base for 2 3/4" pipe.....	CA-20, CAG-20 and CSA-24, CSAG-24.....	10
345987	Slip Fitter base for 4" pipe.....	CA-20, CAG-20 and CSA-24, CSAG-24.....	10
350719	12" wall or pole bracket.....	CA-10, 14, 16.....	11
349847	18" wall or pole bracket.....	CA-10, 14, 16 and CAG-10, 14, 16.....	18
345323	U Adapter (used with 2 1/4" slip fitter).....	CA-10, 14, 16, 20, CSA-24, and CAG-10, 14, 16, CSAG-20.....	10

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Sixteen Inch Searchlights



Sixteen Inch Searchlight

Distinctive Features

All light concentrated into the main beam—There is a large silvered glass reflector in the back of the searchlight and a small spherical silvered glass reflector in front of the lamp between the lamp and the searchlight lens. This small reflector intercepts the direct light from the lamp and redirects it into the main beam. A feature that gives the greatest concentration to the light beam.

Unimpaired efficiency lowers expense—Floodlighting's largest expense, the cost of operation, is reduced by this searchlight's life-long efficiency. Through years of strenuous service maintains substantially the same lumen output as on the day installed. Cleaning and servicing expense is as low as possible.

Daylight focusing feature—The adjustable lamp socket is mounted at the bottom of the drum. Peep sights through the side of the drum line up with cross markers inside making it possible to focus the lamp in daylight. The peep sights are closed against the weather after focusing by knurled head screws.

Cool operation—The sixteen inch searchlight will not overheat. Its aluminum alloy body disposes of heat entirely by radiation, and without the use of ventilating holes.

Colored light—The searchlight beam can be changed from white to colored light simply by mounting colored glass screens inside the door frame.

Construction

Body and Door—Non-corrosive cast silicon aluminum alloy. Lens—High quality plain heat resisting glass, convex in shape.

Reflector—Commercial precision ground and polished silvered glass mirror with spherical silvered glass reflector in place of louver.

Wiring—Two-conductor cable is brought out through rubber bushed waterproof gland.

LAMPS (115 VOLTS)		Type
Application	Watts	of Bulb
Searchlight	94	P-25*
Spotlight	100	P-25*†
Spotlight	250	G-30*†
Floodlight	250	G-30†
Spotlight	400	G-30†
Floodlight	500	G-40†
Airway Beacon	500	T-20†
Floodlight	1000	G-40†

16-Inch Searchlight	Ship. Wt.	Style No.
With Flat Base	Lb., Ea.	
With 2½-inch Slip Fitter	130	342151
With 4-inch Slip Fitter	130	347993
	130	347994

*Medium base lamps. Use with socket reducer Style No. 36213.

†Burn in any position except within 45° of vertical, base up.

‡Burn within 25° of vertical base down.

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Sixteen and Twenty Inch Open-Type Floodlights

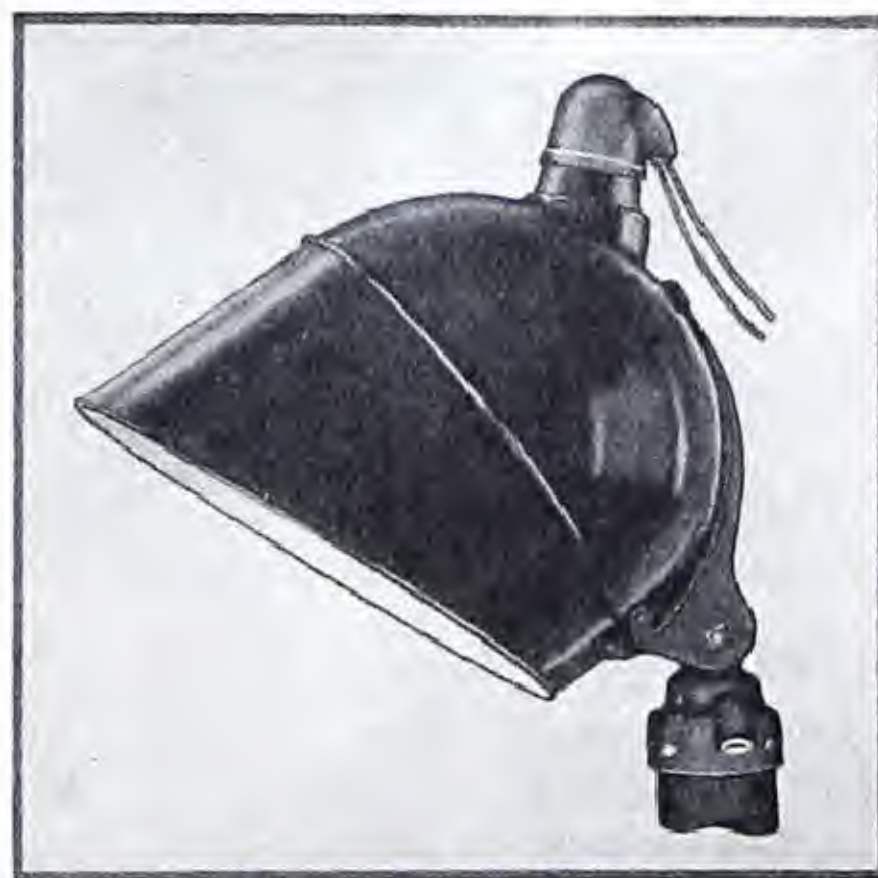
Types AF-16 and AF-20



Type AF-16 Open-Type Floodlighting Conduit Mounting



Type AF-20 Open-Type Floodlight for Cross-Arm Mounting



Type AF-20 Open-Type Floodlight for Pipe Mounting

DISTINCTIVE FEATURES

Low first cost—Open-type floodlights have the advantage of lower first cost over closed-type floodlights.

Result of long experience—In designing these open-type floodlights Westinghouse had the benefit of long experience with similar lighting equipment.

Porcelain enameled finish—Westinghouse AF-20 and AF-16 floodlights have a porcelain enameled finish. It is one of the best reflecting surfaces and is unequaled by any paint finish for its resistance to weather even under the intense heat from the high-wattage lamps.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Sixteen and Twenty Inch Floodlights

OPEN TYPE

Construction

Reflector—Heavy sheet steel, shaped to utilize the lamp's maximum output.

Coated inside and out with porcelain enamel. The first coat is a ground coat after which one coat of green is applied outside and two coats of white inside. Coats fired separately.

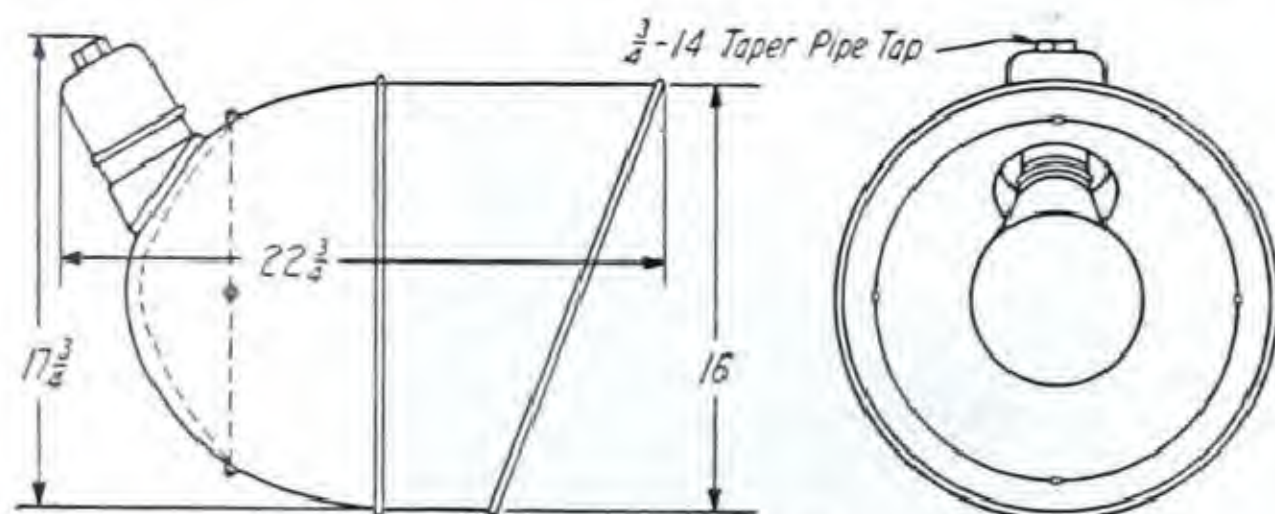
Socket housing—of cast iron, in which is mounted a mogul screw socket.

Wiring—Asbestos covered leads are brought out of the socket housing through a lava bushing and sealed on the AF-20. The AF-16 is arranged for $\frac{3}{4}$ " conduit mounting and internal wiring. It is not necessary to disassemble the socket housing on the AF-20 for wiring as connections can be made to the leads furnished.

Mountings—The mounting bow and bracket on the AF-20 is of cast iron electro-galvanized and enameled green. A bracket can be supplied for cross arm mounting of the AF-20 or for a 4-inch slip fitter steel post top mounting. With either mounting the AF-20 can be tipped at any required angle or rotated horizontally and locked in position. The AF-16 can be tipped and rotated on the conduit fittings with which it is mounted.

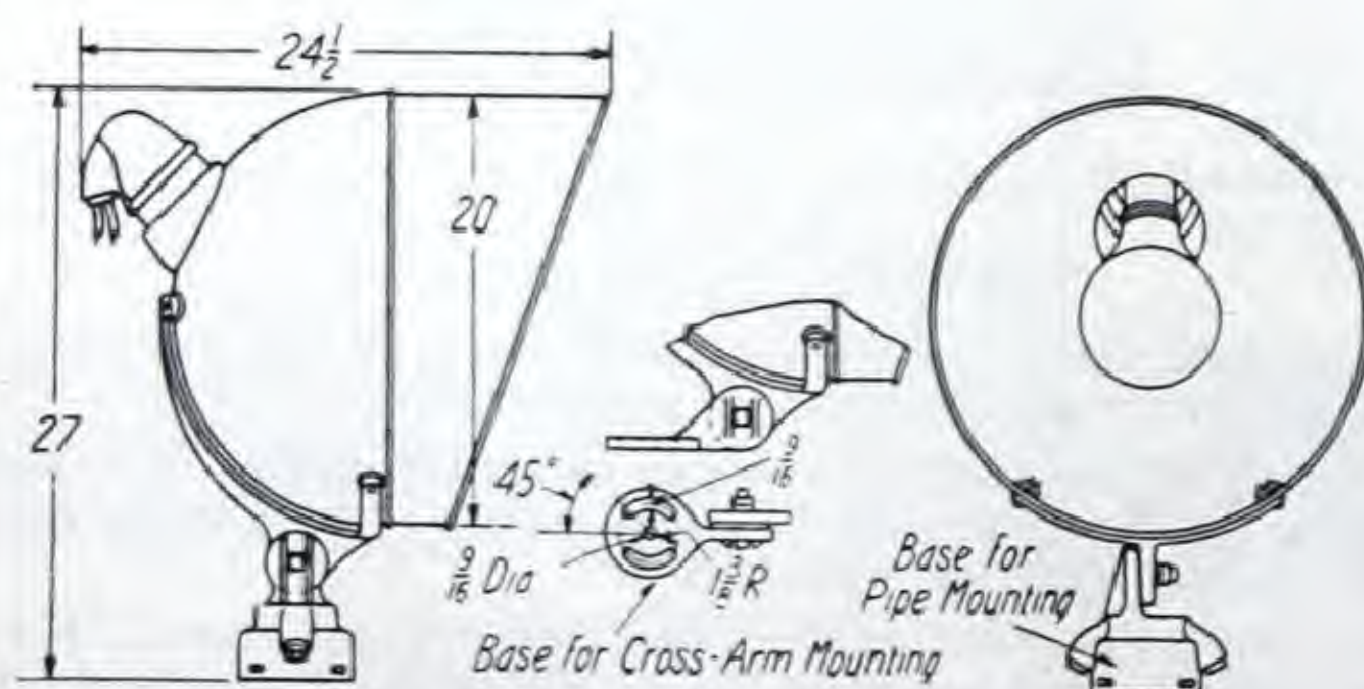
Lamps—The AF-20 floodlight is designed for 750, 1000, 1500, and 2000-watt 115-volt general service lamps. The AF-16 is designed for 750, and 1000-watt lamps.

Style No.	Description	Beam Spread*			Lamp Watts	Bulb	Wt. in Lbs.	
		Total Lumens*	Horiz.	Vert.			Net	Ship.
TYPE AF-20 FLOODLIGHTS								
344644	For cross-arm mounting	21,100	100	90	1500	PS-52	27	40
344645	For 4-inch pipe mounting	21,100	100	90	1500	PS-52	30	43
TYPE AF-16 FLOODLIGHTS								
344168	Complete flood-light	12,350	90	90	1000	PS-52	19½	26
342588	Reflector only	.....	.....	.....	.....	.....	15	20
349746	Hood with socket	.....	.....	.....	.....	.....	4½	6



Dimensions In Inches, Type AF-16

*For estimating purposes only.



Dimensions in Inches, Type AF-20

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Diolux Floodlighting Unit

Ideal for Parking Space—Bathing Beach,—Industrial Yards
Storage Yards,—Building Excavations

Uses Lamp Size 300 or 500 Watts



DIOLUX LIGHTING UNIT

The optical system of the Diolux lighting unit consists of 180° dioptric Fresnel lens and a spherical reflector. The lens made of an excellent quality heat resisting glass and the reflector is of brass spun over an accurate form and chromium plated to ensure long life and high efficiency over a long period of time.

The body of the lighting unit in which the lens and reflector are mounted is of cast iron heavily galvanized.

Placed inside of the body is an adjustable socket support which permits vertical movement of the lamp for the purpose of raising or depressing the beam of light.

After adjustment has been made the socket can be locked in position by means of a locking device operated externally.

To facilitate relamping of the unit a door is provided which hinges from the bottom. This door is provided with a glass panel which permits a portion of the light to be transmitted to the ground beneath the unit.

A bracket is provided for mounting which permits rotation of the lighting unit around its vertical axis and also allows to be tilted towards or away from the pole on which it is mounted.

LAMPS

The Diolux Lighting Unit is designed for use with 300 or 500 watt lamps.

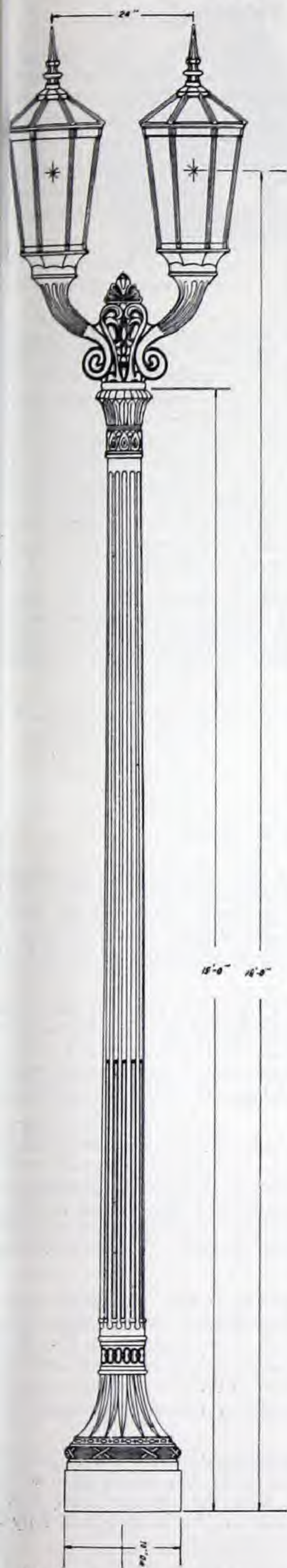
Application	Recommended Watts per 1000 Square Feet for Various Applications
Parking Spaces.....	150—300
Building Excavations.....	300—600
Industrial Yards.....	150—300
Storage Yards.....	150—300
Bathing Beaches.....	150—300
Skating Rinks.....	300—600
Swimming Pools.....	900—1500

Style No. H22842 for Pole mounting.

Style No. H22841 for Wall mounting.

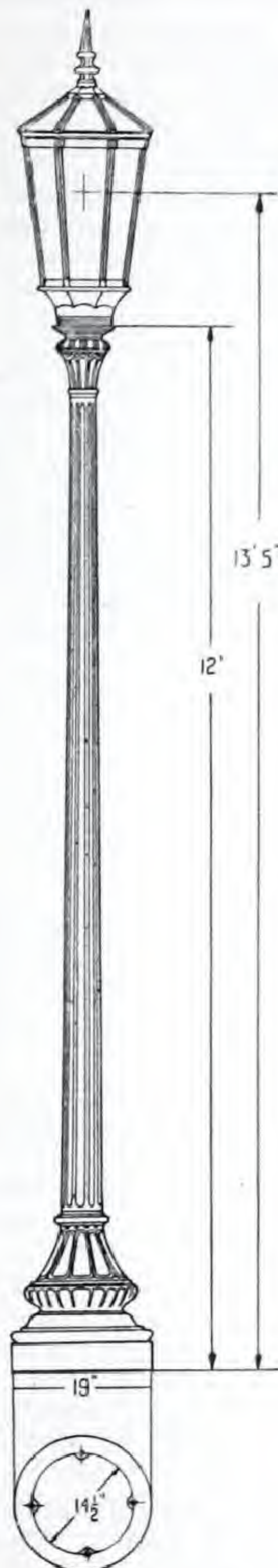
Prices on applications.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT



Capital 15' Standard and Casing with Villa 2 Light Top Section and Octagonal Senior Duolux Lanterns

Duolux Floodlights



Villa 12' Standard with Casing and Octagonal Duolux Lantern

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Duolux Floodlights

Distinctive Features

Pleasing appearance—The Duolux floodlight presents a pleasing appearance. During the day it appears as an ornamental lighting unit and at night, in addition to illuminating the street, it performs its major function—that of floodlighting some building or entrance.

Ease of installation—The unit has a standard type fitter and may be easily attached to any Westinghouse ornamental street lighting standard.

Harmonizes with street lighting system—Standard globe type street lighting luminaires designed to harmonize with the street lighting installation may be equipped with adjustable floodlighting reflectors.

Wide beam control—The reflector can be moved through an unusually wide floodlight beam control of a large area.

Operation

The top, or main floodlighting lamp of the unit, may be multiple operated, which the lower socket of the Octagonal unit may be either series or multiple. Thus the lower lamp of the Octagonal unit may be connected in the underground street lighting series circuit and be controlled with the regular ornamental lighting system. Inasmuch as a standard series film socket cannot be accommodated in the top of the unit, it would be necessary to use a series multiple coil in connection with a mogul multiple socket, should a series hook-up be used.

The recommended spacing of Duolux Units is from 25 to 30 feet between units with the units from 15 to 25 feet from the surface to be illuminated.

Construction

Framework—of lanterns, light in weight, but strong.

Lantern canopy—of heat-resisting glass; reduces maintenance to a minimum, dust-proof and insect-proof.

Parabolic reflector—of chromium plated metal; mounted on adjustable supports, directs a high percentage of light in the floodlighting beam.

COLUMNS

Style No.	Description
H-22866	Arcadian 12' Standard
H-21425	Arcadian 13' 6" Standard
H-22867	Arcadian 15' Standard
H-21563	Capital 13' Standard
H-22850	Capital 15' Standard
336029	Villa 10' Standard
353739	Villa 12' Standard

ORNAMENTAL CASING

Style No.	Description
350662	Arcadian Casing
336294	Capital Casing
353757	Villa 12' Casing

TWO LIGHT TOP SECTIONS

338393	Villa 2 Light Top Section
338395	Arcadian 2 Light Top Section

COMPLETE UNITS

Description	Reflector Lamp Watts	Auxil. Lamp Watts	Ship. Wt. Lb., Ea.	Style No.
Corona Senior Duolux	750	200	60	342333
Corona Junior Duolux	500	100	55	342334
Sollux Senior Duolux	500	100	50	342335
Crystalux Senior Duolux	500	100	50	342336
Washington Large Duolux	1000	200	55	342337
Washington Medium Duolux	750	100	50	342338
Sollington Senior Duolux	1000	200	55	342339
Paragon Senior Duolux	750	200	55	342340
Paragon Junior Duolux	500	100	50	342341
Octagonal Sen. Duolux	1500	500	125	342342
Octagonal Jun. Duolux	500	200	95	342343

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Cornice Floodlight

Type CA



Cornice Floodlight

APPLICATION

The Type CA cornice floodlight is used to eliminate the shadows above building cornices that are caused by floodlights mounted below. The Cornice floodlight is mounted on the building cornice. Its low height makes it inconspicuous on the cornice, and its short wide distribution of light eliminates shadows.

Another application of the Cornice floodlight is lighting coves and arches.

DISTINCTIVE FEATURES

Because it can be mounted inconspicuously, and because of its wide short range, the Cornice floodlight has the distinctive advantage of providing clear and colored floodlighting where space limitations prohibit the use of standard floodlights.

Beautiful color effects are obtainable with colored Cornice floodlights in combination with other standard floodlights.

CONSTRUCTION

Housing—of non-corrosive cast silicon aluminum alloy, equipped with a twin socket for operating two general service lamps in parallel. Lamps 150 watts maximum.

Lens—of clear heat-resisting glass, fastened in a weather-proof mounting in the door. Inner color lenses of the following standard colors are available: red, amber, blue, and green.

Reflector—is the inner surface of the housing. It is sprayed with a high-grade aluminum paint, that provides a good reflecting surface and also gives wide distribution of light.

Door—is clamped to the housing by six T-screws with wing nuts. Two of the T-screws also serve as hinges for the door.

Mounting—is equipped with a U-shaped bracket. By loosening the clamping bolt at each end of the housing, it may be adjusted to any position.

TYPE CA CORNICE FLOODLIGHT AND LENSES

Style No.	Description
344098	Type CA Cornice Floodlight with plain clear lens
335500	Blue inner lens only
335501	Red inner lens only
335502	Amber inner lens only
335503	Green inner lens only

Prices on application.

WESTINGHOUSE FLOODLIGHTING EQUIPMENT

Mobile Color Floodlighting

Mobile color floodlighting is a specially designed method of lighting the exterior of a building with a number of different colors to attract public attention and bring out the predominating architectural features of the building in a symphony of color harmonies.

To obtain even distribution of light over the lighted area requires an accurate study of the building architecture with the view of obtaining the best possible color cycle and the location, number, and type of floodlights.

Methods of obtaining good mobile color effects may be divided into two general classes. First, washout method and second, color blending method.

The washout method is used where only two color changes are desired. The static or background color is left on continuously and either a lighter or a good blending color is brought to full intensity at regular intervals and superimposed on the background color. If the mobile color is lighter than the background and of sufficient intensity, it will wash out the background color and the building will assume the lighter color. If a color which is near the same intensity as the background color is used for the mobile color the building will assume a color which is a combination of the two colors. While the mobile color is increasing or decreasing in intensity there will be various shades in the color changes.

The color blending method is the more commonly used since it gives a wider variety of color combinations. Several colors are chosen and a cycle is laid out with these colors on in a predetermined sequence, with color blending when changing from one color to the next.

Control systems for obtaining mobile lighting are divided into three general classes:

1. Resistance cycle dimmer.
2. Reactance cycle dimmer.
3. Thermionic-Reactance cycle dimmer.

The resistance cycle dimmer uses the required number of resistance dimmer plates operated either by motor driven cams or by a separate motor for each color. If the latter method is chosen a motor driven flasher must be used to control the color motors but more elaborate cycles can be obtained.

The reactance cycle dimmer is similar to the resistance type except that the dimming is accomplished by reactance instead of resistance. The use of reactance dimming will reduce operating costs because reactors have a greater overall efficiency. Pilot plates are used in the cycle dimmer which control the reactors.

The Thermionic-Reactance cycle dimmer is a new development in mobile lighting control. It consists of a small motor with changeable gear speed reducers operating rheostats for the output control of the thermionic tubes to the reactor. The tubes, rheostats, and motor are assembled into one unit which can be connected directly to the a-c. service feeding the reactors and floodlights.

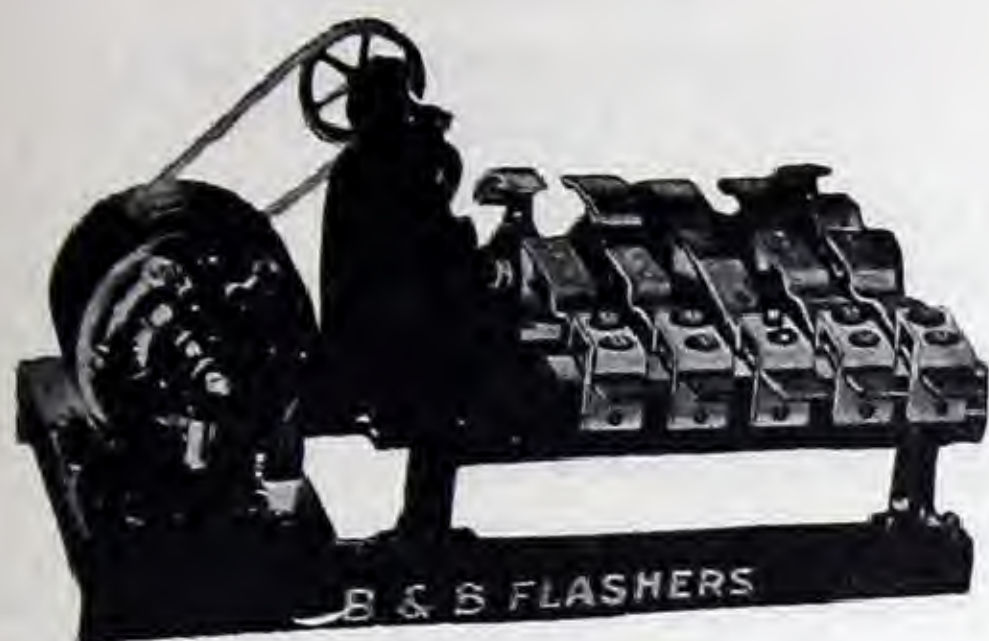
For elaborate cycles or installations where changes of cycle are desired a Thermionic-Reactance control has been developed using rolls on which the various cycles have been recorded. The roll is inserted into the unit and the cycle can be operated at definite intervals or continuously. Any type or length of cycle may be recorded and new rolls made to meet any condition.

Cycle dimmers designed for floodlighting are also applicable to window and fountain lighting. In the latter case water displays can be synchronized with the mobile color cycle. Automatic starting and stopping can be accomplished by contact making clock.

Requests for additional information and assistance in laying out mobile lighting should be referred to the nearest District Sales Office.

Prices on application.

HIGH SPEED TYPE FLASHERS



This type is used for producing spectacular effects such as running water, foam, flames, smoke, dust, revolving wheels, globes and circles, waving flags, travelling borders, waterfalls, mountains, lightning, pulsating effects, fireworks, rain, etc.

Brushes are $\frac{1}{2}$ " wide.

Capacity as follows:—

On D.C. 250 watts—On A.C. 330 watts.

List No.	No. of Brushes	Size Inches	Net Weight	Boxed Weight	List Price	
					Flasher	Steel Cabinet
HS-4	4	20x13x11	46 lbs.	72 lbs.	\$38.00	\$ 7.00
HS-8	8	27x13x11	51 lbs.	78 lbs.	53.00	10.00

Each additional switch or feeder \$3.00

Brushes are 1" wide.

Capacity as follows:—

On D.C. 500 watts. On A.C. 660 watts.

List No.	No. of Brushes	Size Inches	Net Weight	Boxed Weight	List Price	
					Flasher	Steel Cabinet
HHS-4	4	22x13x11	51 lbs.	77 lbs.	\$48.00	\$ 8.00
HHS-8	8	31x13x11	59 lbs.	85 lbs.	63.00	11.00
HHS-12	12	42x13x11	70 lbs.	100 lbs.	83.00	14.00
HHS-16	16	51x13x11	79 lbs.	110 lbs.	103.00	16.50

Each additional switch or feeder \$5.00.

Above Flasher prices include either 110-volt DC or 110-volt 0 cycle AC motor. When furnished without motor, deduct 12.00 from list price.

High Speed Flashers are usually made with a multiple of four brushes (1-2-3-4) with a common feeder ring. Where a lower speed effect is desired such as fountains, rising steam, dropping coins, etc., it is advisable to use six circuit brushes and a feeder. When the flasher is to be balanced on three-phase service, there should be an extra feeder ordered for each set of circuit brushes.

HOW TO FIGURE COMBINATION FLASHERS

When a high-speed is geared to a slow-speed unit add price of both plus cost of motor. A HHS-4 with 5-8 Speller and standard motor therefor lists at \$83.00.

To figure cost of "Speller," "On and Off," "Script" or other low speed types in combination with each other take the price of the unit with the heaviest brushes and add cost of brushes in additional units, dependent on their size, viz.: 15-4 \$7.00 plus No. S-10 \$12.50 equals \$59.50.

FLASHERS



No. 604

WYNK-A-LITE FLASHING PLUG

No. 604

List Price \$0.15

PRONG TYPE FLASHER

No. 620

List Price \$0.20



No. 620



No. 615

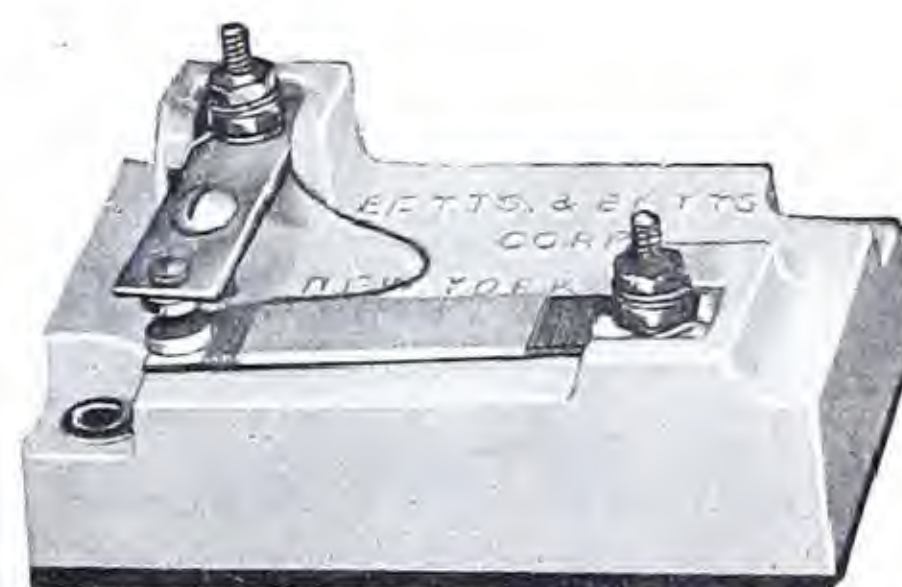
PORCELAIN RECEPTACLE FLASHER

No. 615

List Price \$0.35

PORCELAIN CHAT FLASHER

List No.	Watts	List Price
169	100	\$0.40
672	220	3.30
674	440	5.30
676	660	8.00

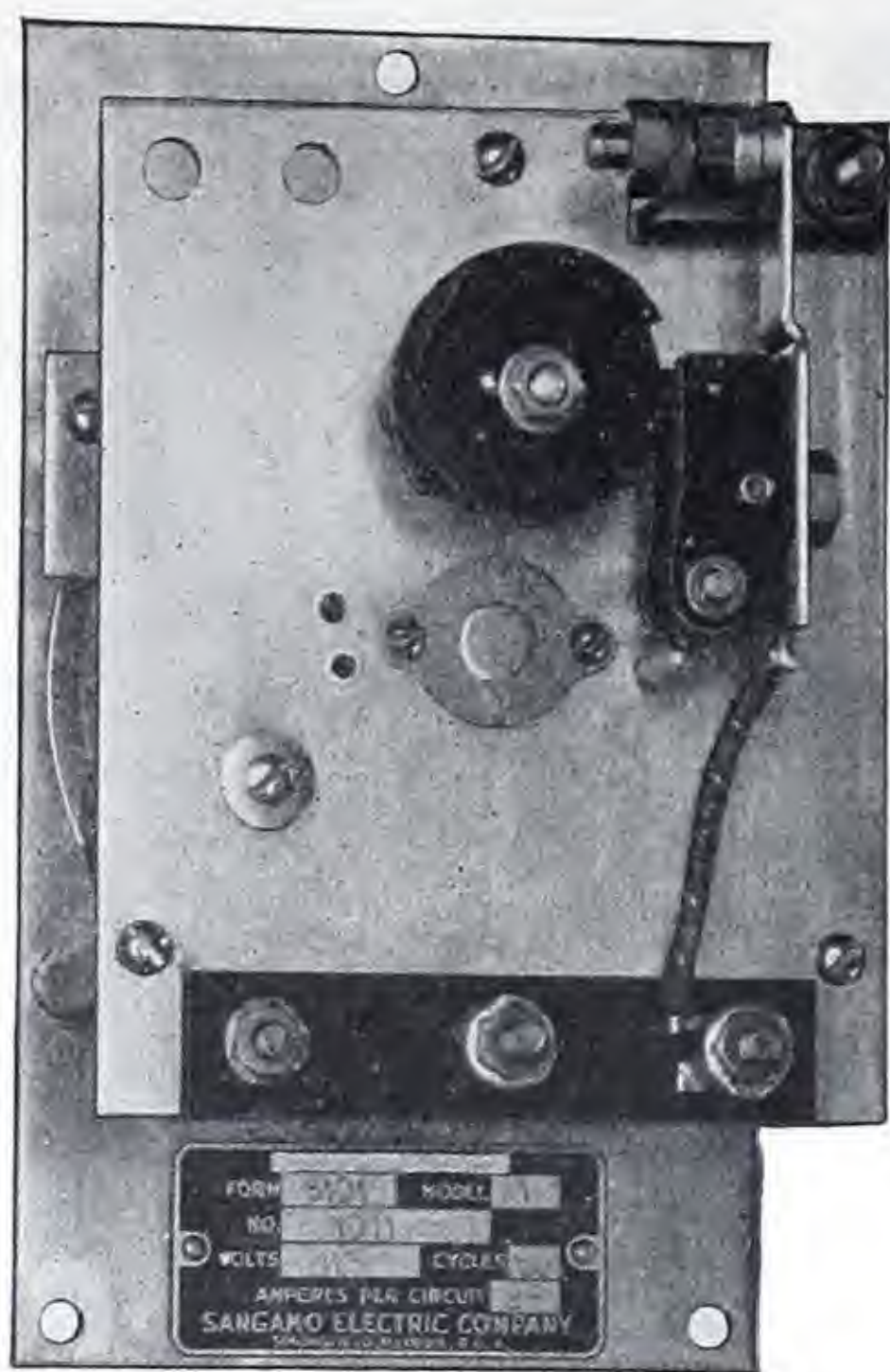


No. 672

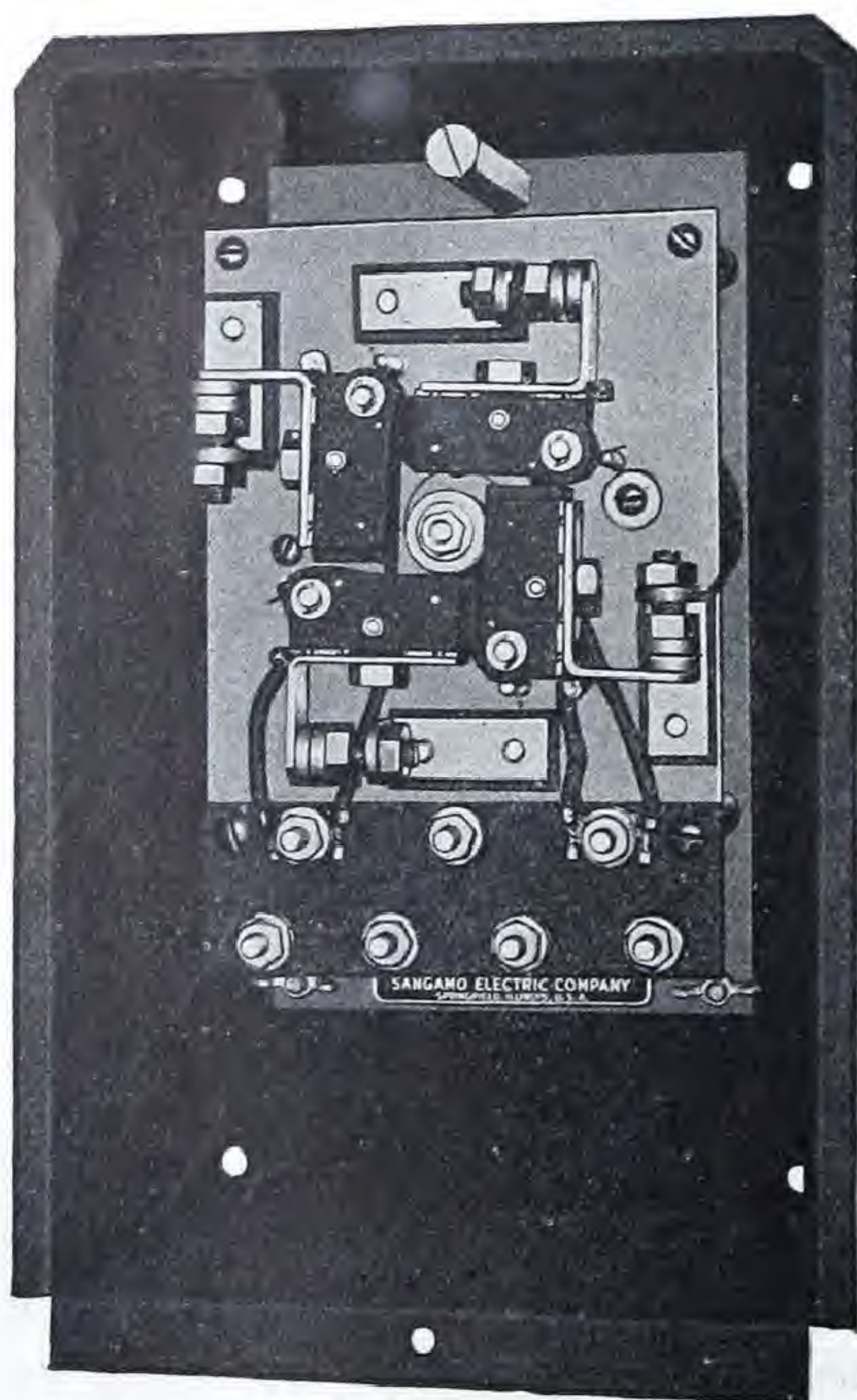
Whatever your problem may be in light control, you will find that many can be solved by the use of some of the flashers and time clocks shown in this section of our catalogue. If not, you have available the assistance of our lighting specialists, located at our various distributing houses. Put your problem up to them. They are there to help you.

SANGAMO SIGN FLASHERS

Motor Driven



Single Contact "off and on" Flasher
Model 1, Form 6101



Model 2, Form 6144

FLASHERS, MODELS 1 AND 2

Sangamo Flashers are built to give a long-life, trouble-free, and dependable service for years. They are distinguished by their simplicity and sturdy construction. They are built to control any type of display from a simple "off and on" effect to the most complicated spectacular action.

SANGAMO SIGN FLASHERS

Motor Driven

FLASHERS, MODELS 1 AND 2

Continued

Models 1 and 2, "Off and On" and "Chaser" flashers, are small and compact. They are designed so that they may be installed inside the sign in order to reduce the cost of installation. The size of these units is $4\frac{1}{4}$ inches wide, $7\frac{1}{2}$ inches high and $4\frac{1}{4}$ inches deep.

Pure silver contacts are used on all flashers. They will not pit or stick, and will insure long life without replacement. These contacts have proved by years of satisfactory operation that they are a superior form of contact for use in sign flashers. The use of silver contacts allows the flasher to be operated in any position; no leveling or final adjustment of the flasher after installation is needed. Neither are they affected by heat or cold, or by short circuits in the sign.

High grade, hardened, ground and polished, ball bearings are used throughout. The ball bearings are enclosed in dustproof housing, lubricated in assembly with a high grade non-corrosive, non-evaporating oil, and need no further attention during the life of the flasher. With this type of bearing, the operation of the flasher is not affected by extreme heat or cold.

The slow speed induction disc motor has a simple speed adjustment. The fast speed is two times greater than the slow speed. The cost of operation of these flashers is very small; the motor draws less than seven watts on the Model 1 and less than thirteen watts on the Model 2.

All steel parts on Sangamo Flashers are heavily nickel plated over copper. All drives are either direct or through spur gear reduction. This insures positive and even action.

The contact points are rated to carry 25 amperes, 2,875 watts per circuit, 115 volts, alternating current; or 2,875 volt-ampere neon tube transformer load.

OFF AND ON OR ALTERNATE FLASHER MODEL 1

Flasher Size $4\frac{1}{4}$ "x $7\frac{1}{2}$ "x $4\frac{1}{4}$ ". Cabinet Size 6"x $9\frac{1}{2}$ "x5".
25, 50 or 60 Cycles

List No.	No. of Circuits	Circuit Timing	Wired	Total Wattage
O 1-6101	1	Off and On	115	2875
O 1-6102	2	Off and On	115-230	5750
O 1-61A2	2	Alternate	115-230	5750
1-61A4	4	Alternate	115-230	11500

Circuit per Wattage: 2875. Amperes per Circuit: 25.

Speed Adjustment: 15 to 30 flashes per minute.

For special speeds consult factory.

For 25 cycle: specify speed of flash desired.

HIGH SPEED BORDER CHASER FLASHER MODEL 2

Flasher Size $4\frac{1}{4}$ "x $7\frac{1}{2}$ "x $4\frac{1}{4}$ ". Cabinet Size 6"x $9\frac{1}{2}$ "x5".
25, 50 or 60 Cycles

List No.	No. of Circuits	Circuit Timing	Wired	Total Wattage
O 2-6133	3	1-3	115-230	8625
2-6136	6	1-3	115-230	17250
O 2-6144	4	1-4	115-230	11500
2-6148	8	1-4	115-230	23000
2-6166	6	1-6	115-230	17250

Circuit per Wattage: 2875. Amperes per Circuit: 25.

Speed Adjustment: 150 to 250 flashes per minute.

25 cycle Model 2 flashers driven by a constant speed induction motor, specify speed of flash on order.

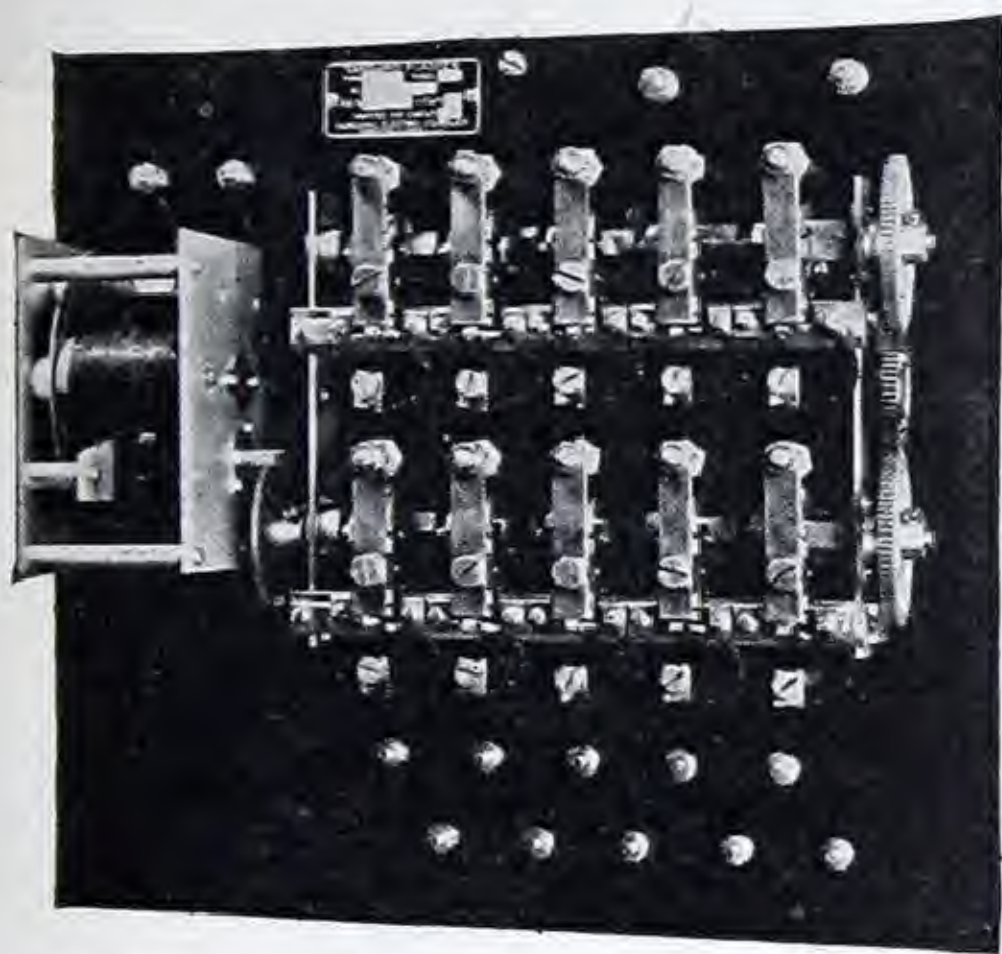
SANGAMO SIGN FLASHERS**Motor Driven****FLASHERS, MODELS 1 AND 2**

Continued

DIRECT CURRENT FLASHERS

Standard A.C. flashers can be used on direct current where alternating current is available for the motor. Condensers of the proper size and type must be connected to the contacts for proper operation. Where A.C. is not available for the motor, flashers can be furnished driven by a direct current motor.

For prices consult our office, giving number of circuits, load per circuit and flashing cycle or sequence desired.



Speller Flasher, Model 4, Form 61S12

SPELLER FLASHER, MODEL 4

Speller flashers are so designed that they can be built to meet any requirement in the control of electric signs.

They are equipped throughout with ball bearings and silver contacts.

Each contact is controlled by individual split cams. One cam controls the "on" operation and the other one the "off" operation; only one "on" and "off" operation per contact per cycle.

When two or more circuits are to operate in unison the whole load is put on one contact, if it doesn't exceed the capacity of one contact. In case the load is larger than the capacity of one contact, then the load is broken through layers, so that a clean cut operation is assured.

The contacts on the Model 4 Speller flasher are in two sizes. 15 and 50 amperes, alternating current.

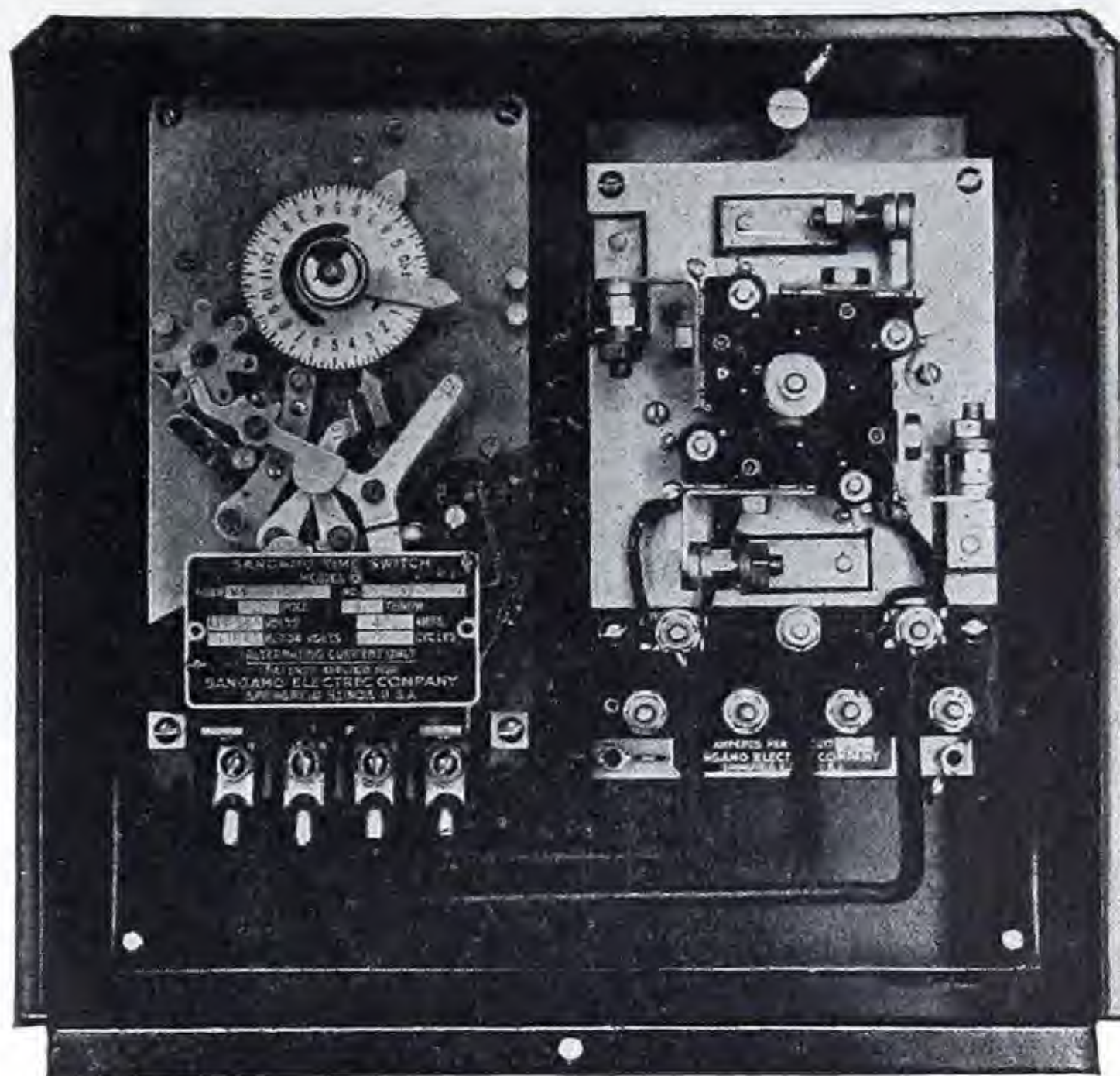
The 50 ampere contact is recommended when the operations are not over ten per minute.

25, 50 or 60 Cycles

When ordering Speller type flashers, be sure to furnish the office with complete information, including the number of circuits, load per circuit, flashing cycle or sequence of operation desired, and advise whether 115 volts, 2 wire or 115/230 volts, 3 wire power supply is available.

For D.C. prices, consult the office, giving complete information for quotation.

Speller type flashers complete with all fuses, relays and wiring can be supplied. For prices, consult office giving complete information.

SANGAMO FLASHERS**Motor Driven**

VS-21 Time-Switch and Form 6144 Flasher

FLASHERS WITH TIME SWITCHES

A convenient combination is the unit consisting of a flasher and time-switch mounted in the same cabinet, as illustrated.

This combination can consist of any of the various models of flashers with either Form VS, VSC or VW time-switch to produce any flashing effect or time-switch control that might be desired. All electrical connections between the time-switch and flasher units are made at the factory; only the external leads to and from the combination units are required. This results in a saving in the installation costs.

FLASHERS, MODEL 3

The Model 3 flasher has been developed to fill the need for a small, inexpensive, but dependable flasher that is simple in design and rugged in construction. The flasher, complete with cabinet, weighs less than six pounds, and will operate in any position. It is an ideal unit for the control of small signs and will give dependable and satisfactory service for a long period of time.

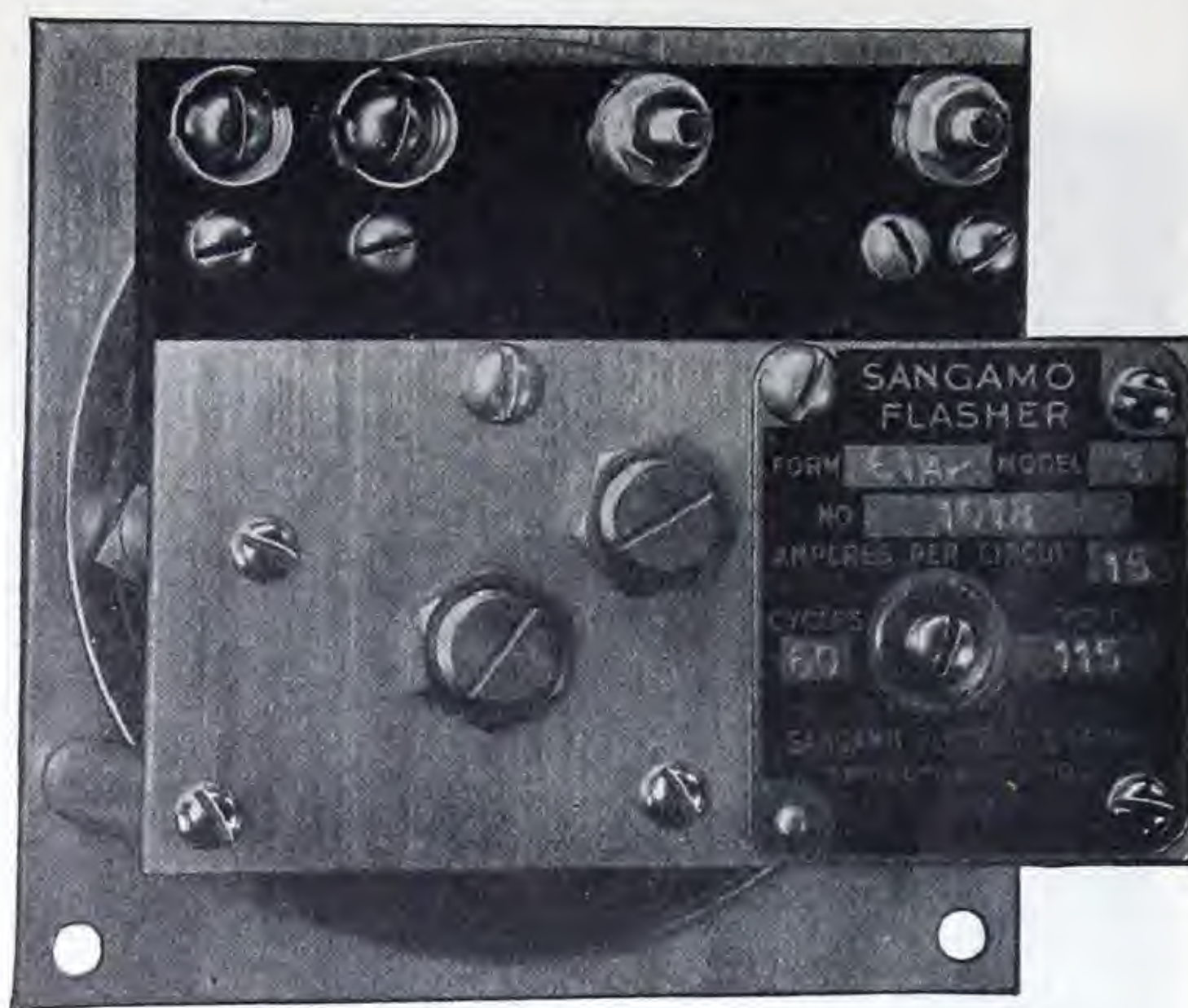
The flasher has pure silver contacts and is driven by a slow speed induction motor. This motor has a simple speed adjustment which permits a change in speed over a very wide range. The bearings are of the polished pivot construction, and are lubricated for the life of the flasher. The operations are not affected in any manner by extreme variations of temperature. The contacts are rated at 15 amperes, (1725 watts or 1725 V.A. transformer rating) 115 volts alternating current.

The contact fingers are equipped with rollers which ride on bakelite cams. This unit is so designed that it can be installed in the sign and will operate in any position.

All steel parts are finished with nickel over copper, an accepted rust-proofing treatment.

SANGAMO FLASHERS

Motor Driven



"Alternate" Flasher, Model 3, Form 61A2

FLASHER MODEL 3

OFF & ON AND ALTERNATE FLASHERS

4 $\frac{5}{8}$ "x4 $\frac{3}{8}$ "x2 $\frac{1}{4}$ " 25, 50 or 60 Cycles

List No.	No. of Circuits	Circuit Timing	Wired	Total Wattage
O 3-6101	1	Off and On	115 V.	1725
O 3-6102	2	Off and On	X115	3450
3-6103	3	Off and On	115-230	5175
3-6104	4	Off and On	115-230	6900
O 3-61A2	2	Alternate	X115	3450
3-61A3	3	Alternate	115-230	5175
3-61A4	4	Alternate	115-230	6900

Circuit per Wattage: 1725. Amperes per Circuit: 15.

Cabinet: Cabinets for flashers marked "O"—Slide cover type. "Weatherproof" Cabinets for other flashers not marked "O," hinged type.

Speed of flash: 15 to 30 flashes per minute.

Standard cams are set for 50-50 operation.

"X" In case flashers marked "X" are desired wired for 115/230 volts, specify on order.

For 25 cycle flashers specify speed of flash desired.

HIGH SPEED BORDER CHASER FLASHERS

4 $\frac{5}{8}$ "x4 $\frac{3}{8}$ "x4" 25, 50 or 60 Cycles

List No.	No. of Circuits	Circuit Timing	Wired	Total Wattage
3-6133	3	1-3	115-230	5175
3-6144	4	1-4	115-230	6900

Circuit per Wattage: 1725. Amperes per Circuit: 15.

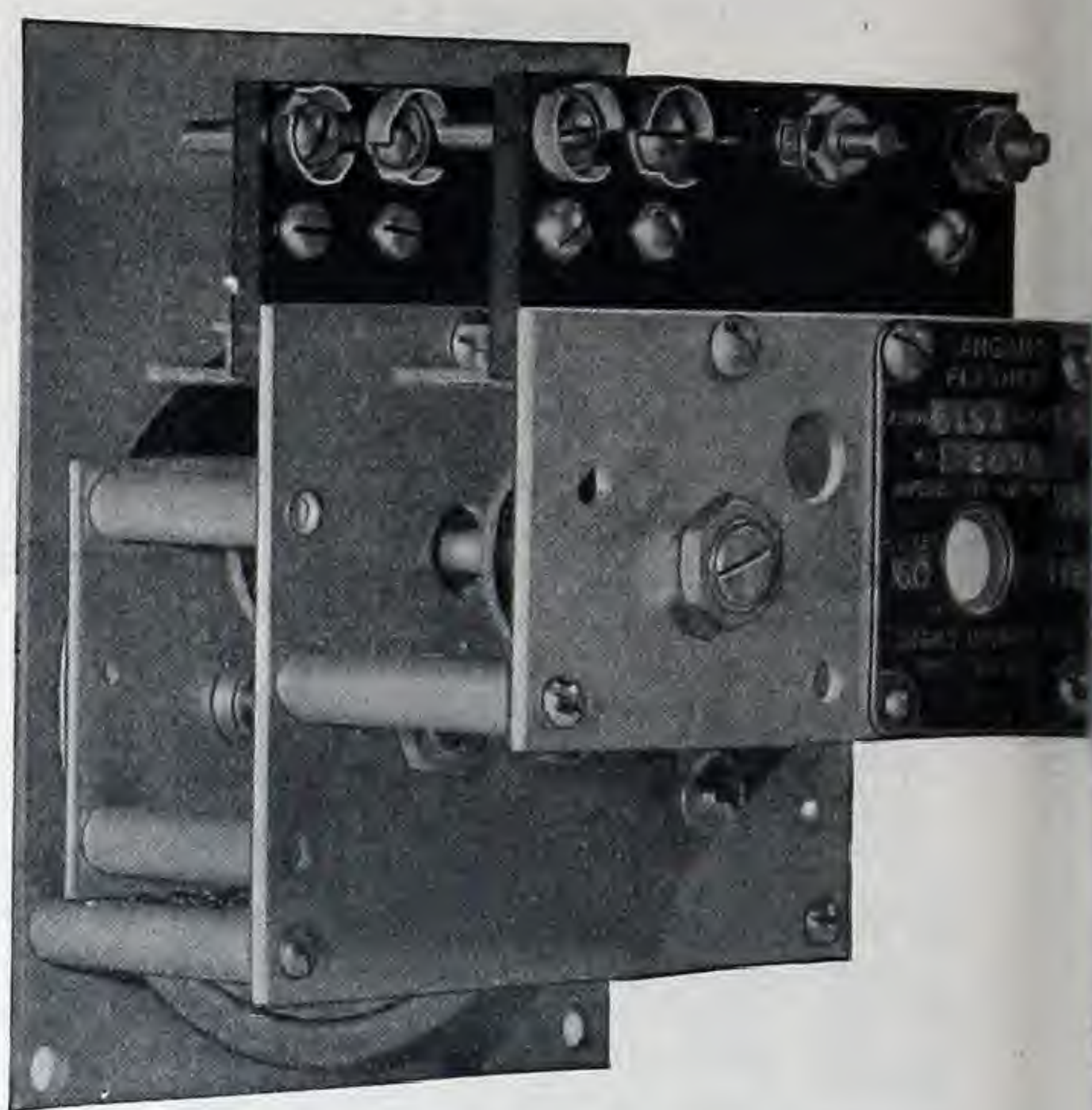
Standard flashing: 1 "off," 3 "on."

Speed of flash: 175 to 240 flashes per minute.

For 25 cycles specify speed of flash desired.

SANGAMO FLASHERS

Motor Driven



Model 3, Speller Flasher, 3-61S4

SPELLER FLASHER, MODEL 3

The Model 3 Speller Flasher was designed to fill the need for an inexpensive Speller Flasher. This unit uses the standard Model 3 contacts rated at 15 amperes, 115 volt alternating current. The cams are made of canvas backed bakelite, and are cut to meet the different flashing cycle as required. The cams are all cut special so for each circuit as many operations per cycle per contact as desired may be supplied.

The above illustration shows the type of construction used to four contacts. Above four contacts a slightly different mounting arrangement is required.

With this arrangement the motor is mounted on edge at the left of a steel plate, with the contacts mounted to the right in a horizontal plane. As many contacts as may be required for the control of any spelling action can be supplied.

25, 50 or 60 cycles

List No.	No. of Circuits	Circuit Timing	Wired	Total Wattage
3-61S1	1	As	115	1725
3-61S2	2	specified	115	3450
3-61S3	3	on	115-230	5175
3-61S4	4	Order	115-230	6900
	*			

Circuit per Wattage, 1725. Amperes per Circuit, 15.

*Five contacts or more see below.

For 25 cycles add \$5.00 list extra.

Three different fast cycles may be had as follows: 4 seconds, 8.5 seconds, 18.7 seconds, (the slow cycle is three times as long as the fast cycle and is easily adjusted).

For Speller type flashers having more than four contacts specify complete information on order as to the number of circuits, timing desired, wattage per circuit.

SANGAMO FLASHERS

Motor Driven

RADIO INTERFERENCE ELIMINATOR

The arcing at the contacts of the flashers may cause radio interference which, on some installations, is objectionable.

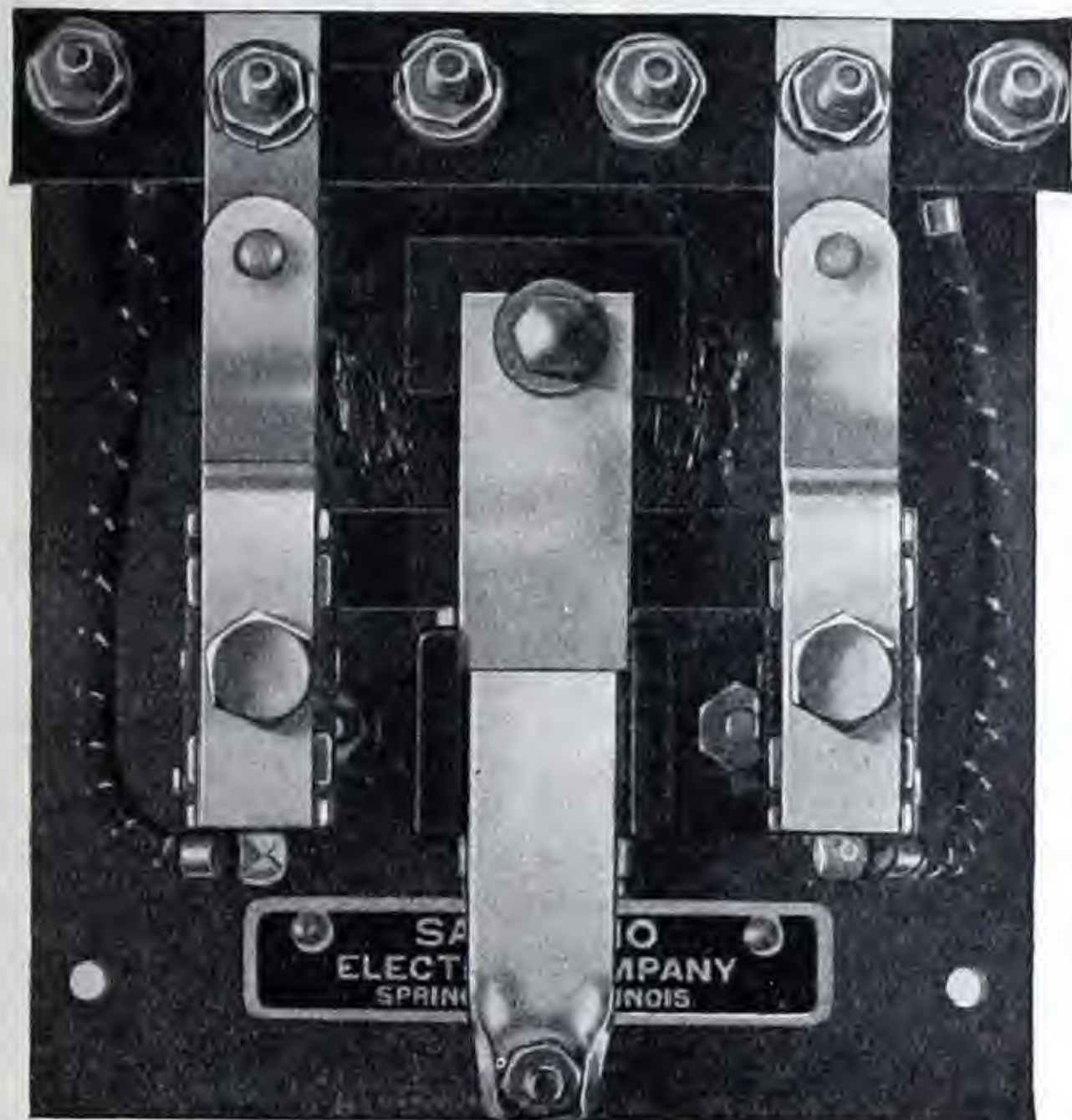
Each eliminator consists of two choke coils and two condensers, so that the interference is completely choked and given a path to ground.

For best results eliminator should be mounted in the same cabinet as the flasher and with the leads as short as possible.

Three types of eliminators have been developed to reduce interference to a minimum.

One eliminator is required for each contact or circuit that is causing the interference. Full directions for connecting the eliminator are supplied.

List No.	Amperes per Circuit	
A	5	One Unit required for each circuit causing interference
B	15	
C	25	



Relay No. 6-61F2

RELAY MODEL 6

A new relay, primarily for sign flashing duty, has been developed and designed for use in connection with flashers.

It can be used where the load is larger than the capacity of one contact or where it is desired to break a number of circuits at one time for a clean cut "off" and "on" action.

This relay is made in two styles only, each having two poles and for use on alternating current only. The type 6-61F2 has the contacts closed when the coil is energized. The other type, 6-61R2, has the contacts opened when the coil is energized.

The relay is small in size, quiet in operation and so designed that the mechanical movement is extremely small. This makes an ideal unit when used where an extremely large number of operations are expected.

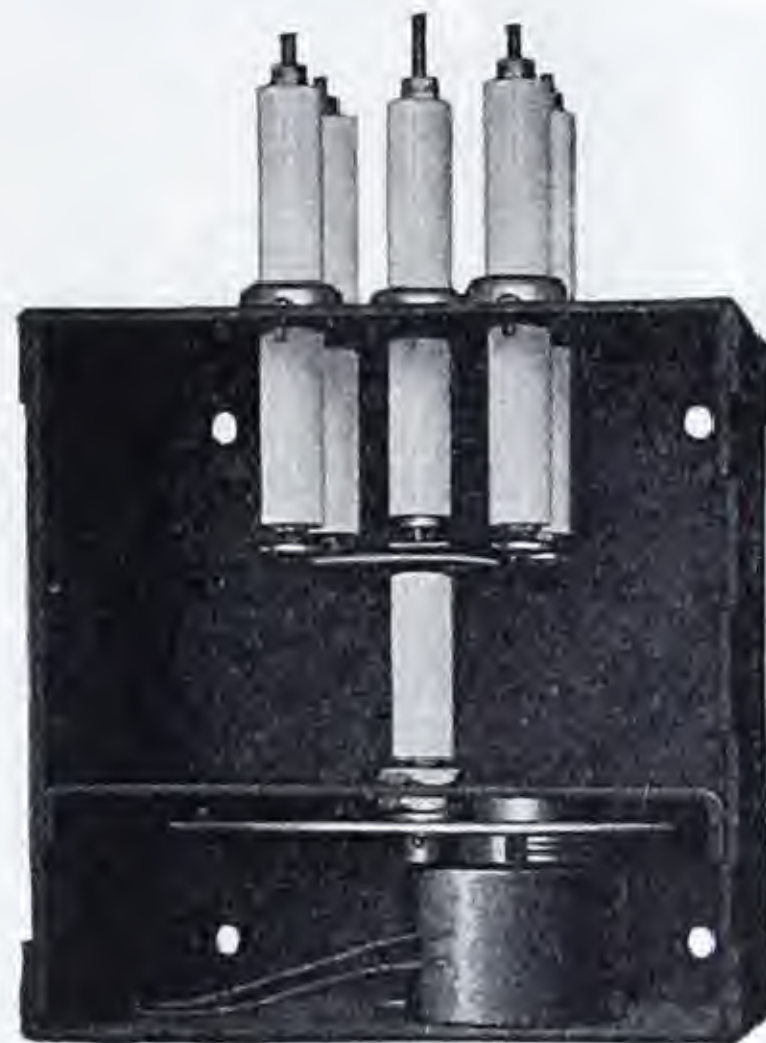
25, 50 or 60 cycles

List No.	No. of Circuits	Amperes per Circuit	Wattage per Circuit	Total Wattage
6-61F2	2	75	8625	17250
6-61R2	2	75	8625	17250

For use on alternating current only. Specify voltage.

SANGAMO FLASHERS

Motor Driven



Neon Flasher

HIGH VOLTAGE NEON FLASHER MODEL 5

The Model 5 Flasher is an adjustable speed motor driven unit for the flashing of neon tube signs on the high voltage or secondary side of the transformers.

The switching mechanism is operated on the well-known automobile ignition distributor system and is reliable, dependable and positive in action. Each unit will handle one 15,000 volts, 30 M.A. transformer. Glazed porcelain insulation is used throughout on all the high voltage circuits. All metal parts in the contact chamber are of stainless steel to prevent corrosion.

The speed of flash is varied by a simple speed adjustment from 75 to 300 flashes per minute.

The unit is compact and can be mounted inside the sign. For best results the flasher should be mounted with terminals in the "up" position. Be sure all terminals are connected.

As shown below the flasher is made in four different styles, depending on the number of circuits required.

For more than six circuits, full information is required as to the flashing effect desired, size of transformers, etc. Flashers can be furnished where more than one transformer is used.

25, 50 or 60 Cycles

Model	Number of Circuits	Rate of Flash
5-61N2	2	75—300
5-61N3	3	75—300
5-61N4	4	75—300
5-61N6	6	75—300

Cabinet size, $4\frac{3}{8}" \times 4\frac{3}{8}" \times 5\frac{1}{2}"$. Shipping weight, 6 lbs. Flashing speed 5-35 flashes per minute, can be supplied.

Specify Voltage. Speed of 25 cycle flasher 50 to 85 flashes per minute. Double speed can be had by using a flasher with double the required number of terminals.

SANGAMO TIME SWITCHES

Form VW



Double-Pole, Single-Throw

SANGAMO FORM VW TIME SWITCH

1. Electrically Wound.
2. Ten Hours Reserve.
3. Forty Ampere Capacity.
4. Revolutionary Mechanical Contact.
5. Manual Operation without Disturbing Sequence.
6. Jeweled Balance.
7. Sunday and Holiday Cutout.
8. Dustproof Mounting.
9. Pry-outs at Back and Bottom.
10. Fully Guaranteed.

A constant speed alternating current motor winds the mainspring and keeps it wound. During current interruptions the mainspring carries on, having a reserve of ten hours.

A jeweled balance with non-magnetic, non-rusting, temperature compensating, special alloy hairspring guarantees dependable time.

The contacts are slow opening through a small gap; revolutionary, but thoroughly tested and guaranteed.

The switch is equipped with a Sunday and Holiday cutout. Three pins are regularly supplied and one of these should be placed in each of the positions representing the days the switch is not to operate.

Levers for three complete daily operations are supplied, allowing for either one, two or three on and off periods each day.

Either on or off levers may be tripped manually without affecting the sequence of subsequent operations.

Switch is supplied for 115 volts or 230 volts either 25, 50 or 60 cycle and is made in three forms:

- VW-11 Single-Pole, Single-Throw
- VW-12 Single-Pole, Double-Throw
- VW-21 Double-Pole, Single-Throw

Prices on application.

SANGAMO TIME SWITCHES

Form VS



SANGAMO FORM VS TIME SWITCH

1. Low Speed High Torque Self-Starting Synchronous Motor.
2. Forty Ampere Capacity.
3. Silver Contacts.
4. Manual Operation without Disturbing Sequence.
5. Sunday and Holiday Cutout.
6. Dustproof Mounting.
7. Arranged for Conduit Connection with Pryouts at Back and Bottom.
8. Fully Guaranteed.

A low speed, high torque self-starting synchronous motor operates the time switch unit and guarantees accurate operation on controlled frequency circuits. In event of power interruption, the motor will start automatically when power is restored, it only being necessary to reset the dial to the correct time.

The contacts open through a small gap approximately fifteen thousandths of an inch. Arcing at the contacts is practically eliminated giving phenomenal performance in service.

The switch is equipped with a Sunday and Holiday cutout. Three pins are regularly supplied and one of these should be placed in each of the positions representing the days the switch is not to operate.

Either on or off levers may be tripped manually without affecting the sequence of subsequent operations.

The complete unit with contact mechanism and moulded bakelite terminal block is mounted in a pressed steel case having a hinged door. Pryouts for $\frac{1}{2}$ " and $\frac{3}{4}$ " conduit are provided at the bottom and back. Ample space is allowed for making connections to the terminal block. The door is arranged with a hasp for locking or sealing. The switch can also be furnished mounted in a weatherproof case for outdoor use.

The Form VS time switch is supplied for operation on 115 or 230 volts, 25, 50 or 60 cycle. It is rated at 40 amperes as follows:—

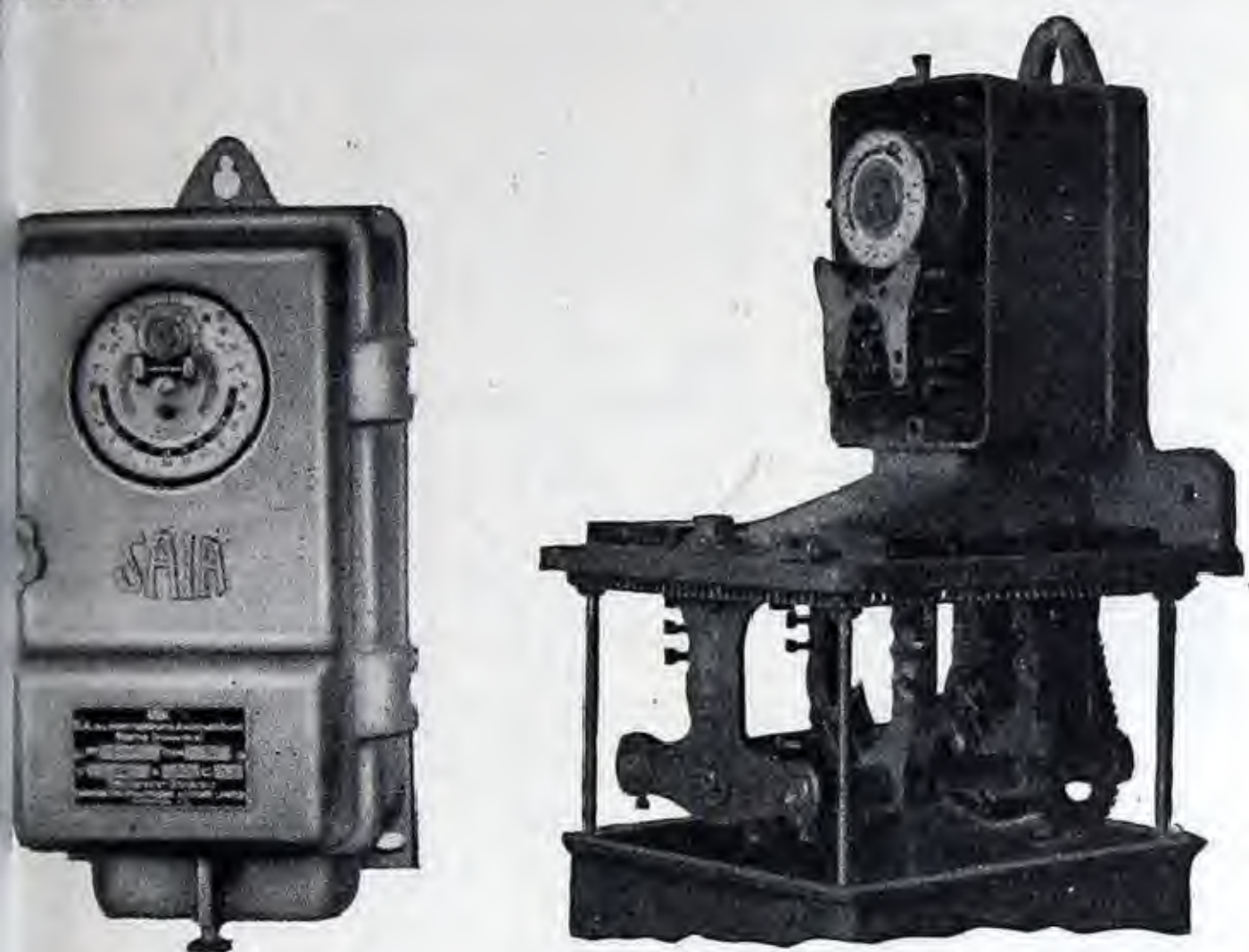
- VS-11 Single-Pole, Single Throw
- VS-12 Single-Pole, Double Throw
- VS-21 Double-Pole, Single Throw

It can also be supplied as a Double-pole, Double Throw and Triple-pole, Double Throw with a rating of 6 Amperes 115 Volts and 3 Amperes 220 Volts.

Prices on application.

SAIA SWITCHES

Saia Switches are motor driven time and remote control switches electrically wound and electrically propelled so as to operate absolutely automatic day in and day out, throughout the year. They are made in Switzerland and have a 15 jewel high grade Swiss clock movement. They can be supplied with either an astronomical clock face dial or a plain clock face dial.



Types

All clock controlled Saia Switches are equipped with high grade Swiss clock, 15 jewels, anchor escapement, temperature compensation and electric wind.

Type Z apparatus are standard time switches.

Type Z switches (except 100/200 amp. range) can be equipped with additional separate 10 amp. switch or remote control actuating switch, operated from same clock, at different hours from the main switch, and suitable for the control of small sign, heater, pump circuits or other type F remote switches, all listed sizes.

Type F apparatus (without clock) are remote control switches, operated from type Z master-clock or from or in conjunction with, thermo regulators for temperature control of liquids, air or mixtures, electrically heated.

Type ZF apparatus similar to type F, but containing clock, arranged to close and open heater circuit, and in conjunction with thermo regulators, maintain temperature during certain predetermined hours.

Type FR apparatus (without clock), but with built-in 110-volt coil, used in service with 110/220 volt, 3-wire systems having additional 4th wire for street lighting. The FR switch is designed to relay the lighting circuits, etc.

The push-on feature makes it possible to close or open the switch, by means of an external, approved type, 110-volt, bell-push, independently of the setting of the clock-arms. This switch can be placed under a store counter or other remote but convenient place, and is not included in the price.

Dials are arranged with two on and two off operations daily and can be plain (hand-set) or astronomical which automatically adjust the trip-arms daily to synchronize with the changing daylight throughout the year. Additional operating arms can be supplied (see extras list).

Motors in all stock switches are wound for 110-volts (only). If this voltage is not available, then clearly specify what voltage is obtainable for motor excitation.

Type ZW group switch arranged to close two circuits, single pole, at evening, one circuit opening at midnight, the other at dawn.

Saia Switches are made for use with alternating current only.

SAIA SWITCHES

LIST PRICES

Size in Amperes	Weight in Pounds	Type Z Time Switches with Plain Dial			Group Switches ZW
		1 Pole	2 Pole	3 Pole	
250 Volt; Air-break Switch					
6	7	\$120.00	\$140.00	.....	.....
10	7	\$126.00	\$146.00	.....	.....
15	9	145.00	\$150.00	155.00	160.00
25	10	162.00	\$168.00	174.00	176.00
30	11	180.00	\$190.00	200.00	195.00
40	23	195.00	\$210.00	225.00	255.00
60	24	210.00	\$225.00	240.00	285.00
600 Volt, Air-break Switch					
15	10	150.00	155.00	160.00	.....
40	23	205.00	215.00	230.00	.....

600-Volt, Oil-break Switch					
100	44	290.00	\$310.00	335.00	325.00
200	49	315.00	\$355.00	395.00	380.00

†These listings are stock switches and include push-on feature, except in 5 and 10 ampere sizes.

LIST PRICES

Size in Amperes	Weight in Pounds	Type ZF Switches			Type F Switches		
		1 Pole	2 Pole	3 Pole	1 Pole	2 Pole	3 Pole
250 Volt; Air-break Switch							
15	9	153.00	159.00	165.00	80.00	86.00	92.00
25	10	172.00	178.00	184.00	94.00	100.00	106.00
30	11	195.00	205.00	215.00	114.00	120.00	126.00
40	23	210.00	220.00	235.00	120.00	130.00	145.00
60	24	225.00	235.00	250.00	135.00	145.00	160.00
600 Volt; Air-break Switch							
15	10	158.00	164.00	170.00	82.00	93.00	99.00
40	23	220.00	230.00	245.00	130.00	140.00	155.00
600 Volt, Oil-break Switch							
100	44	300.00	320.00	345.00	225.00	245.00	270.00
200	49	320.00	360.00	400.00	245.00	285.00	325.00

For List Prices of type FR Switches add \$25.00 list per piece to all type F listings.

	List Extra
Push-on feature (except heavy type listing).....	\$15.00
Astronomical Dials.....	20.00
Sunday Cut-Out.....	30.00
Heating Unit (except 100/200 amp. and Sunday cut-out).....	20.00
Separate 10 amp. 1 pole Switch in Type Z.....	50.00
Separate Remote Control Switch in Type Z.....	40.00
Extra operating arms on dials, each.....	2.00
Prices on other special arrangements quoted on application.	

Type Q Thermo Regulator Unit, with Mercury Tube Switch, Single pole, temperature range up to 120°C, for liquids.	
6 amp., 250 volt, dimension chart, fig. 4.....	32.00
12 amp., 250 volt, dimension chart fig. 4.....	34.00
Add \$4.50 list for horizontal mounting.	

Type R, Thermo Regulators for use with Type F and ZF with adjustable temperature regulation.	
R1 - 20° to +120°C for liquids.....	36.00
R2 0 to +300°C for liquids.....	70.00
R3 - 10° to +120°C for air.....	50.00
R4 0 to +120°C for liquids.....	40.00

Type G Apartment House Passage Lighting Switches (without Clock) to automatically switch off lights 2-3-4 or 6 minutes after they have been switched on by hand, type ZG (with clock) provides continuous lighting during certain hours, after which the type G feature comes into effect.

All single pole:—	
5 amp., 250 volt Type G.....	70.00
10 amp., 250 volt Type G.....	75.00
5 amp., 250 volt Type ZG.....	185.00
10 amp., 250 volt Type ZG.....	195.00
High tension type HTS 40 amp. 2 pole, 2300 volts SAIA-RCOC combination, including Oil, Hangers, Plain Dial. Price.....	
\$520.00	

When ordering specify:—
Type of Apparatus—Give type letters.
Voltage of motor.
Voltage of Switch proper.
Number of Poles.
Frequency of supply.
Current Capacity in Amperes.
Type of Dial. If astronomical, state city of final destination.

JEFFERSON AIR-COOLED TRANSFORMERS

For Operating 110 Volt Lights and Equipment on Low Rate Power Circuits



Cover broken away to show primary leads in one compartment and the secondary leads in another.

H.E.P.C. App.
No. 2952

Jefferson Air-Cooled Transformers open the way for big savings in electrical bills. They permit lights, soldering irons, drills, and small motor-driven devices to be operated from high-voltage, lower-rate power lines. Whether a single light or a large number of devices must be supplied with 110-volt current (new installations or replacement work), the savings obtained from the use of a Jefferson Transformer pay worthwhile returns.

In addition to savings on electrical bills, eliminating separate circuits for 110-volt equipment saves wiring—both cost of installation and upkeep. In many cases the wiring saved alone will pay for the transformer.

Jefferson Air-Cooled Transformers are supplied in two types: Double Wound Transformers and Auto Transformers, both listed as standard by Underwriters' Laboratories. An innovation in construction is offered in the feature of entirely enclosed primary and secondary connections. Separate compartments are provided for primary and secondary splices, which may be brought into the transformer through either rigid or flexible conduit or armored cable, to meet National Electrical Code rulings. For open wiring, standard porcelain bushings may be used. The rugged cases are constructed of rust-resisting metal and are equipped with heavy mounting brackets. The highest grade core iron, re-annealed after punching, and double-vacuum impregnated windings are incorporated in the design of these Jefferson Transformers. All types up to 3-KVA, double-wound, and 5-KVA auto type, are compound filled, making them impervious to moisture and the elements. Transformers of capacities above these ratings are not compounded. In determining size of transformer, total volt ampere load must be properly figured, as inductive loads have low power factors causing the wattage to be decidedly less than the volt ampere load.

Double wound types are used in a wide variety of applications. Typical uses are railroad lighting and signaling; signal systems in schools, factories, mines; remote control switching; lights and other low-voltage devices which it is desired to operate from power lines; for insulating circuits from power and lighting supply lines; for emergency lighting systems.

Auto transformers—commonly called compensators or balance coils—are economical substitutes for ordinary transformers. Recommended for use where it is desired to operate 220-volt devices on 110-volt lines or 110-volt devices on 220-volt lines, where electrical code requirements permit the use of auto type transformers. Where auto transformers are used as balance coils the capacity will depend on the unbalanced load. It is usual, however, to figure this unbalancing at 25 per cent; hence, a 1000-volt amp. transformer will care for a 4000-volt amp. load with 25 per cent unbalancing. For example, across each 110-volt section of the transformer apply 50 per cent of the total load.

JEFFERSON AIR-COOLED TRANSFORMERS

For operating 110 volt lights and equipment on low rate power circuits.

DOUBLE WOUND TYPES

220-230-240 Volt Primary—110-115-120 Volt Secondary—60 Cycles

List No.	Capacity Volt Amps.	Depth	Width	Length	Approx. Net Wt. Lbs.	List Price
235-101	50	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	7 $\frac{1}{2}$	\$22.5
235-111	75	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	7 $\frac{1}{2}$	24.0
235-121	100	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	11 $\frac{3}{4}$	25.5
235-131	150	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	13	28.5
235-141	250	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	14 $\frac{3}{4}$	34.5
235-151	500	6	5	11	28	48.0
235-161	750	6 $\frac{3}{4}$	5	11	35	60.0

220-240 Volt Primary—115-230 Volt Secondary—60 Cycles

235-201	1000	7	8 $\frac{1}{4}$	12	59	77.0
235-211	1500	7 $\frac{1}{2}$	10	14 $\frac{1}{4}$	84	92.0
235-221	2000	7 $\frac{1}{2}$	10	14 $\frac{1}{4}$	99	110.0
235-231	3000	9 $\frac{1}{2}$	10	14 $\frac{1}{4}$	125	140.0
235-241	5000	11 $\frac{1}{2}$	10 $\frac{1}{8}$	14 $\frac{1}{4}$	132	207.0
235-251	7500	11 $\frac{1}{2}$	10 $\frac{1}{8}$	22	175	290.0
235-261	10000	14 $\frac{5}{8}$	10 $\frac{5}{8}$	26	265	360.0

440 Volt Primary—110 Volt Secondary—60 Cycles

235-501	50	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	8	22.5
235-511	75	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	8	24.0
235-521	100	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	12	25.5
235-531	150	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	13 $\frac{3}{4}$	28.5
235-541	250	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	14 $\frac{3}{4}$	34.5
235-551	500	6	5	11	28	48.0
235-561	750	6 $\frac{3}{4}$	5	11	35 $\frac{1}{2}$	60.0

550-440 Volt Primary—110-220 Volt Secondary—60 Cycles

235-301	50	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	8 $\frac{1}{2}$	24.0
235-311	75	3 $\frac{3}{4}$	4 $\frac{1}{8}$	6 $\frac{11}{16}$	8 $\frac{1}{2}$	25.5
235-321	100	5	4 $\frac{7}{8}$	7 $\frac{1}{16}$	12 $\frac{1}{2}$	27.0
235-331	150	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	14	31.5
235-341	250	5	4 $\frac{7}{8}$	7 $\frac{5}{8}$	23 $\frac{1}{2}$	37.5
235-351	500	6	5	11 $\frac{5}{8}$	27	52.5
235-361	750	7	8 $\frac{1}{4}$	11	57	65.0

440-220 Volt Primary—220-110 Volt Secondary—60 Cycles

235-401	1000	7	8 $\frac{1}{4}$	12	65	77.0
235-411	1500	7 $\frac{1}{2}$	10	14 $\frac{1}{4}$	88	92.0
235-421	2000	7 $\frac{1}{2}$	10	14 $\frac{1}{4}$	100	110.0
235-431	3000	9 $\frac{1}{2}$	10	14 $\frac{1}{4}$	160	140.0
235-441	5000	11 $\frac{1}{2}$	10 $\frac{1}{8}$	14 $\frac{1}{4}$	225	207.0
235-451	7500	11 $\frac{1}{2}$	10 $\frac{1}{8}$	22	300	290.0
235-461	10000	14 $\frac{5}{8}$	10 $\frac{5}{8}$	26	375	360.0

550-600 Volt Primary—220-110 Volt Secondary—60 Cycles

235-601	1000	7	8 $\frac{1}{4}$	12	65	80.0
235-611	1500	7 $\frac{1}{2}$	10	14 $\frac{1}{2}$	90	96.0
235-621	2000	7 $\frac{1}{2}$	10	14 $\frac{1}{2}$	101	116.0
235-631	3000	9 $\frac{1}{2}$	10	14 $\frac{1}{2}$	160	148.0
235-641	5000	11 $\frac{1}{2}$	10 $\frac{1}{8}$	14 $\frac{1}{2}$	225	215.0
235-651	7500	11 $\frac{1}{2}$	10 $\frac{1}{8}$	22	300	303.0
235-661	10000	14 $\frac{5}{8}$	10 $\frac{7}{8}$	26	375	380.0

AUTO TRANSFORMERS

220-230-240 Volt Primary—110-115-120 Volt Secondary—60 Cycles

List No.	Capacity Volt Amps.	Length	Width	Height	Weight Lbs.	List Price
233-101	100	6 $\frac{11}{16}$	4 $\frac{1}{8}$	3 $\frac{3}{4}$	7 $\frac{1}{4}$	17.5
233-111	150	6 $\frac{11}{16}$	4 $\frac{1}{8}$	3 $\frac{3}{4}$	9	19.5
233-121	250	7 $\frac{5}{8}$	4 $\frac{7}{8}$	5	9	27.0
233-131	500	7 $\frac{5}{8}$	4 $\frac{7}{8}$	5	14	34.5
233-141	750	11	5 $\frac{9}{16}$	6	26	42.0
233-151	1000	11	5 $\frac{9}{16}$	6	28	48.0
233-161	1500	11	5 $\frac{9}{16}$	6 $\frac{3}{4}$	33	60.0
233-171	2000	12	8 $\frac{1}{8}$	7	65	72.0
233-181	3000	14 $\frac{1}{4}$	10	7 $\frac{3}{8}$	90	87.0
233-191	4000	14 $\frac{1}{4}$	10	7 $\frac{3}{8}$	100	102.0
233-201	5000	14 $\frac{1}{4}$	10	7 $\frac{1}{2}$	108	118.0
233-231	7500	14 $\frac{1}{4}$	10	9 $\frac{1}{2}$	160	158.0
233-241	10000	14 $\frac{1}{4}$	10 $\frac{1}{4}$	11 $\frac{1}{2}$	225	195.0
233-251	15000	22	10 $\frac{1}{8}$	11 $\frac{1}{2}$	300	274.0
233-261	20000	26	16 $\frac{7}{8}$	14 $\frac{5}{8}$	375	340.0

All of the above prices are for 60 cycle transformers only. Prices covering other voltages and frequencies on application.

JEFFERSON TRANSFORMERS

Jefferson Core and Coil

LUMINOUS TUBE SIGN TRANSFORMERS

Jefferson core and coil types are particularly adaptable for all portable signs, where space is at a premium and where all sections of tube are to be operated. Each unit is assembled in the same careful and thorough manner as are Jefferson encased types. Windings are vacuum-treated, impregnated and the entire unit is dipped and baked in protective insulating varnish.

Universal mounting brackets are supplied on all core and coil types. These brackets hold the core rigidly, reducing to absolute minimum the possibility of any of these transformers developing an audible hum.

As shown in the illustration, core and coil transformers are equipped with flexible primary leads 4" long. The secondary leads are 4" long, are heavily insulated and provided with connection clips.

Jefferson core and coil transformers of 3000 volt secondary or less are listed as standard by the Hydro Electric Power Commission of Ontario, and when properly installed will insure Hydro approval of the completed sign. Care should be taken in the installation to see that there is ample clearance between secondary coils and sign enclosure. For example there should be $\frac{3}{8}$ " clearance when transformers of 3000 volt secondary or less are used, and $\frac{1}{2}$ " clearance when transformers of 4000 volts and above are used.



Type 720
Core and Coil

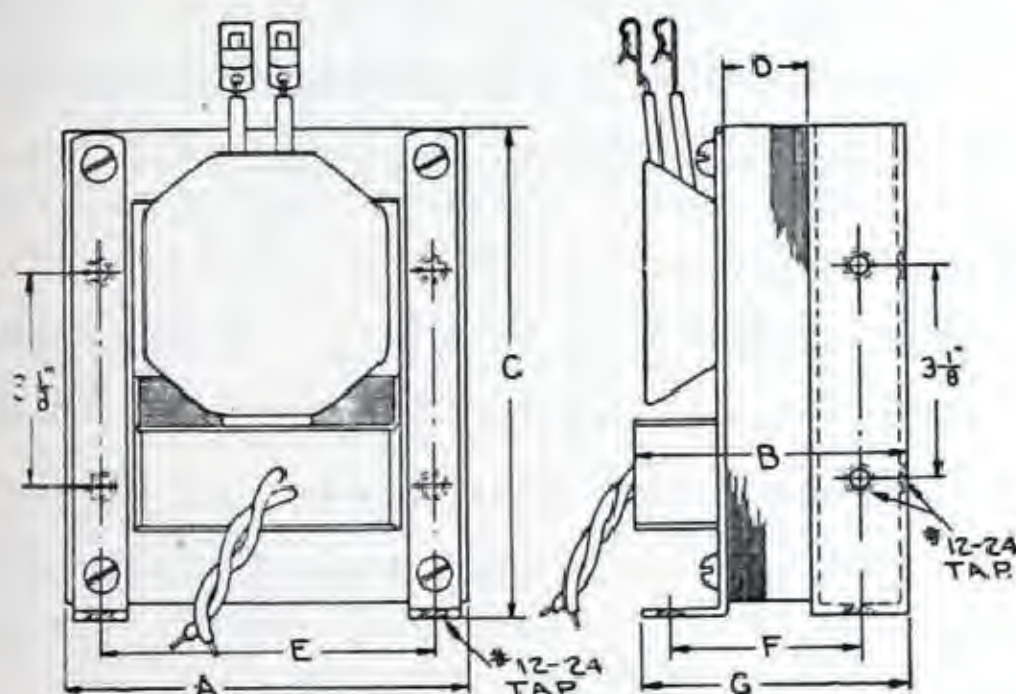


Fig. 9

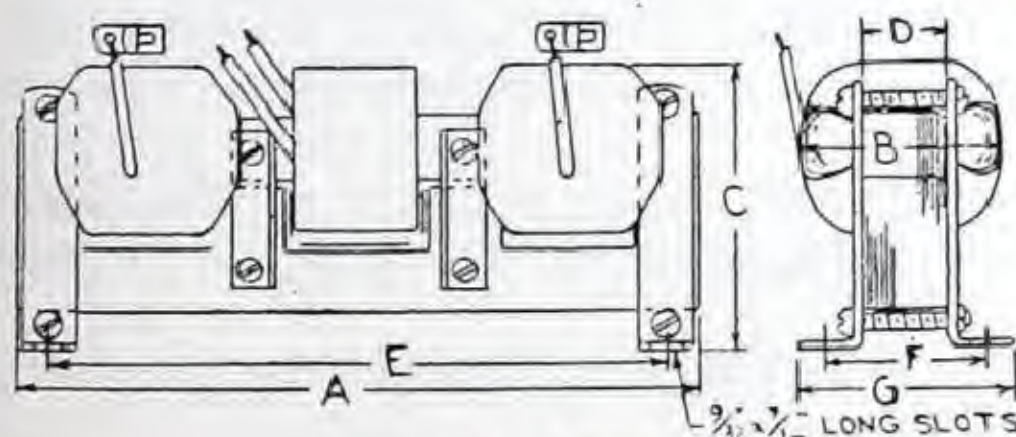


Fig. 10

List No.	Capacity V. A.	Secondary Volts	M. A.	Approx. Shipping Weight Lbs.
720-361	100	5,000	18	5 $\frac{1}{4}$
720-371	80	4,000	18	5
720-391	60	3,000	18	4 $\frac{1}{4}$
720-381	50	2,000	18	3 $\frac{1}{2}$

All of above Transformers have 110 volt 60 cycle primaries.

Approximate Dimensions in Inches

List No.	Fig.	A	B	C	D	E	F	G
720-351	10	8 $\frac{1}{4}$	2 $\frac{15}{16}$	3 $\frac{1}{4}$	1	7 $\frac{1}{2}$	1 $\frac{15}{16}$	2 $\frac{9}{16}$
720-331	9	3 $\frac{3}{4}$	2 $\frac{15}{16}$	4 $\frac{5}{8}$	1 $\frac{1}{4}$	3 $\frac{1}{8}$	2 $\frac{1}{4}$	2 $\frac{31}{32}$
720-361	9	3 $\frac{3}{4}$	2 $\frac{11}{16}$	4 $\frac{5}{8}$	1	3 $\frac{1}{8}$	2	2 $\frac{23}{32}$
720-371	9	3 $\frac{3}{4}$	2 $\frac{11}{16}$	4 $\frac{5}{8}$	1	3 $\frac{1}{8}$	2	2 $\frac{23}{32}$
720-391	9	3 $\frac{3}{4}$	2 $\frac{11}{16}$	4 $\frac{1}{4}$	1	3 $\frac{1}{8}$	2	2 $\frac{23}{32}$
720-381	9	3 $\frac{3}{4}$	2 $\frac{7}{16}$	4 $\frac{1}{4}$	$\frac{3}{4}$	3 $\frac{1}{8}$	1 $\frac{3}{4}$	2 $\frac{15}{32}$

JEFFERSON TRANSFORMERS

Luminous Tube Sign Transformers

Approved by the Hydro Electric Power Commission of Ontario



Nos. 721-111, 721-121



Nos. 721-141, 721-221



Nos. 721-111X, 721-121X



No. 721-161



No. 721-351

Jefferson luminous tube sign transformers are designed for use in all types of portable or fixed, indoor or outdoor neon signs.

The cases in which Jefferson transformers are assembled are made of extra heavy rust-resisting steel, with substantial brackets, providing the rugged construction so necessary to long lived transformers. Binding posts and nuts are cadmium plated to guard against corrosion, while the entire case is black enamelled, baked thoroughly to insure a tough and durable finish.

110 Volts 60 Cycle—Binding Posts Standard (one at each end of case)

List No.	Cap. V. A.	Approx. Watts Con- s'mpt'n	Secondary Volts	M. A.	Overall Dimensions Long	Wide	High	Approx. Ship. Wgt. Lbs.
721-111	450	225	15000	30	14 $\frac{3}{4}$	4 $\frac{3}{4}$	6 $\frac{3}{8}$	32
721-411	900	360	15000	60	14 $\frac{7}{8}$	6 $\frac{1}{4}$	7 $\frac{1}{8}$	47
721-221	250	125	12000	24	11 $\frac{9}{16}$	4 $\frac{3}{16}$	5 $\frac{11}{16}$	21
721-121	360	180	12000	30	14 $\frac{3}{4}$	4 $\frac{3}{4}$	6 $\frac{3}{8}$	32
721-421	720	310	12000	60	14 $\frac{3}{8}$	5 $\frac{1}{8}$	5 $\frac{7}{8}$	38
721-341	190	80	9000	18	11 $\frac{3}{8}$	3	4 $\frac{1}{2}$	13
721-141	250	125	9000	30	11 $\frac{9}{16}$	4 $\frac{3}{16}$	5 $\frac{11}{16}$	21
721-441	500	225	9000	60	14 $\frac{3}{8}$	5 $\frac{1}{8}$	5 $\frac{7}{8}$	32
721-151	225	100	7500	30	11 $\frac{9}{16}$	4 $\frac{3}{16}$	5 $\frac{11}{16}$	21
721-351	150	65	7500	18	11 $\frac{3}{8}$	2 $\frac{3}{4}$	4 $\frac{1}{2}$	10 $\frac{1}{2}$
721-131	180	75	6000	30	11 $\frac{3}{8}$	3	4 $\frac{1}{2}$	13
721-331	140	50	6000	18	11 $\frac{3}{8}$	2 $\frac{3}{4}$	4 $\frac{1}{2}$	10
721-161	150	70	5000	30	9 $\frac{1}{16}$	4	4 $\frac{7}{8}$	14
721-361	100	45	5000	18	8 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{3}{4}$	8 $\frac{1}{4}$
721-171	140	55	4000	30	8 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{3}{4}$	9
721-371	90	35	4000	18	8 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{3}{4}$	7 $\frac{1}{2}$
721-191	100	40	3000	30	8 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{3}{4}$	9
721-391	80	25	3000	18	8 $\frac{3}{8}$	3 $\frac{5}{8}$	4 $\frac{3}{4}$	8

110 Volts 60 Cycle—Binding Posts Standard (both at one end of case)

List No.	Cap. V. A.	Approx. Watts Con- s'mpt'n	Secondary Volts	M. A.	Overall Dimensions Long	Wide	High	Approx. Ship. Wgt. Lbs.
721-111X	450	225	15000	30	12 $\frac{11}{16}$	5 $\frac{5}{8}$	5 $\frac{7}{8}$	31
721-121X	360	180	12000	30	12 $\frac{11}{16}$	5 $\frac{5}{8}$	5 $\frac{7}{8}$	29
721-221X	250	125	12000	24	10 $\frac{7}{8}$	4 $\frac{3}{8}$	5 $\frac{3}{4}$	22
721-141X	250	125	9000	30	10 $\frac{7}{8}$	4 $\frac{3}{8}$	5 $\frac{3}{4}$	22

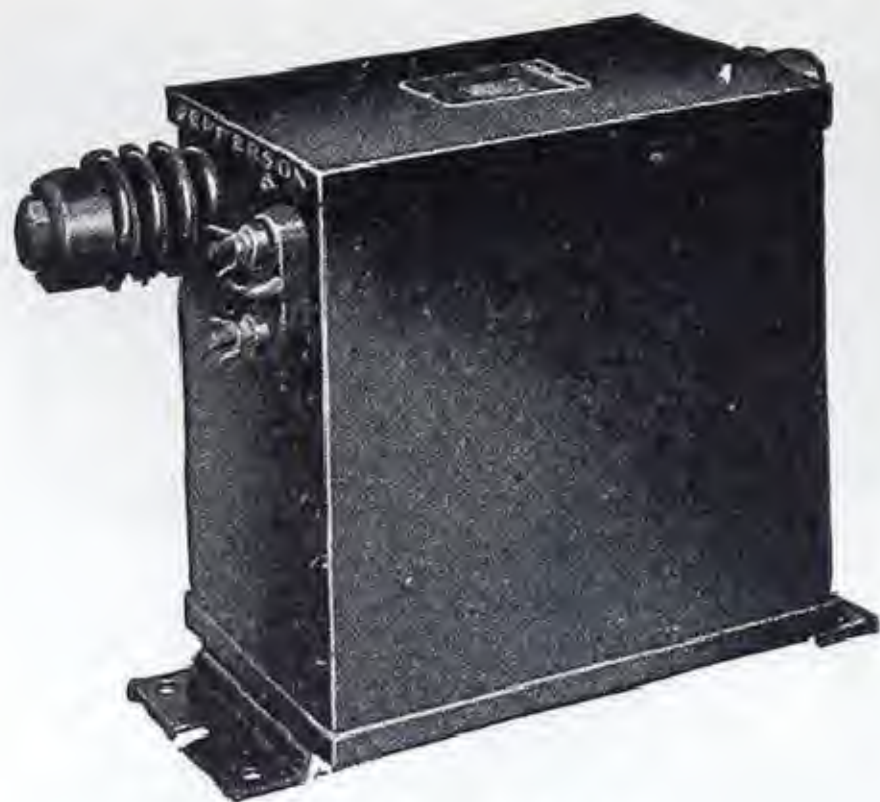
110 Volts 25 Cycle—Binding Posts Standard (one at each end of case)

List No.	Cap. V. A.	Approx. Watts Con- s'mpt'n	Secondary Volts	M. A.	Overall Dimensions Long	Wide	High	Approx. Ship. Wgt. Lbs.
721-112	450	225	15000	30	14 $\frac{7}{8}$	6 $\frac{1}{4}$	7 $\frac{1}{8}$	48
721-122	360	180	12000	30	14 $\frac{7}{8}$	6 $\frac{1}{4}$	7 $\frac{1}{8}$	43
721-222	250	125	12000	24	14 $\frac{3}{8}$	5 $\frac{1}{8}$	5 $\frac{7}{8}$	32
721-142	250	125	9000	30	14 $\frac{3}{8}$	5 $\frac{1}{8}$	5 $\frac{7}{8}$	32
721-162	150	75	5000	30	11 $\frac{9}{16}$	4 $\frac{3}{16}$	5 $\frac{11}{16}$	22

JEFFERSON TRANSFORMERS

High Power Type

Luminous Tube Transformers



Type "724"

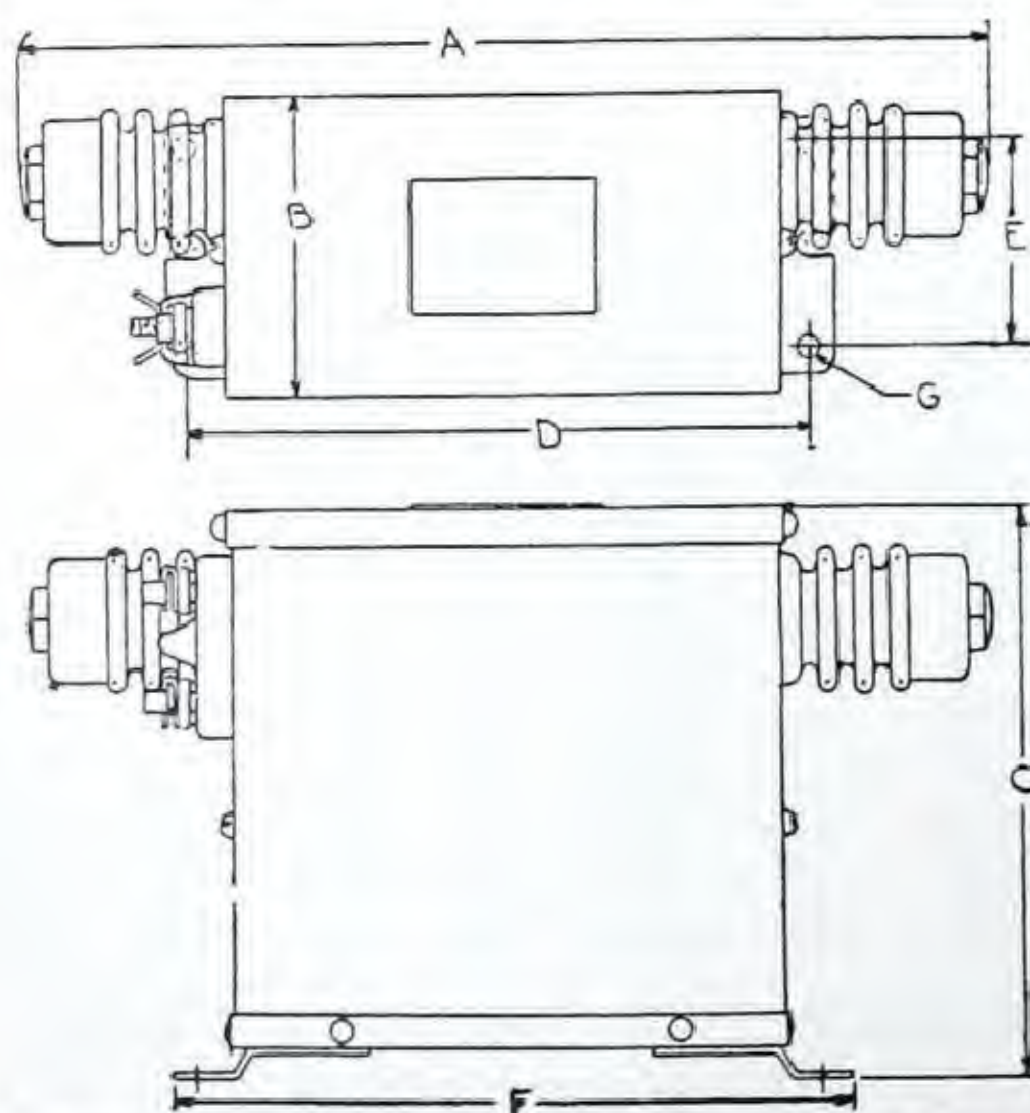
In some sections of the country, power supply companies have incorporated minimum power factor clauses in their contracts affecting all low power factor loads.

To provide luminous tube transformers suitable for use in cities operating under power factor rulings, Jefferson engineers have developed a series of transformers incorporating built-in capacitors.

The inherently high reactance of standard luminous tube transformers causes low power factor. In the Jefferson series "724" transformers this reactance is partially neutralized by the incorporation of the capacitor, which is treated and immersed in a liquid insulation of recent discovery which is non-inflammable, provides a much greater insulating factor and permits operation at higher temperatures without detrimental effects. Service records never before approached with capacitors of other types have been attained, and only after long and successful laboratory and field tests has this new capacitor been adopted. The method of installation prevents the capacitor from absorbing transformer heat, insuring operation at comparatively low temperatures.

These combination transformer and capacitor units operate at a power factor of approximately 90% when connected to the proper tube load under normal line voltage conditions.

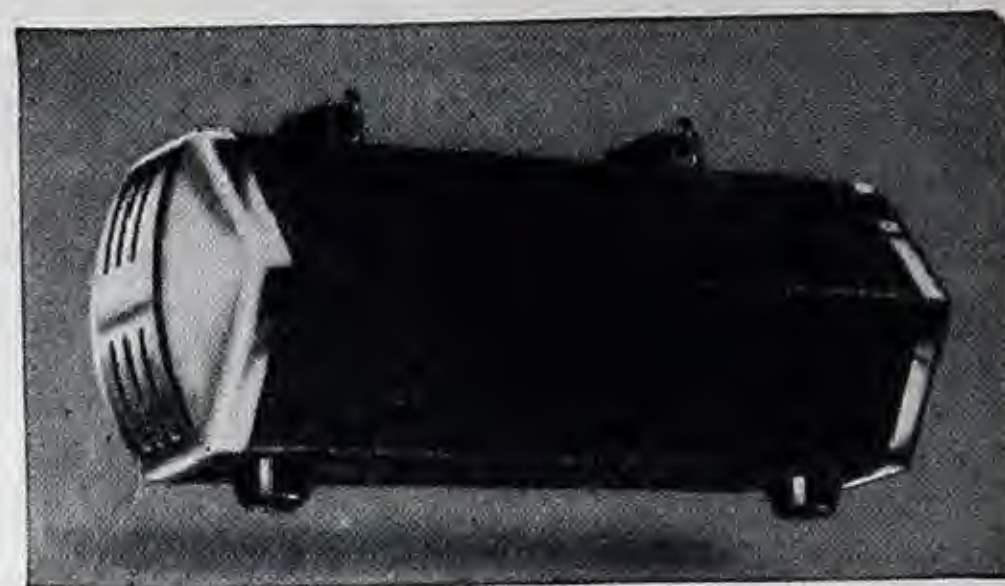
List	Capacity V.A.	Secondary Volts	M. A.	Approx. Ship- ping Weight Lbs.
724-111	250	15000	30	37
724-121	200	12000	30	35
724-221	150	12000	24	26
724-141	150	9000	30	26
724-151	120	7500	30	25
724-131	100	6000	30	20
724-161	90	5000	30	16



APPROXIMATE DIMENSIONS IN INCHES

List No.	A	B	C	D	E	F	G	H	J
724-111	14 $\frac{3}{8}$	5 $\frac{7}{16}$	7 $\frac{7}{8}$	8 $\frac{9}{16}$	10 $\frac{1}{16}$	3 $\frac{3}{16}$	10 $\frac{15}{16}$	6 $\frac{9}{16}$	7 $\frac{1}{16}$ x 5 $\frac{5}{8}$
724-121									
724-141									
724-151	11 $\frac{9}{16}$	4 $\frac{1}{2}$	7 $\frac{5}{8}$	7 $\frac{13}{16}$	8 $\frac{3}{16}$	2 $\frac{1}{2}$	8 $\frac{3}{4}$	6	1 $\frac{1}{4}$ x 2 $\frac{5}{8}$
724-221									
724-131									
724-161	9 $\frac{1}{8}$	4 $\frac{1}{16}$	6 $\frac{1}{2}$	6 $\frac{9}{16}$	7	2 $\frac{1}{2}$	7 $\frac{9}{16}$	5 $\frac{3}{16}$	1 $\frac{1}{4}$ x 2 $\frac{5}{8}$

JEFFERSON LUMINOUS TUBE TRANSFORMERS



No. 728-111

Series 728 are provided with hanging brackets, and standing position, brackets are also available. The porcelain secondary bushings accommodate either high tension cable leads or serve as electrode housings.

Installation is exceptionally convenient. The chromi- end plates are quickly removable by loosening one screw opening wide the wiring compartments at each end of the case. When cables are used, they are securely anchored by quickly-attached clamps which eliminate strain on the secondary connections. No splicing is ever required installing the Series 728. Glass tubes or metal shields can be used over cables if desired. The bushings are quickly adjustable to accommodate variation in electrode centers.

In quality, the new Series 728 is all that the Industry has come to expect of Jefferson Products. It incorporates many point grounded balanced design and the other features pioneered by Jefferson which have made such important contributions to the efficiency and dependability of luminous tube signs.

Dimensions 16 $\frac{1}{2}$ " long, 6 $\frac{1}{16}$ " deep by 7 $\frac{7}{16}$ " high.
Mounting screws spaced 7 $\frac{1}{2}$ " on screw hole centers.

List No.	Capacity V.A.	Secondary Volts	M.A.
728-111	450	15000	30
728-121	360	12000	30
728-221	250	12000	24
728-141	250	9000	30
728-341	190	9000	18
728-151	225	7500	30
728-351	150	7500	18
728-131	180	6000	30
728-331	140	6000	18

Hanging brackets and cable clamps are included with above transformers at no extra cost. Primary pull switch 6 foot three conductor primary cord and 2-prong plug standing type mounting supports and secondary cables available at small additional cost.

MAZDA LAMPS

A Mazda lamp is always the product of the latest and best methods of incandescent lamp making.

The filaments of all Mazda lamps are at present made of tungsten. When any material more suitable for the purpose is discovered or developed, it will be used.

In a Mazda "B" lamp the filament operates in a vacuum.

In a Mazda "C" lamp the filament operates in an inert gas.

HOW TO ORDER LAMPS

All orders should give the following information:

Quantity—Number of lamps desired. Purchasers will avoid delays and get best discount by ordering standard package quantities.

Size of lamps—Specify wattage of multiple lamps and names of street series lamps.

Voltage—For multiple lamps.

Amperes—For series lamps.

Bulb—For example: A-19, G-25, T-8, PS-30, etc. The letter in the bulb designation indicates its shape and the number its diameter in eighths of an inch. Thus a PS-30 bulb is pear shaped and is 30/8 or 3 3/4 inches in diameter. "G" indicates a round (globular), and "T" a tubular bulb. The letter "A" indicates the standard line bulb shape with inside finish, unless otherwise noted.

Finish of bulb—Inside frosted, clear, white, white bowl, yellowlight, frosted, etc.

Base—Medium screw, mogul screw, or candelabra screw.

Service—For example: projection, floodlighting, locomotive headlight, etc.

EXTRA CHARGES FOR SPECIAL FEATURES

Natural colors. For natural colored lamps add the following percentage charges to the list prices of clear lamps:

Natural Color	S-17, S-19, S-21 ‡A-19, ‡A-21	S-14 Bulb
Green or †Blue.....	50%	40%
Purple.....	75%	60%
Ruby or Opal.....	100%	75%
Amber or Canary.....	150%	100%

The extra charges given above cover only bulbs of the manufacturers' standard colored glass and types of bulbs listed.

*Natural Ruby and Natural Amber Lamps are regularly furnished in the light shade. Dark Ruby and Dark Amber used in photographic works will be furnished, only when orders specify "Photographic Ruby" or "Photographic Amber," at the same price.

†Does not include daylight blue, photographic blue or manufacturers' standard colored glass used for blue sign lamps.

‡These lamps are regularly supplied clear. (Not inside frosted).

Coated Colors and Tints.—The following additional list charges shall be added to the list prices of clear lamps for coated colors and tints as follows: Red, Yellow, Green, Blue, Amber-range, Rose and Ivory Coated Colors and Flametints. On coated colors and tints not appearing in price book, an additional charge of 20% will be added to the price of regular coated colored lamps. Colors and tints are not recommended on any lamps larger than 150 watts.

List Price of Clear Lamps	List Additional Coated Colors
Less than \$1.00.....	\$0.20
\$1.00 to \$1.99.....	.20
2.00 to 2.99.....	.30
3.00 to 3.99.....	.40
4.00 to 4.99.....	.50

The extra charges given above apply only to the Manufacturers' standard coated colors and tints.

MAZDA LAMPS

EXTRA CHARGES—(Continued)

The prices of white, all frosted and white bowl lamps in these schedules cover lamps so finished by the Manufacturer's standard coated method only.

With the exception of those lamps listed as white, frosted and white bowl, the following list additional charges shall be added to the list prices of clear lamps for either white bowl or all frosting such clear lamps.

List Price of Clear Lamps	List Additional Charge for White, White Bowl or all Frosting
Less than \$1.00.....	\$0.05
\$1.00 to \$1.99.....	.10
2.00 to 2.99.....	.15
3.00 to 3.99.....	.20
4.00 to 4.99.....	.25
5.00 to 5.99.....	.30
6.00 to 6.99.....	.35
7.00 to 7.99.....	.40
8.00 to 8.99.....	.45
9.00 to 9.99.....	.50
10.00 to 10.99.....	.55
11.00 to 11.99.....	.60

Etching or Printing Letters.—The following charges for etching or printing letters or designs on Mazda Lamps (in accordance with specifications given below) are net and subject to no discount:

Size of Lamp in Watts (for Street Series Lamps, Size in Candle- Power)	Net Price of Etching or Printing per Lamp
50 watts or under.....	1/2c.
Over 50 watts, up to and including 80.....	3/4c.
Over 80 watts, up to and including 150.....	1c.
Over 150 watts, up to and including 250.....	1 1/4c.
Over 250 watts.....	1 1/2c.

Orders for large lamps with customer's etching may be filled either short or in excess, within the limits of 5% except that on orders for less than 40 lamps the shortage or excess may equal but not exceed two lamps.

Etched lamps are not rejectable by the purchaser under the provisions of the standard specifications.

Voltage.—Lamps of 100, 105, 125 and 130 volts can be supplied at the same prices as lamps of 110, 115 and 120 volts. For prices of voltages other than 100, 105, 110, 115, 120, 125 and 130 volts, apply to the manufacturer.

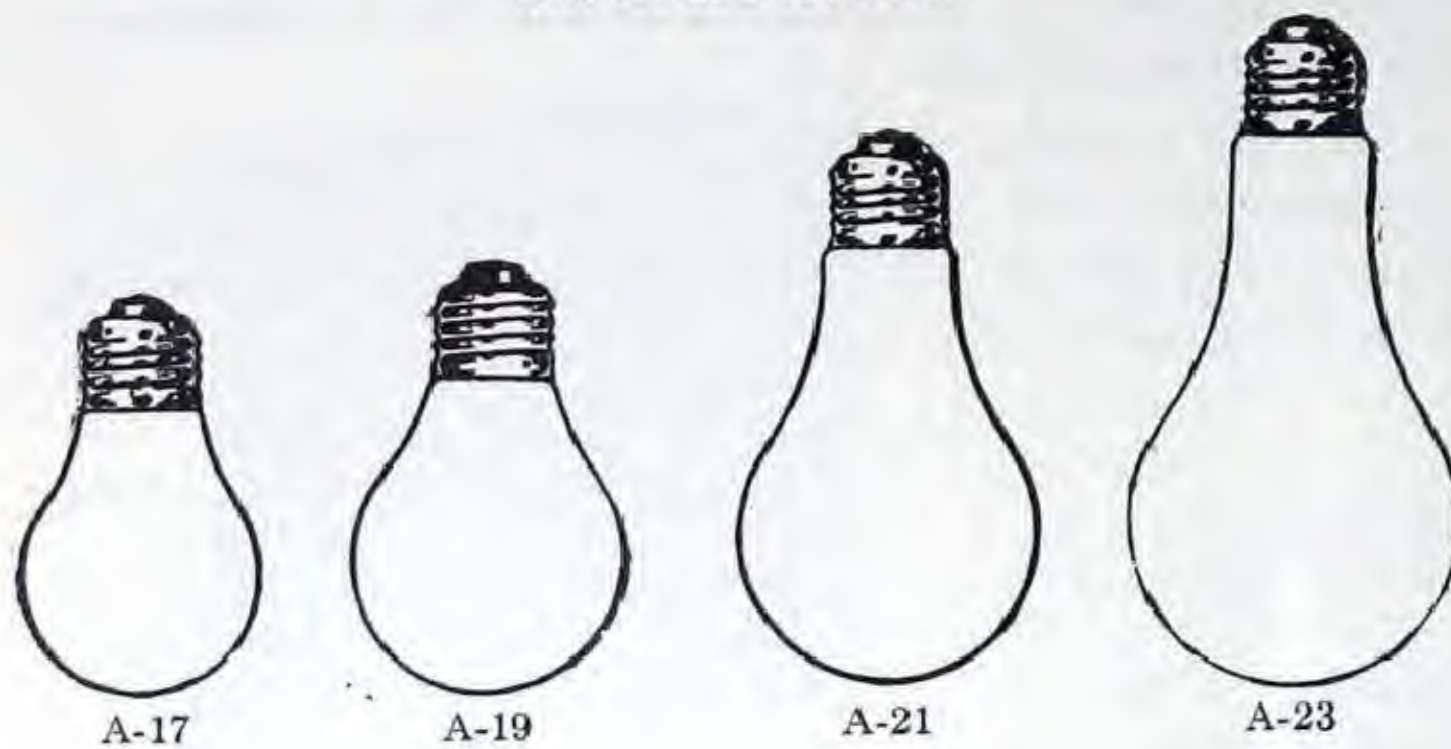
As lamps for 200, 220, 230, 240, 250 and 260 volts cover approximately 90 per cent of the demand, lamps for other voltages between 200 and 260 are not regularly carried in stock in all places but may be obtained at the same prices.

Special Basing.—The prices listed cover only lamps fitted with unskirted bases unless otherwise indicated. The price of lamps fitted with bases other than listed may be obtained on application.

When lamps listed with medium base are equipped with medium bayonet base add 10 cents to the list price.

MAZDA LAMPS

STANDARD LINE
GENERAL LIGHTING SERVICE
110, 115 and 120 Volts



The Standard Line Lamps represent the latest developments in incandescent lamp manufacture, and for general lighting service are distinctly superior to the old types which they supersede. They present a more attractive appearance, produce better illumination, are more efficient, and are easily cleaned.

However, there are a few classes of service, as indicated below, where special precautions are necessary.

Outdoor Service. The 40- to 1000-watt lamps of the Standard Line are MAZDA "C" (gas filled) lamps and should not be generally used out of doors, unless protected from rain or snow.

INSIDE FROSTED MAZDA LAMPS

Watts	Mazda B or C	Bulb	Screw Base	Std. Pkg. Quan.	List Price
25	B	A-19.....	Medium	120	\$0.25
40	C	A-19.....	Medium	120	.25
60	C	A-21.....	Medium	120	.25
75	C	A-21.....	Medium	120	.50
*100	C	A-23.....	Medium	60	.40
100	C	A-23.....	Medium	60	.50
150	C	PS-25.....	Medium	24	.75
200	C	PS-30.....	Medium	24	1.05
250	C	PS-35.....	Medium	24	1.40
300	C	PS-35.....	Mogul	24	1.75
500	C	PS-40.....	Mogul	12	2.80
750	C	PS-52.....	Mogul	6	5.55
1000	C	PS-52.....	Mogul	6	5.80

*750 hour supplied in 110, 115 and 120 volt only.

All above lamps Universal Burning.

The 15-watt A-17 lamp is shown under Decorative Lighting Service.

HIGH VOLTAGE LIGHTING SERVICE
220, 230 and 250 Volts

INSIDE FROSTED MAZDA LAMPS

Watts	Mazda B or C	Bulb	Screw Base	Std. Pkg. Quan.	List Price
25	B	A-19.....	Medium	120	\$0.35
50	B	A-21.....	Medium	120	.35
100	C	A-23.....	Medium	60	.60

COUNTRY HOME LIGHTING SERVICE
28-32 Volts

INSIDE FROSTED MAZDA C LAMPS

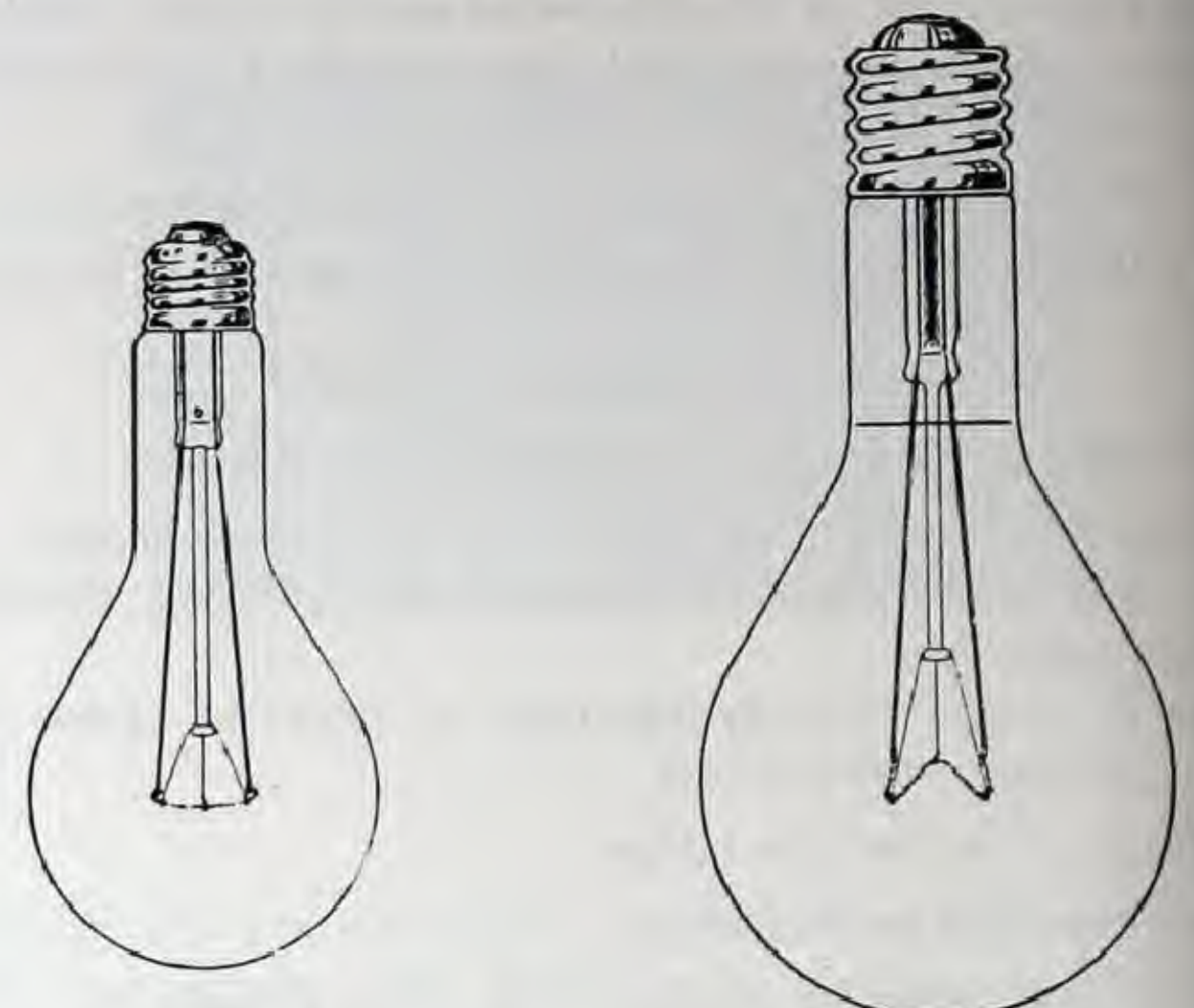
Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
15	A-17.....	Medium	120	\$0.30
25	A-19.....	Medium	120	.30
50	A-21.....	Medium	120	.35
100	A-23.....	Medium	60	.50

Orders should specify "28-32 Volts" and "Country Home Lighting" to distinguish from train lighting lamps.

The prices on this schedule apply only to lamps which are designed for an average voltage, as determined by the manufacturer, suitable for operation on 28-32 volt circuits, and do not apply to lamps ordered for individual voltages within this range.

MAZDA LAMPS

GENERAL LIGHTING SERVICE
110, 115 and 120 Volts



150 Watts

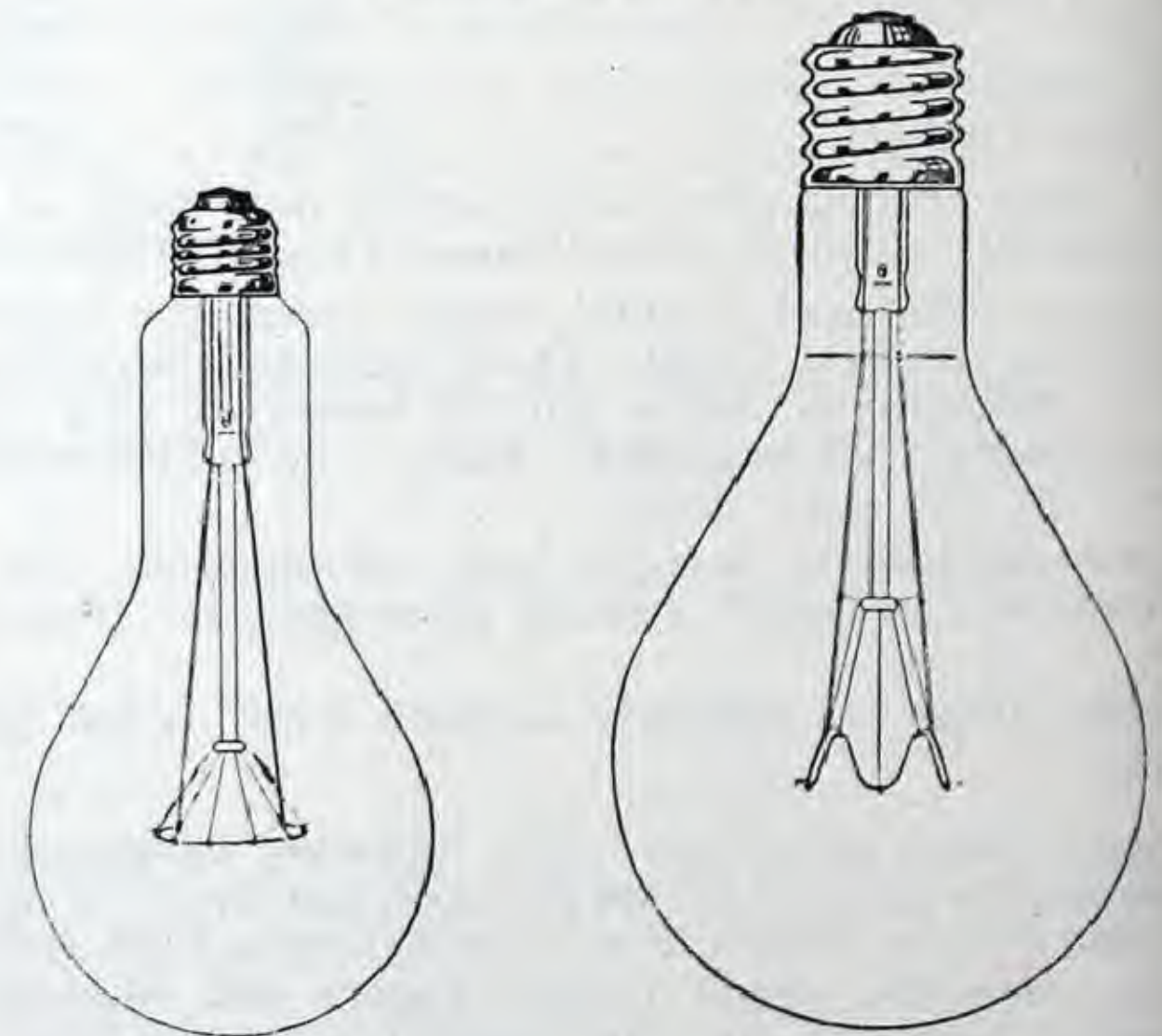
300 Watts

MAZDA C LAMPS

Watts	Bulb	Approx. Lumens	Screw Base	Std. Pkg. Quan.	List Price Clear	List Price White Bowl
150	PS-25	2300	Medium.....	24	\$0.75	\$0.95
200	PS-30	3300	Medium.....	24	1.05	1.25
250	PS-35	4300	Medium.....	24	1.40	1.50
300	PS-35	5400	Mogul.....	24	1.75	1.85
500	PS-40	9800	Mogul.....	12	2.65	3.00
750	PS-52	15000	Mogul.....	6	5.25	5.55
1000	PS-52	20500	Mogul.....	6	5.50	5.80
1500	PS-52	33000	Mogul Clamp...	6	7.25	...
2000	PS-52	45000	Mogul Clamp...	6	18.50	...

All above lamps Universal Burning.

HIGH VOLTAGE LIGHTING SERVICE
220, 230, and 250 Volts



200 Watts

500 Watts

MAZDA C LAMPS

Watts	Bulb	Approx. Lumens	Screw Base	Std. Pkg. Quan.	List Price Clear	List Price White Bowl
150	PS-25	1875	Medium.....	24	\$1.00	\$1.10
200	PS-30	2700	Medium.....	24	1.35	1.45
300	PS-35	4200	Mogul.....	24	2.00	2.15
500	PS-40	8200	Mogul.....	12	2.75	2.90
750	PS-52	12600	Mogul.....	6	5.50	5.80
1000	PS-52	18300	Mogul.....	6	6.25	6.60

All above lamps Universal Burning.

MAZDA LAMPS

STANDARD LINE

TRAIN LIGHTING SERVICE

32 Volts

*64 Volts

INSIDE FROSTED MAZDA C LAMPS

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
15	A-17.....	Medium	120	\$0.30
25	A-19.....	Medium	120	.30
50	A-21.....	Medium	120	.35
100	A-23.....	Medium	60	.50

Lamps should be marked "Train Lighting" to distinguish from Country Home Lighting Lamps.

This lamp in 64 volt is Mazda B.

COLORED LAMPS

110, 115 and 120 Volts

Flametint lamps give a soft tinted lighting effect often desirable in homes, hotels, theatres, etc.

Substantially all the color effects required for decorative and display lighting in theatres, restaurants, signs, etc., can be produced by the colored and tinted lamps listed below. In the interest of lamp type simplification it is recommended that colored lamp demand be confined to these types which are superior to and supercede the G18½ and G25 colored lamps.

INSIDE COLORED MAZDA B LAMPS

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
15	†A-17 Colored.....	Medium	120	\$0.30
15	A-17 Flametint and Ivory.....	Medium	120	.35
15	†A-17 Colored.....	Medium	120	.40
25	†A-19 Colored.....	Medium	120	.30
25	A-19 Flametint and Ivory.....	Medium	120	.35
25	†A-19 Colored.....	Medium	120	.40
40	†A-21 Colored.....	Medium	120	.30
40	A-21 Flametint and Ivory.....	Medium	120	.35
40	†A-21 Colored.....	Medium	120	.40

750 hour supplied in 110, 115 and 120 volt only.

Supplied in Standard Colors.

OUTSIDE COLORED MAZDA B LAMPS

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
15	†A-17 Colored.....	Medium	120	\$0.30
15	A-17 Flametint and Ivory.....	Medium	120	.45
15	†A-17 Colored.....	Medium	120	.45
25	†A-19 Colored.....	Medium	120	.30
25	A-19 Flametint and Ivory.....	Medium	120	.40
25	†A-19 Colored.....	Medium	120	.45
40	†A-21 Colored.....	Medium	120	.30
40	A-21 Flametint and Ivory.....	Medium	120	.40
40	†A-21 Colored.....	Medium	120	.45

750 hour supplied in 110, 115 and 120 volt only.

Supplied in Standard Colors.

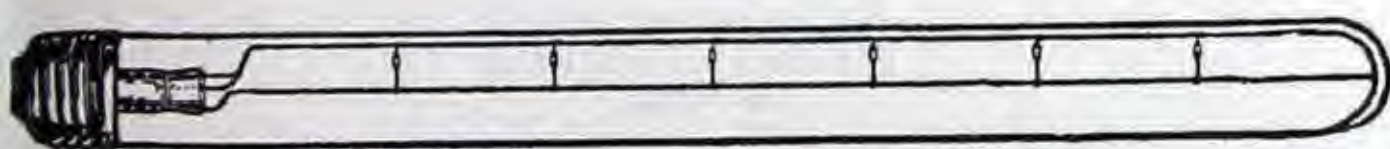
LIMITED LIGHTING SERVICE

110, 115 and 120 Volts



25 Watts—T-6½

25 Watts—T-10



40 Watts—T-8

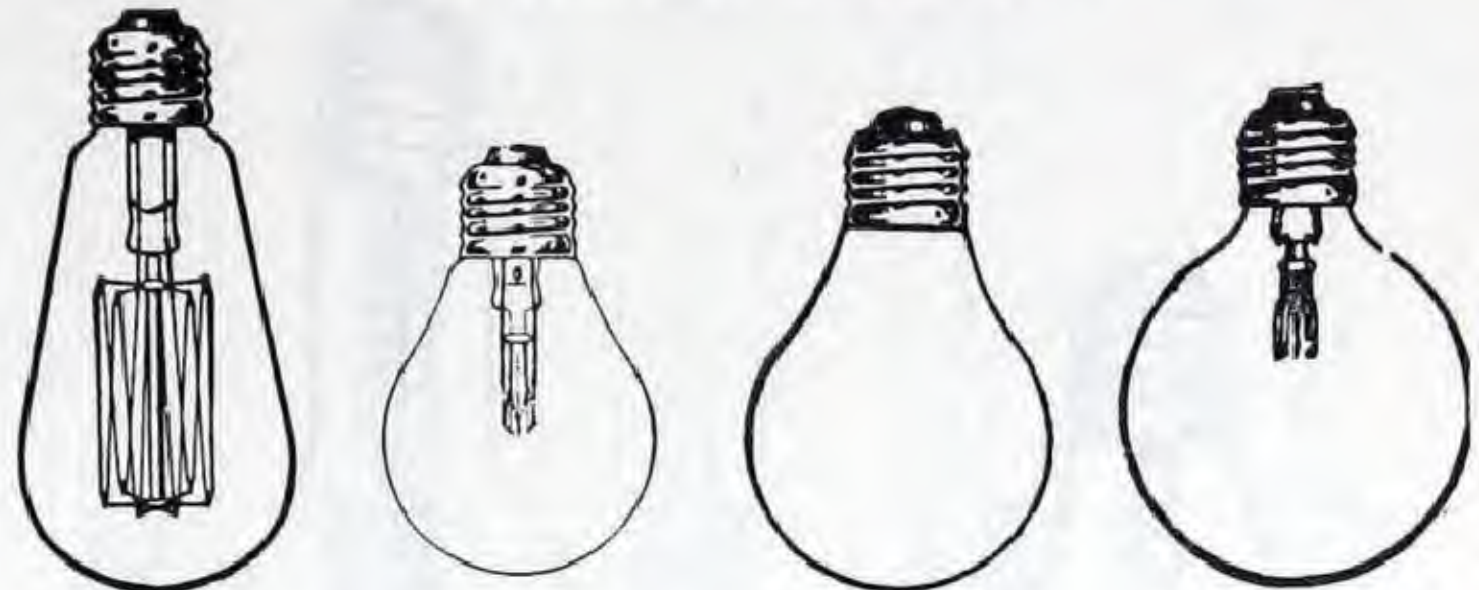
CLEAR MAZDA B LAMPS

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
25	T-6½ Clear.....	Intermediate	60	\$0.70
25	T-10 Clear.....	Medium	60	.60
40	T-8 Clear.....	Medium	24	1.30
50	T-8 Clear.....	Medium	24	1.00

MAZDA LAMPS

STREET RAILWAY SERVICE

105, 110, 115, 120, 125 and 130 Volts



S-Bulb

A-Bulb

A-Bulb

P-Bulb

†MAZDA B LAMPS—STREET RAILWAY

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
23	S-17 Clear...	Medium.....	.....	120	\$0.32
94	S-24½ Clear..	Medium.....	.....	60	1.00

†MAZDA B LAMPS—STREET RAILWAY HEADLIGHT

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
*23	A-19 Clear...	Medium.....	2 1/8	120	\$ 0.80
*36	A-19 Clear...	Medium.....	2 1/8	120	.80
56	P-25 Clear...	Medium.....	2 1/8	60	1.15
94	P-25 Clear...	Medium.....	2 1/8	60	1.50

†MAZDA B—INSIDE FROSTED STREET RAILWAY

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
23	A-19.....	Medium.....	.....	120	\$ 0.30
36	A-21.....	Medium.....	.....	120	.30
56	A-21.....	Medium.....	.....	120	.35

Amp.

30 Volts

†1.0	A-19.....	Medium.....	.....	120	\$0.60
†1.6	A-21.....	Medium.....	.....	120	.75

*These lamps will satisfactorily replace the G-18½ bulb lamps of 2 1/8 inch, and 2 1/8 inch light centre length.

†These lamps are for use 5 in series on 525, 550, 575, 600, 625 and 650 volts.

¶These lamps, if burned horizontally, will not give as good service as when burned in a vertical position.

These prices apply only for lamps of the voltages given above.

†Mazda C Street Railway Cut-out lamps. These are for use approximately twenty lamps in series on 600 volt circuits. Where the circuit voltage is greater or less than 600 volts, sufficient lamps may be installed or omitted in order to make the total lamp voltage equal to that of the circuit.

MAZDA C—TRAFFIC SIGNAL SERVICE

110, 115 and 120 Volts



A-21

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
60	A-21 Clear.....	Medium.....	2 7/8	120	\$0.45

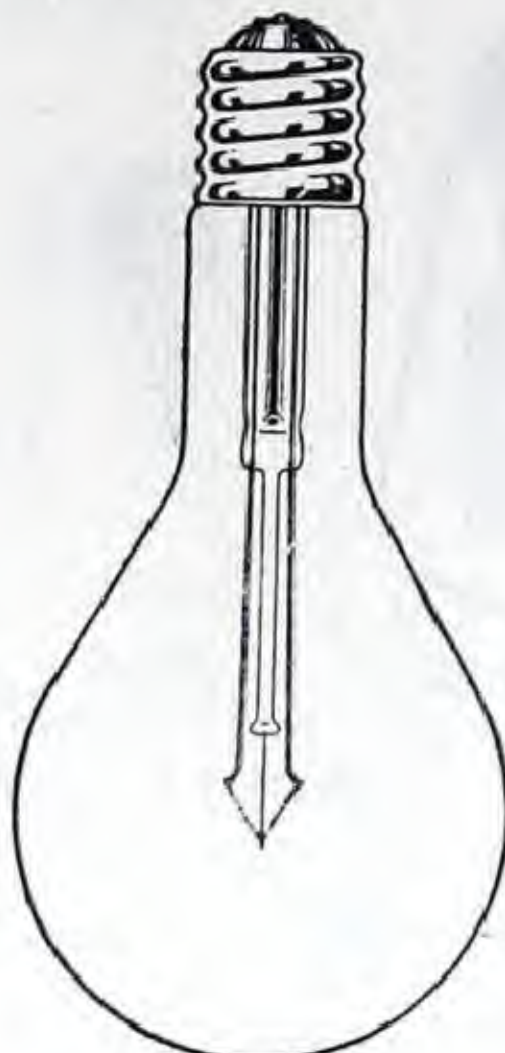
MAZDA LAMPS

STREET LIGHTING SERVICE

6.6 Amperes



S-Bulb



PS-Bulb

MAZDA C LAMPS

Lumens	Av'ge Volts	Bulb	Std. Pkg. Quan.	List Price
600	6.5	S-24½ Clear.....	60	\$1.00
800	8.1	S-24½ Clear.....	60	1.15
1000	9.6	S-24½ Clear.....	60	1.15
2500	22.3	PS-35 Clear.....	24	2.05
4000	38.8	PS-35 Clear.....	24	2.55
6000	49.4	PS-40 Clear.....	12	3.35

The above lamps are fitted with mogul screw base.

The nominal candle-power of these lamps is one-tenth of their lumen rating. There are but few conditions of street lighting now prevailing which justify the use of lamps smaller than 1000 lumens.

STREET LIGHTING SERVICE

4, 5.5 and 7.5 Amperes*

MAZDA C LAMPS

Lumens	Bulb	Average Volts			Std. Pkg. Quan.	List Price
		4.0 Amp.	5.5 Amp.	7.5 Amp.		
600	S-24½ Clear	10.5	7.7	5.8	60	\$1.00
800	S-24½ Clear	13.9	10.1	7.2	60	1.15
1000	S-24½ Clear	16.6	12.0	8.5	60	1.15
2500	PS-35 Clear	41.4	28.0	19.8	24	2.05
4000	PS-35 Clear	64.1	43.3	30.1	24	2.55
6000	PS-40 Clear	93.5	62.4	43.7	12	3.35

The above lamps are fitted with mogul screw base.

The nominal candle-power of these lamps is one-tenth their lumen rating. There are but few conditions of street lighting now prevailing which justify the use of lamps smaller than 1000 lumens.

*There is a very marked trend toward the use of the 6.6 ampere lamps as the standard.

MAZDA C LAMPS

Lumens	Av'ge Volts	Bulb	Light Center Length, Inches	Amp.	Std. Pkg. Quan.	List Price
4000	14.6	PS-40 Clear...	9½	15	12	\$2.90
6000	15.9	PS-40 Clear...	9½	20	12	3.65
10000	25.9	PS-40 Clear...	9½	20	12	4.50
15000	38.5	PS-40 Clear...	9½	20	12	6.00
25000	62.2	PS-52 Clear...	9½	20	6	9.25

The above lamps are fitted with mogul screw base.

These lamps are designed for base up burning position. If for base down burning may be supplied with light center length 8¼". Lamps ordered for base down burning position may be supplied at the same price.

The nominal candle-power of these lamps is one-tenth of their lumen rating.

FOR NEW STREET LIGHTING EQUIPMENT
SHORT LIGHT CENTER

MAZDA C LAMPS

Lumens	Av'ge Volts	Bulb	Light Center Length, Inches	Amp.	Std. Pkg. Quan.	List Price
4000	14.6	PS-35 Clear.....	7	15	24	\$2.55
6000	15.9	PS-40 Short Clear	7	20	12	3.35
10000	25.9	PS-40 Short Clear	7	20	12	4.20
15000	38.5	PS-40 Short Clear	7	20	12	5.40

The above lamps are fitted with mogul screw base.

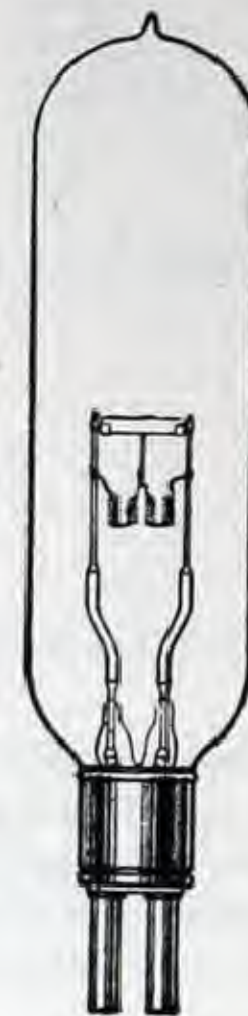
The above lamps are manufactured for base up burning. If for base down burning may be supplied with light center length of 6¼ inches.

MAZDA LAMPS

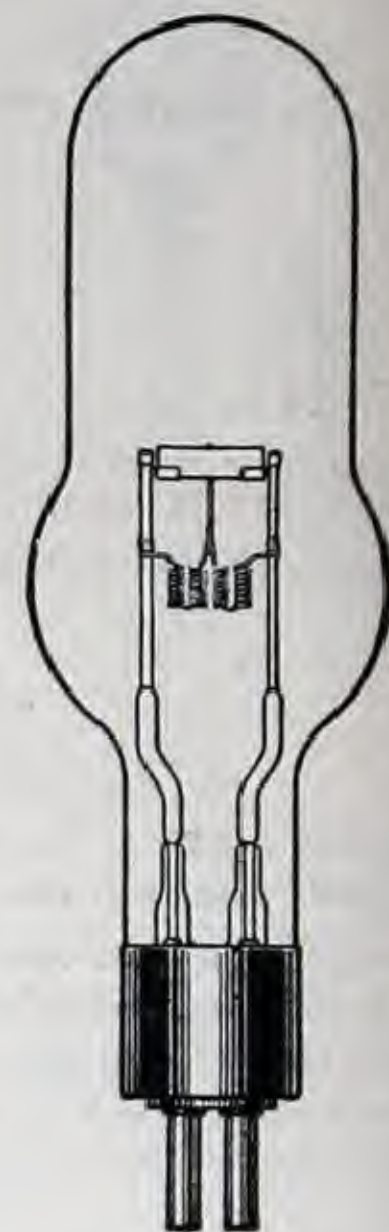
AIRPORT FLOODLIGHTING SERVICE

(continued)

30 and 32 Volt



T-24



GT-38

MAZDA C LAMPS

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
30 Volts					
†1000	T-20.....	Mogul	4¾	6	\$9.10
32 Volts					
1500	T-24.....	Prong	5¼	6	15.00
3000	GT-38....	Prong	7	4	39.00

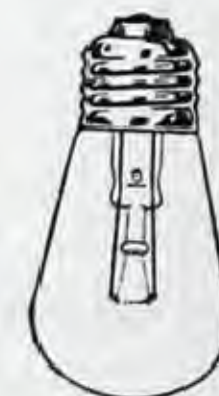
*May be used in Advertising Beacon.

These lamps must burn base down.

The above lamps are of limited, but increasing demand and may be supplied where demand exists.

†Airway Beacon, 500 hrs. life.

LOCOMOTIVE LIGHTING SERVICE



S-14 Bulb

MAZDA B LAMPS—LOCOMOTIVE CAB*

34 Volts

Watts	Bulb	Std. Pkg. Quan.	List Price
15	S-14 Clear.....	120	\$0.29

MAZDA C LAMPS—LOCOMOTIVE HEADLIGHT

32 Volts

Watts	Bulb	Light Center Length, Inches	Std. Pkg. Quan.	List Price
†100	P-25 Clear.....	3	60	\$1.30
†250	P-25 Clear.....	3	60	2.00

The above lamps are fitted with medium screw base.

*Orders should specify for locomotive cab lighting. 34 volts only.

†These lamps can be burned in any position except within 45 degrees of vertically, base up.

MAZDA LAMPS

FLOODLIGHTING SERVICE

110, 115 and 120 Volts



G-Bulb

MAZDA C LAMPS

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
50	G-30.....	*Medium	3	24	\$2.30
100	G-40.....	Mogul	4 1/4	12	4.20
100	G-40.....	Mogul	5 1/8	12	9.00
100	G-40.....	Mogul	5 1/8	12	12.00

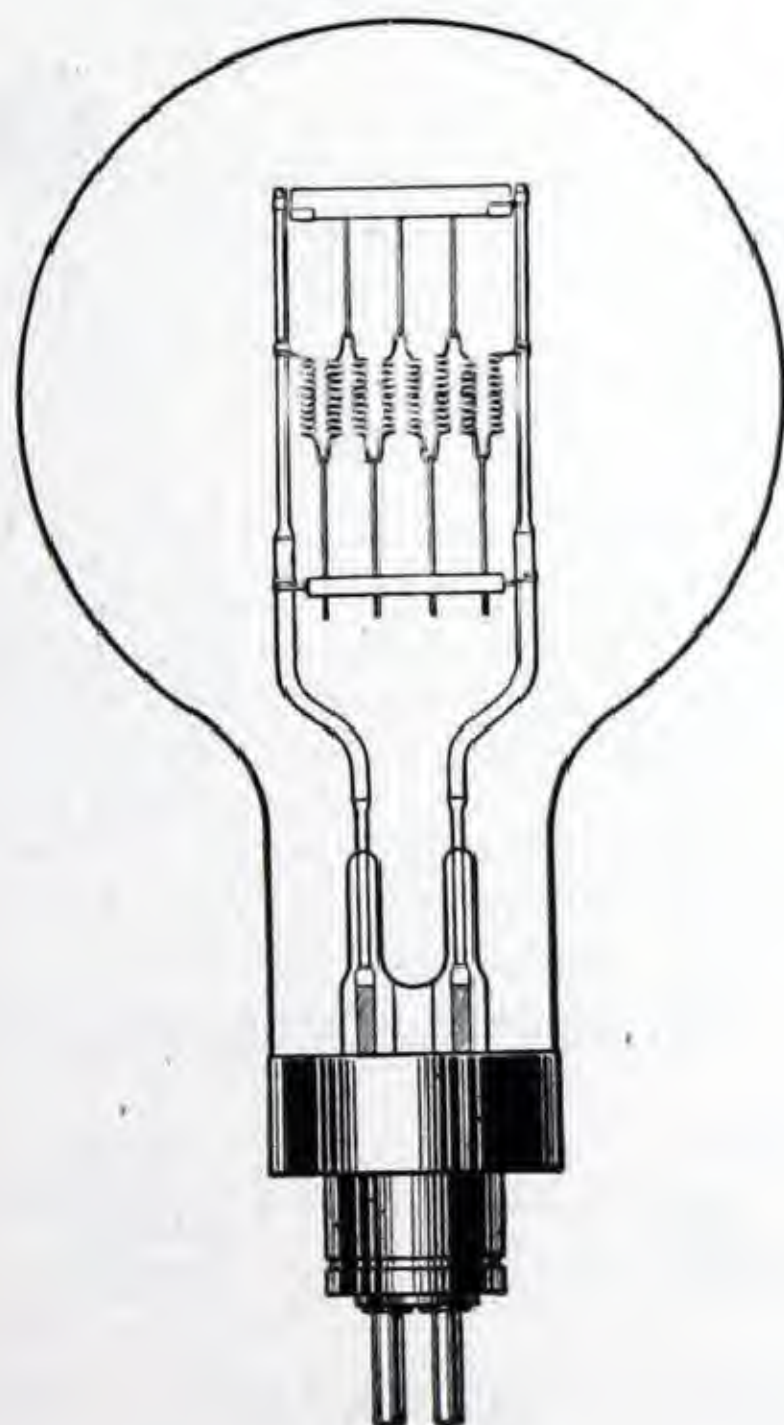
Mogul screw base can be supplied at same price with a light center length of 3 3/8 inches and a maximum over-all length of 5 1/8 inches.

Orders for these lamps must specify for floodlighting purposes.

These lamps can be burned in any position except within 45 degrees of vertically, base up.

AIRPORT FLOODLIGHTING SERVICE

110, 115 and 120 Volts



G-96

MAZDA C LAMPS

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
1000	T-20.....	Mogul	4 3/4	6	\$8.50
5000	G-64.....	Prong	9	1	55.00
10000	G-96.....	Skirted Prong	12	1	125.00

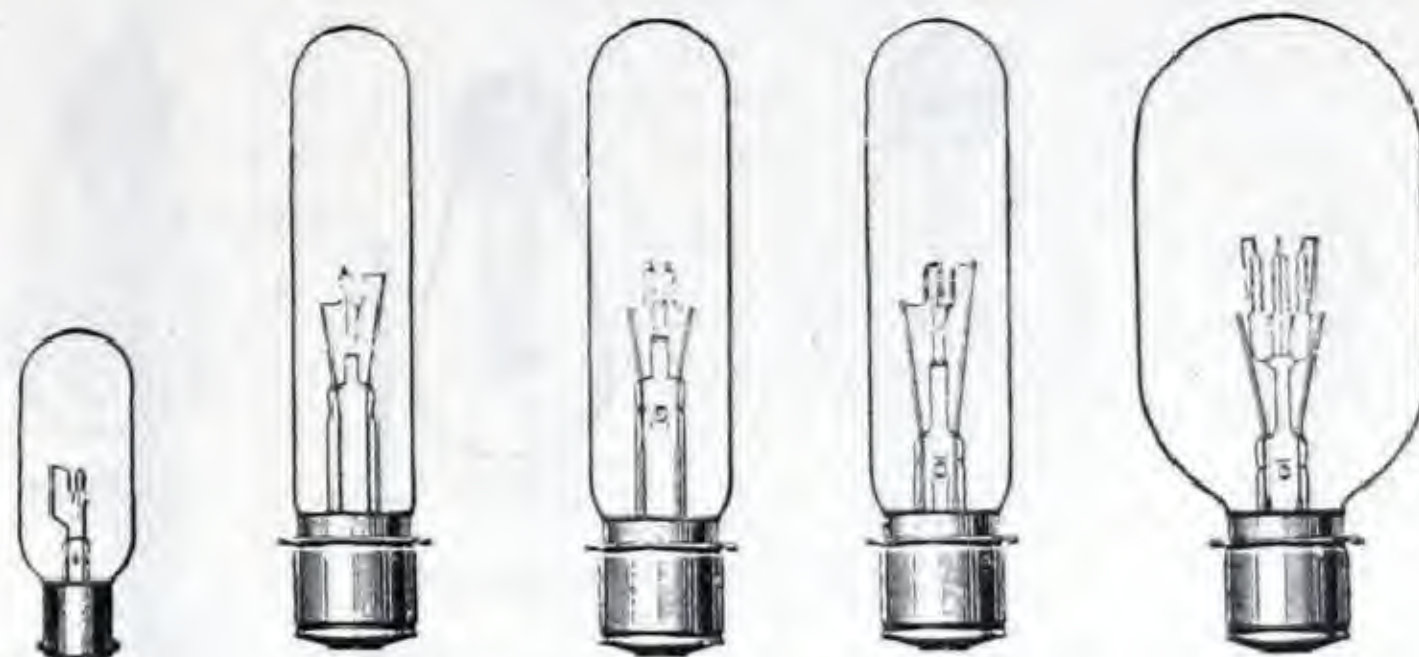
These lamps must burn base down.

The above lamps are of limited, but increasing, demand and may be supplied where demand exists.

†Airway Beacon. 500 hrs. life.

MAZDA LAMPS

PROJECTION LAMPS



T8
50 Watts

T8 1/2
100 Watts

T10
200 Watts
50 Volts

T10
200 Watts

T20
500 Watts

MAZDA C LAMPS

Watts	Bulb	Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
50 Volts					
a 200	T-10.....	Med. Prefocus.....	f 2 3/8	24	\$2.65
250	T-10.....	Med. Prefocus.....	f 2 3/8	24	3.00
110, 115 and 120 Volts					
g 50	T-8.....	D.C. Bay. Cand.....	g 1 3/8	24	\$2.00
b 100	T-8 1/2.....	Med. Prefocus.....	f 2 1/8	24	2.80
c 200	T-10.....	Med. Prefocus.....	f 2 1/8	24	3.05
500	T-20.....	Med. Prefocus.....	f 2 1/8	6	4.25
e1000	T-20.....	Mog. Prefocus.....	f 3 1/8	6	9.00

(a) Medium screw base can be supplied with a light center length of 3 inches and maximum over-all length of 5 1/2 inches.

(b) Medium screw base can be supplied with a light center length of 3 inches and a maximum over-all length of 5 1/2 inches.

(c) Medium screw base can be supplied with a light center length of 3 inches and a maximum over-all length of 5 1/2 inches.

(e) Mogul screw base can be supplied with a light center length of 4 3/4 inches and a maximum over-all length of 9 1/8 inches.

(f) The light center length of this lamp is the distance from center of light source to top of base fin.

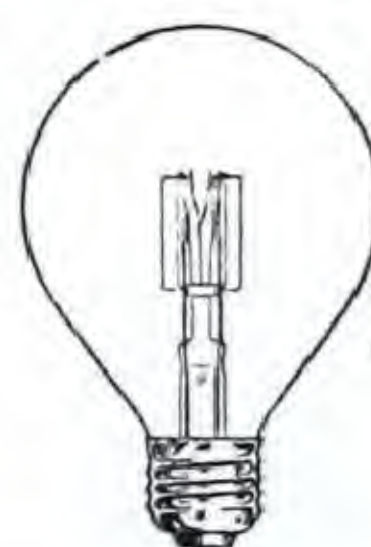
(g) The light center length of this lamp is the distance from center of light source to top of base pins.

g These lamps may be obtained with single contact bayonet Candelabra base at same list price.

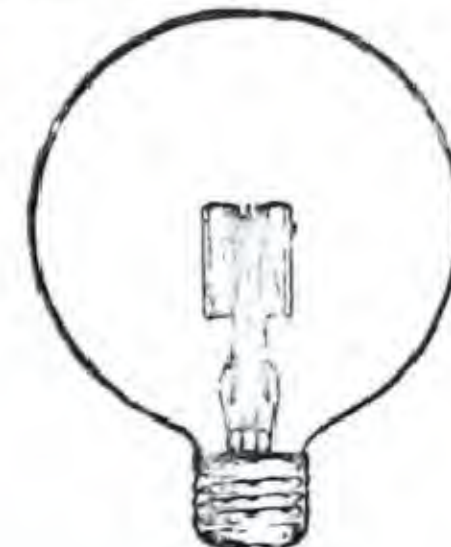
These lamps must burn base down.

SPOTLIGHT SERVICE

110, 115 and 120 Volts



P-Bulb



G-Bulb

MAZDA C LAMPS

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
100	P-25.....	Medium.....	3	60	\$1.30
250	G-30.....	†Medium.....	3	24	2.30
400	G-30.....	†Medium.....	3	24	4.00
1000	G-40.....	Mogul.....	5 1/8	12	9.50
1500	G-40.....	Mogul.....	5 1/8	12	12.25
*2000	G-48.....	Mogul.....	5 1/4	8	18.00

†Mogul screw base can be supplied at same price with a light center length of 3 3/8 inches and a maximum over-all length of 5 1/8 inches.

†Medium screw skirted base can be supplied at the same price with a light center length of 3 3/4 inches and a maximum over-all length of 5 1/4 inches.

Orders for these lamps must specify for spotlight purposes.

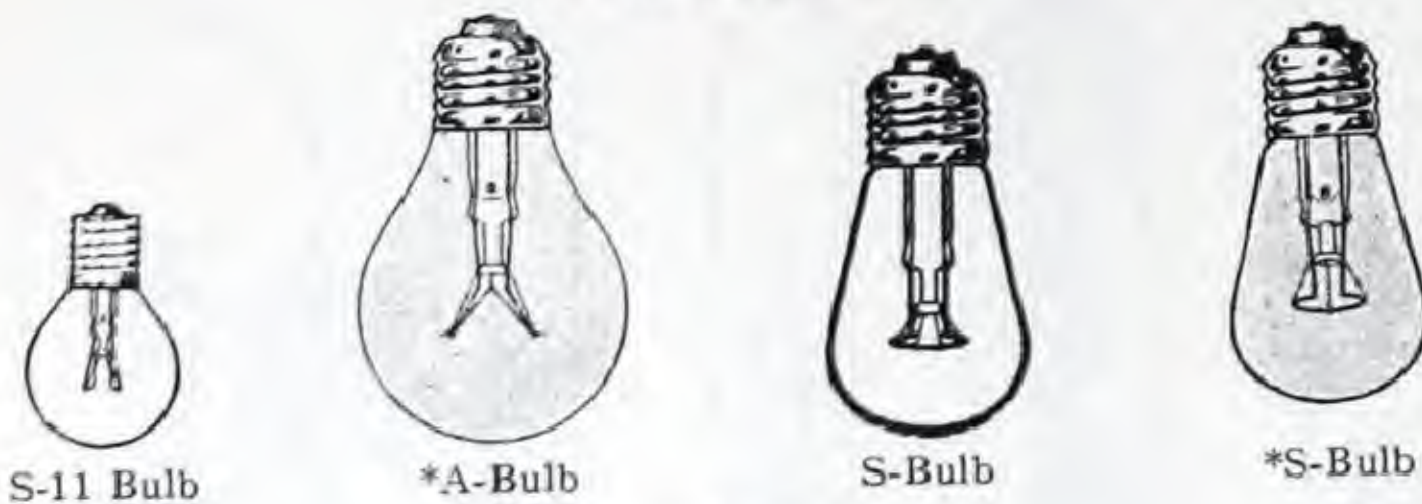
*This lamp is not regularly carried in stock, but will be manufactured to order.

These lamps can be burned in any position except within 45 degrees of vertically, base up.

MAZDA LAMPS

SIGN LIGHTING SERVICE

110, 115 and 120 Volts



MAZDA B SIGN LAMPS

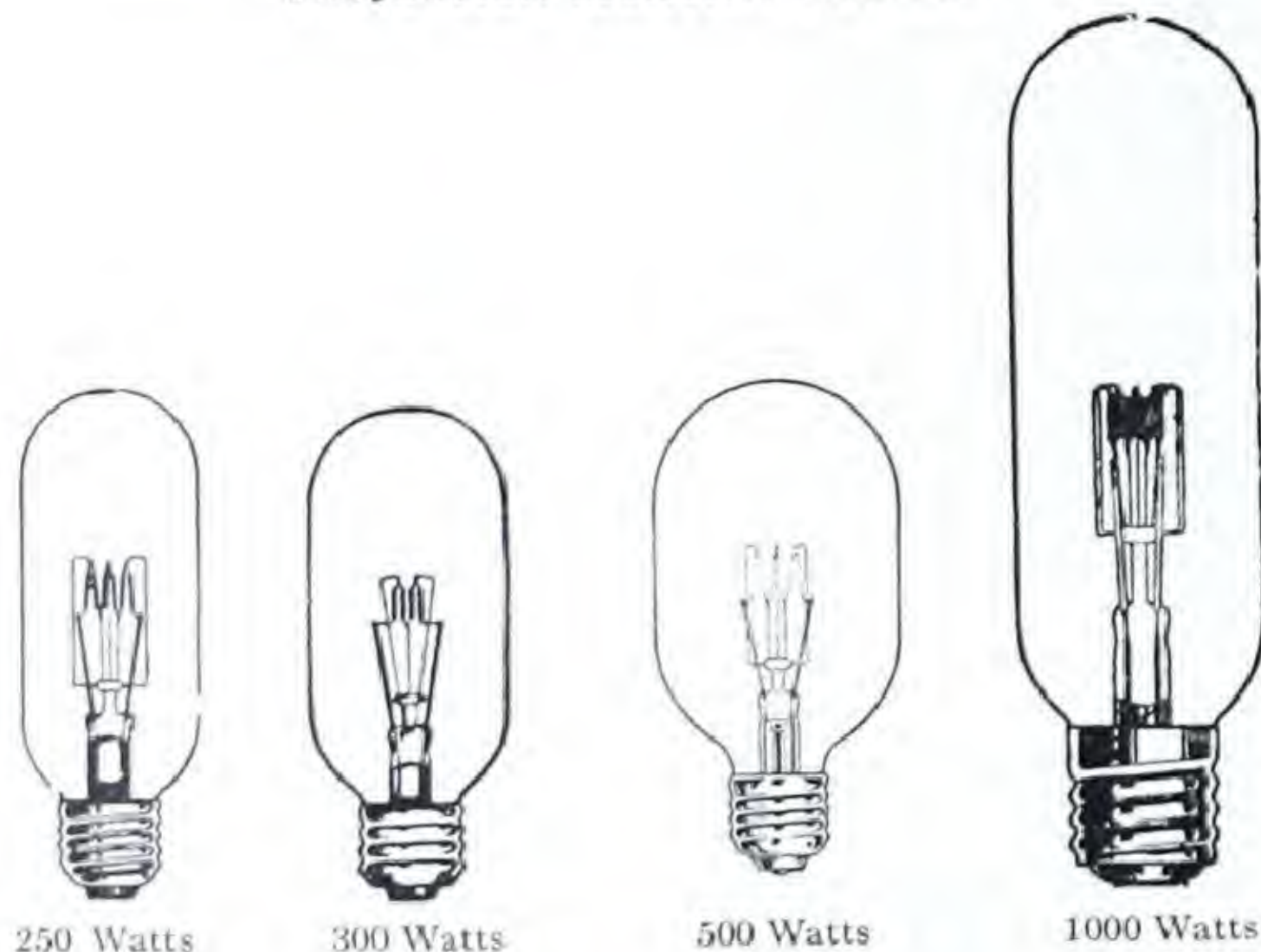
Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
6	S-11 Clear and Inside Colored...	Intermediate	120	\$0.32
†10	S-11 Clear.....	Intermediate	120	.32
†10	S-11 White.....	Intermediate	120	.32
†10	S-11 Colored.....	Intermediate	120	.32
†10	S-14 Inside Frosted.....	Medium	120	.30
10	S-14 Clear.....	Medium	120	.30
10	S-14 White.....	Medium	120	.30
†10	S-14 Colored.....	Medium	120	.30
15	*S-14 Daylight.....	Medium	120	.45
25	*A-19 Clear Daylight.....	Medium	120	.50
40	A-21 Inside Frosted.....	Medium	120	.25
50	*A-19 Clear Daylight.....	Medium	120	.50

†These lamps are suitable for decorative lighting service and are identical with the corresponding lamps listed under Decorative Mazda Lamps.

†This lamp may be supplied in all standard coated colors.

*The bulb is of special light blue glass to give a whiter light than the ordinary clear bulb lamp.

PROJECTION LIGHTING SERVICE



MAZDA C LAMPS

Watts	Bulb	Screw Base	Light Center Length, Inches	Std. Pkg. Quan.	List Price
28-32 Volts					
*165	T-10.....	Medium	3	24	\$2.60
*300	T-16.....	Medium	3	12	3.70
*600	T-20.....	Mogul	4¾	6	7.20
*900	T-20.....	Mogul	4¾	6	9.00
¶ 75 Volts					
375	T-10.....	Medium	3	5½	\$4.50
25 hours rated life, to be used only with forced ventilation.					
¶ 110, 115 and 120 Volts					
165	T-10.....	Medium	3	24	\$2.60
250	T-14.....	Medium	3	24	2.15
400	T-20.....	Medium	3	6	3.90
1500	T-20.....	Medium	3	6	4.00
600	T-20.....	Mogul	4¾	6	6.50
1500	T-24.....	Mogul	5¾	6	14.65

¶Medium screw skirted base can be supplied at the same price with a light center length of 3¾ inches and a maximum over-all length of 6¾ inches.

*The price of this lamp applies only to a lamp which is designed for an average voltage, as determined by the manufacturer, suitable for operation on 28-32 volt circuits, and does not apply to lamps ordered for individual voltages within this range.

These lamps must burn base down.

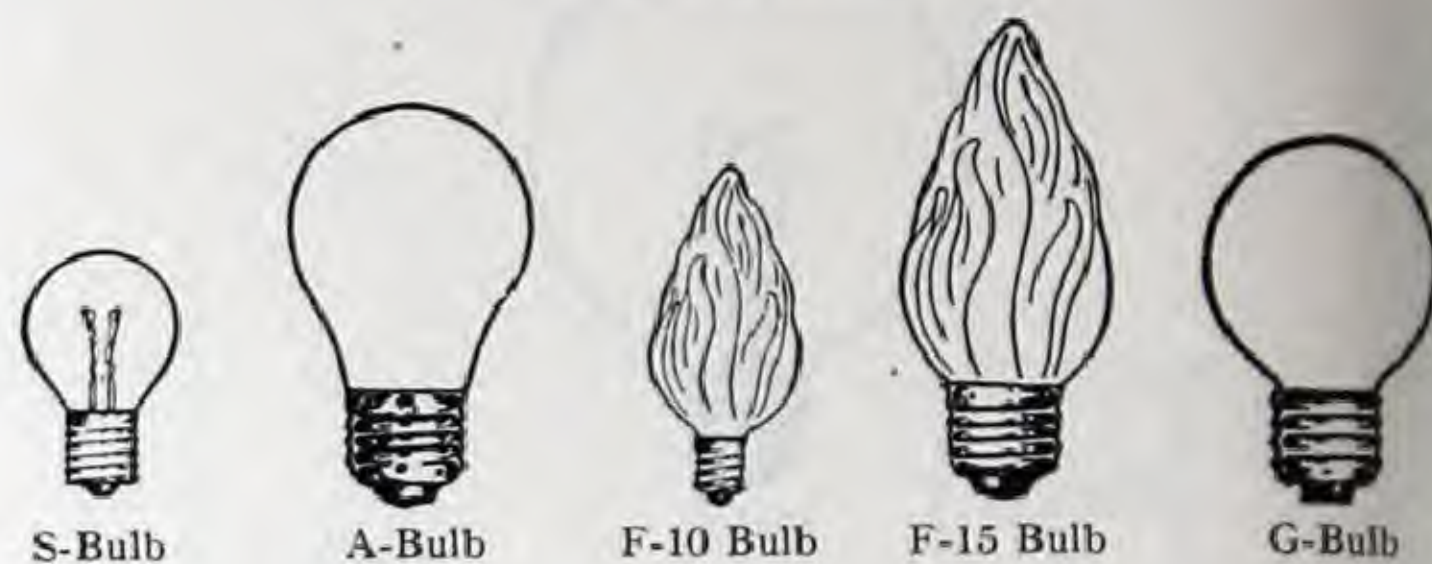
¶The above lamps may be supplied when fitted with Medium Base with Medium Prefocus Base, when fitted with Mogul Base with Mogul Prefocus Base at the same list price.

MAZDA LAMPS

DECORATIVE LIGHTING SERVICE

110, 115 and 120 Volts

MAZDA B LAMPS



Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
6	S-11 Clear and Inside Colored....	Intermediate	120	\$0.32
†10	S-11 Clear.....	Intermediate	120	.32
†10	S-11 White.....	Intermediate	120	.32
*†10	S-11 Colored.....	Intermediate	120	.32
15	A-17 Inside Frosted.....	Medium	120	.25
*15	F-10 White and Colored.....	Candelabra	100	.50
*25	F-15 White and Colored.....	Medium	120	.30
*25	G-18½ White, Clear and Colored. †	Medium	120	.40
*25	G-25 White, Clear and Colored... †	Medium	60	.50
*40	G-25 White, Clear and Colored... †	Medium	60	.50

†These lamps are suitable for sign lighting service and are identical with the corresponding lamps listed under Sign Lighting Service.

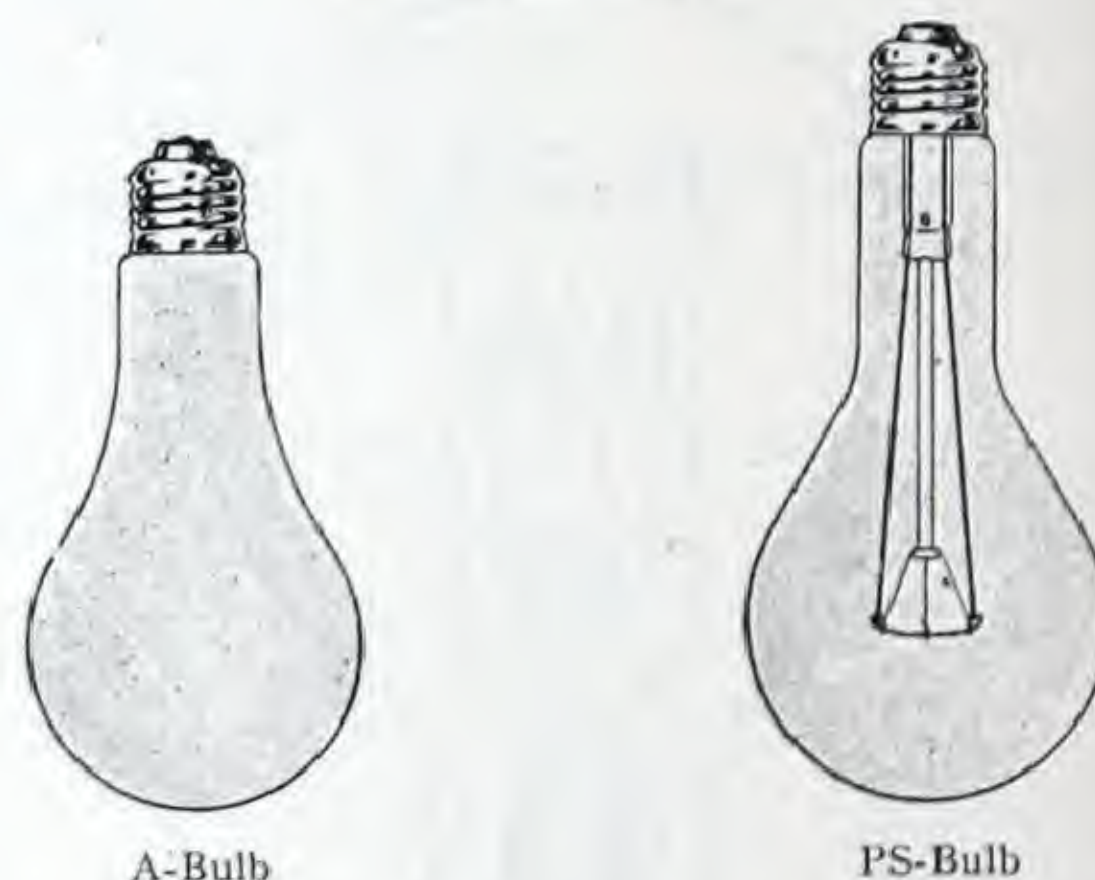
*This lamp may be supplied in all standard coated colors.

†When demand and stock conditions warrant, these lamps will be superseded by the STANDARD LINE lamps.

GENERAL LIGHTING SERVICE

DAYLIGHT

110, 115 and 120 Volts



MAZDA C DAYLIGHT LAMPS—INSIDE FROSTED

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
60	A-21 Daylight.....	Medium	120	\$0.50
100	A-23 Daylight.....	Medium	60	.80

MAZDA C DAYLIGHT LAMPS—CLEAR

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
150	PS-25 Daylight.....	Medium	24	\$1.30
200	PS-30 Daylight.....	Medium	24	1.70
300	PS-35 Daylight.....	Mogul	24	2.40
500	PS-40 Daylight.....	Mogul	12	3.70
1000	PS-52 Daylight.....	Mogul	6	9.75
1500	PS-52 Daylight.....	Mogul	6	11.65

MAZDA Daylight Lamps have bulbs made of special blue glass to produce light approximating average daylight quality.

MAZDA C PHOTOGRAPHIC BLUE LAMPS—CLEAR

Watts	Bulb	Screw Base	Std. Pkg. Quan.	List Price
1000	PS-52 Photographic.....	Mogul	6	\$9.75
1500	PS-52 Photographic.....	Mogul	6	11.65

MAZDA LAMP COLORING DEVICES

Northern Coloring Fluid

A high-grade fluid for coloring incandescent lamps that is widely used and giving great satisfaction.

Gives the lamps that snap and brilliance usually found only in natural colored glass. Furnished in blue, green, purple, amber, red, violet, canary, pink and frosting. Satisfactory results guaranteed when used according to directions. Pint and quart sizes in single and individual cartons; large sizes in cases. A dipping cup is furnished with each pint and quart.



Size	List Price Each
Gallon.....	\$28.00
Half-gallon.....	15.00
Quart.....	8.00
Pint.....	4.00
Half-pint.....	2.00

Color Caps



Made of natural colored glass in ruby, green, amber, blue, canary and opal. They snap on the lamp. Colors may be assorted in making up standard package.

Specify with every order: Size† of bulb and style A or B.

†S-14 fits 1 3/4" diameter bulb, 2 1/2, 5, 7 1/2 and 10-watt (sign type).

Style A



Style B

AS-17 fits 2 1/8" diameter bulb, 15 and 25-watt lamps.
AS-19 fits 2 3/8" diameter bulb, 40 and 50-watt lamps.
BA-19 fits new type A-19 25-watt lamp.

	Style A			Style B			
	AS-14	AS-17	AS-19	BS-14	BS-17	BS-19	BA-19
Price	.19	.43	.46	.20	.47	.50	.40

How to Use Color Caps

Style A caps are usually preferable for large roof signs, permanent displays and channel letters, as they produce the desired effect by reflecting without "killing" the light.

Style A color face of letter or design same color as the caps to be used. Use gloss paint.

Style B. These can be used like colored lamps on any background. They are especially adaptable for frequent color changes or where a deep color is required. Also recommended for street decorating, window display, fire exits, elevator signs, stage lighting effects, etc.

Cosmos Lamp Coloring

For direct application by dipping or spraying on metals, lacquer, cellophane or glass.

Application

Clean the surfaces to be finished.

Apply the lacquer at room temperature or even warmer temperature you are sure is also at same temperature. Allow work to dry at same temperature too. Keep the work away from dust or drafts. Do not use artificial heat to dry.

Colours

Clear Amber	Clear Red
Clear Ruby	Clear Ruby
Clear Green	
Opaque Amber	Opaque Red
Opaque Blue	Opaque Ruby
Opaque Green	

List Price, any colour \$1.00 per pint.

ETCH-O-LITE



The use of Etch-O-Lite for etching or frosting glass articles, gives a smooth satin-like surface which will neither catch nor hold dirt, and which is superior in appearance to either sand blast or acid etch. It is harmless to hands or clothing and can be shipped by freight, express or parcel post.

Frosting with Etch-O-Lite is a simple, rapid and positive operation. The article to be frosted is dipped in Etch-O-Lite, and after 1 1/2 or 2 minutes the material which adheres is scraped back into the can. Upon washing, the article will be found to have a permanent white frost, as the gloss has been removed from the glass!

It is economical: Mazda lamps—10 W. to 500 W. may be frosted at a cost of a fraction of a cent each for material.

If Etch-O-Lite becomes too thick it may be thinned to proper consistency by adding a small quantity of Etch-O-Lite Thinner. All containers are guaranteed against leakage for one year.

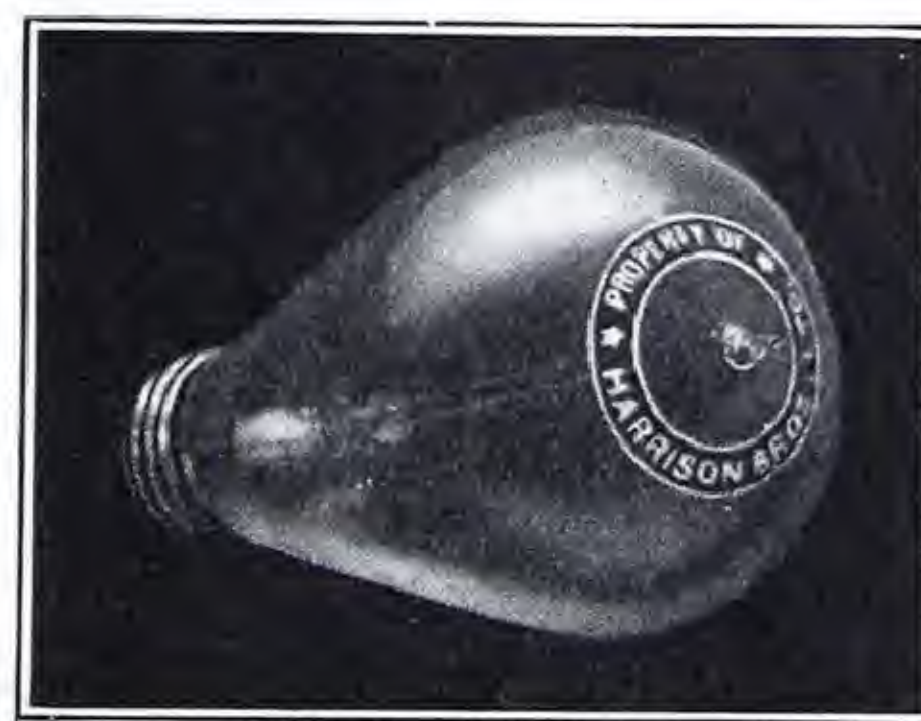
Size Can	Contents Pounds	List Price per Can
Small.....	4	\$ 6.00
Medium.....	8	11.60
Large.....	12	15.60
Thinner, 1/2-pint Cans.....		1.00
Dipping Machines. List Price, each.....		3.50

REED'S ETCHING OUTFITS



The loss sustained by hospitals, office buildings, industrial plants and similar institutions on stolen electric light bulbs and general glassware amounts to thousands of dollars a year.

Reed's Glass Etching Ink Outfit supplies the needed protection.



Showing Etched Globe

The outfit consists of one-half pint can of Reed's Etching Ink, Lead Inking Pad, Camel's Hair Brush, Flexible Form Adapter and Rubber Stamp to make impression. With this outfit 10,000 to 12,000 pieces of glassware can be easily and permanently marked. The outfit will pay for itself in a short time if the loss on stolen glassware is at all serious.

Standard Outfit, including ink as shown. List Price ea.	\$14.00
One half-pint can ink..... List Price ea.	8.50
Standard Outfit with 4 oz. bottle ink.... List Price ea.	11.50
Standard Outfit with 2 oz. bottle ink.... List Price ea.	9.00

DECORATIVE MAZDA LAMPS



No. 93

No. 95.—An assortment of 10 designs of 15-volt Mazda fancy lamps, packed in attractive display box.

List Price, per lamp.\$0.15



No. 90

No. 93.—Display box of 25 C-9 1/4, 120-volt Edison or Westinghouse Mazda lamps in assorted colors.

List Price, per lamp.\$0.15

No. 94.—Edison or Westinghouse C-9 1/4, 120-volt Mazda lamps. Packed 10 of one color to a box. Colors: red, green, blue, orange, yellow and white.

List Price, per lamp.\$0.15



No. 95

No. 90.—Display box of 100 C-6, 15-volt Edison or Westinghouse Mazda lamps in assorted colors.

List Price, per lamp.\$0.08

No. 92.—Edison or Westinghouse C-6 15-volt Mazda lamps. Packed 10 of one color to a box. Colors: red, green, blue, orange, yellow and white.

List Price, per lamp.\$0.08

DECORATIVE LIGHTING OUTFITS

No. 100.—8 lt. series outfit with 8 Mazda C-6, 15-volt lamps, long double silk cord with lead to patented add-on connector; has adjustable patented berry beads to hold sockets and lamps in any desired position.

List Price, complete with lamps..... \$1.50



No. 100

No. 111.—8 lt. series outfit with 8 Mazda C-6, 15-volt lamps. This set is of loop construction, of a single silk cord, has patented berry beads and patented add-on connector.

List Price, complete with lamps..... \$1.25



No. 140

No. 140.—8 lt. series outfit with 8 Mazda C-6, 15-volt lamps, triple silk cord with patented add-on connector at extreme end of the line, so as to permit a continuous festooning of lights; also has patented berry beads.

List Price, complete with lamps..... \$1.75

DECORATIVE OUTDOOR OUTFITS



No. 3125

No. 3125.—A 25 lt. multiple streamer, thorough weatherproof, Bakelite sockets, Bakelite patented berry beads, C-9 1/4 120-volt Mazda lamps, lacquer coated wire. Most wonderful streamer for general utility.

List Price, complete with lamps..... \$9.00

No. 3000.—7 lt. Weatherproof multiple outfit, using C-9 1/4 Mazda Intermediate base, 120-volt inside colored lamps, Bakelite sockets, lacquer coated wire. The extension connection is at the extreme end, also has Bakelite berry beads which permit the placing of socket and lamp in any desired position on the tree.

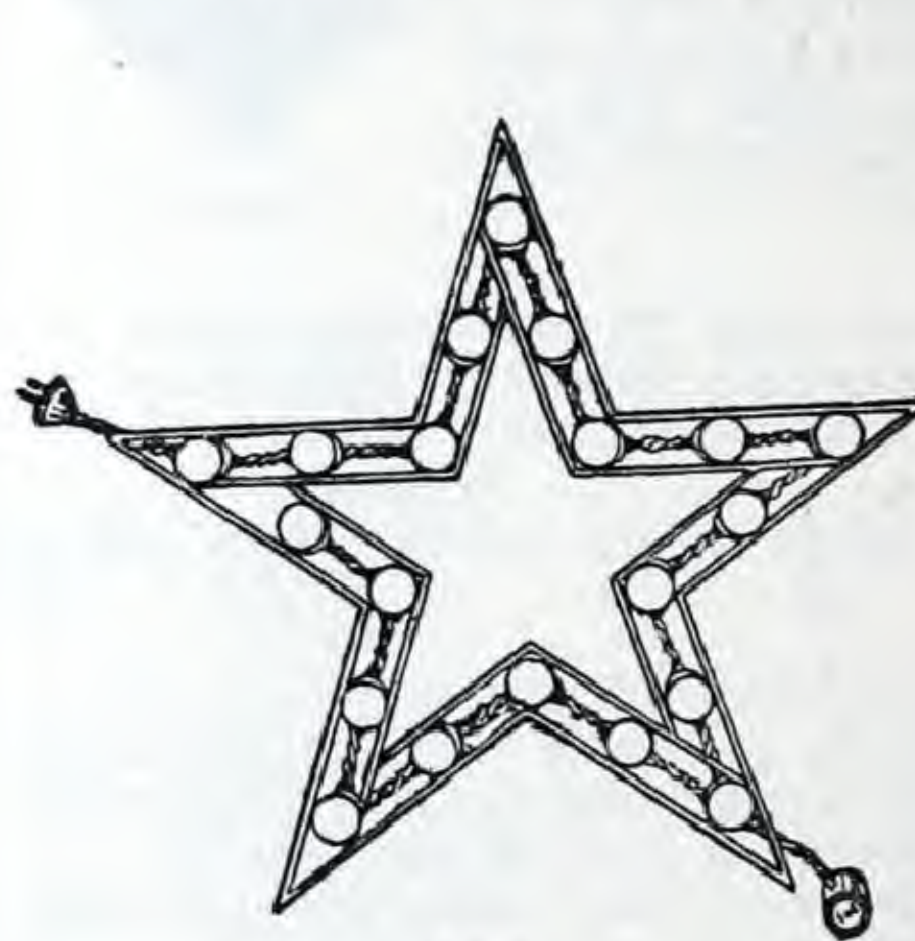
List Price, complete with lamps..... \$2.65



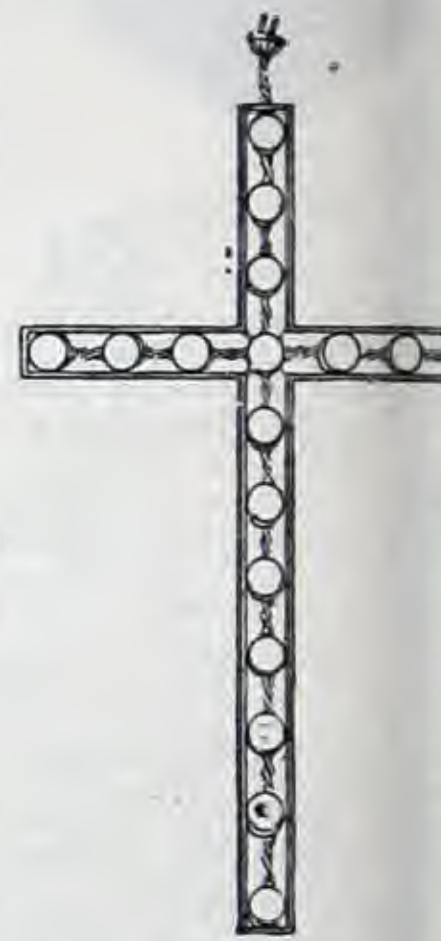
No. 3000

No. 3500.—Same construction as No. 3000, but with twinkling device permitting the lamps to twinkle or burn continuously as desired.

List Price, complete with lamps..... \$5.00



Star



Cross

No. 35.—Cross, 24 inches by 14 inches, complete with 17 C-9 1/4 120-volt white Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$12.00

No. 22.—Crescent 16 inch, complete with 15 C-9 1/4, 120-volt can inside coated Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$11.00

No. 23.—Diamond, 18 inch, complete with 16 C-9 1/4, 120-volt green inside coated Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$11.00

No. 24.—Spearhead, 17 inch, complete with 16 C-9 1/4, 120-volt blue inside coated Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$11.00

No. 21.—Circle, 14 inch, complete with 18 C-9 1/4, 120-volt red inside coated Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$12.00

No. 10.—Star, 12 inch, complete with 10 C-9 1/4, 120-volt white inside coated Mazda lamps, with connector ready to attach, fully weatherproof.

List Price, complete with lamps..... \$7.00

No. 25.—Star, 19 inch, with 20 white C-9 1/4 Mazda lamps, connector weatherproof.

List Price, complete with lamps..... \$12.00

No. 26.—Star, 30 inch, with 40 white C-9 1/4 Mazda lamps, connector weatherproof.

List Price, complete with lamps..... \$24.00

No. 27.—Star, 50 inch, with 60 white C-9 1/4 Mazda lamps, connector weatherproof.

List Price, complete with lamps..... \$37.00

WIRING DEVICES and ELECTRICAL SUPPLIES

An order placed with the Northern Electric Company for Wiring Devices and Electrical Supplies assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

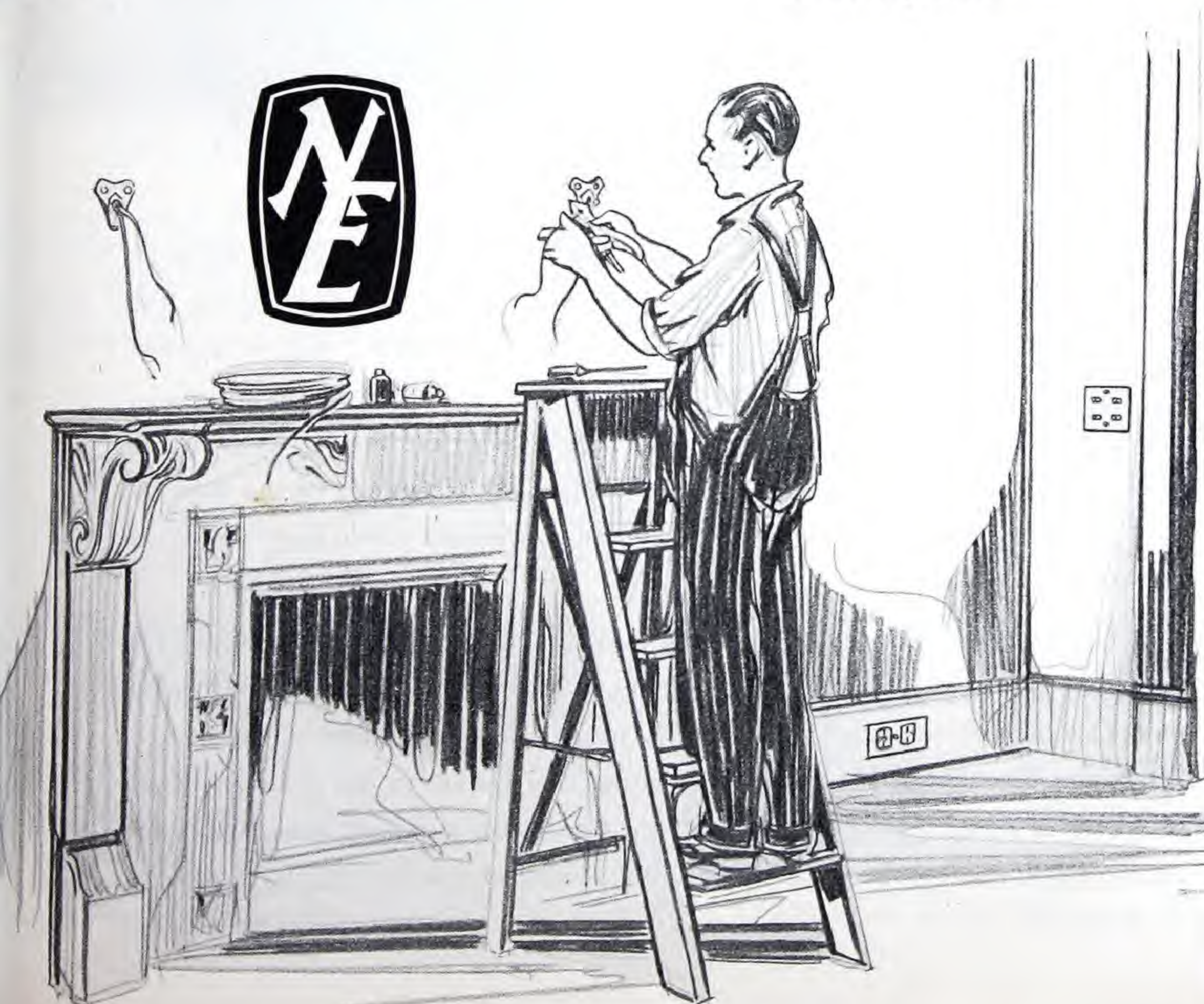
You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

INDEX

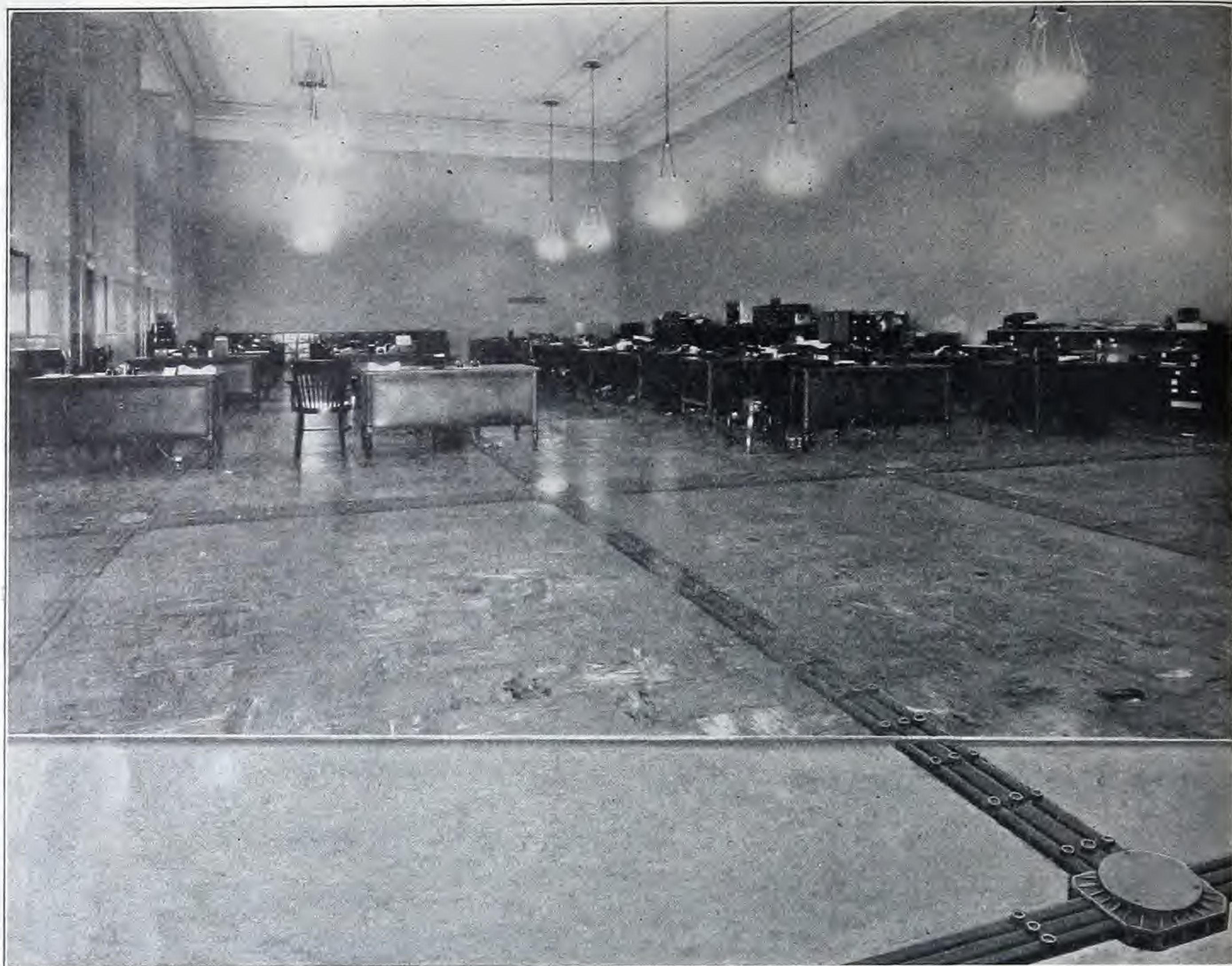
Batteries	Flashlights
Cabinets	Fuses
Conduits	Insulating Varnishes
Conduit Fittings	Panelboards
Connectors	Signaling Devices
Flashers	Wiring Devices

See alphabetical index for page numbers of listings at back of book.



WIRING DEVICES AND ELECTRICAL SUPPLIES

WALKER "ALSTEEL-PRESET" UNDERFLOOR DISTRIBUTION SYSTEMS



Phantom View

The "ALSTEEL-PRESET" System in general consists of a network of rectangular steel ducts, single or multiple with inserts cast in the floor. Each length of duct is equipped with "PRESET" inserts applied in the course of manufacture, at regular closely spaced uniform intervals. This forms a continuous concealed steel raceway with outlets for wires of the various services from the center of distribution to the surface of the floor at the point of application, constantly available without disturbing the floor structure.

The practical advantage, economy and convenience of these "PRESET" regularly spaced inserts are readily apparent. The use of steel for this raceway meets the highest standards of safety by insuring the continuity of the metallic ground throughout the system. Locating this system in the floor solves all problems of appearance and availability. Confusion, dirt and noise are practically eliminated in making connections during occupancy of the building.

WALKER "ALSTEEL-PRESET" UNDER-FLOOR DISTRIBUTION SYSTEMS

DUCT



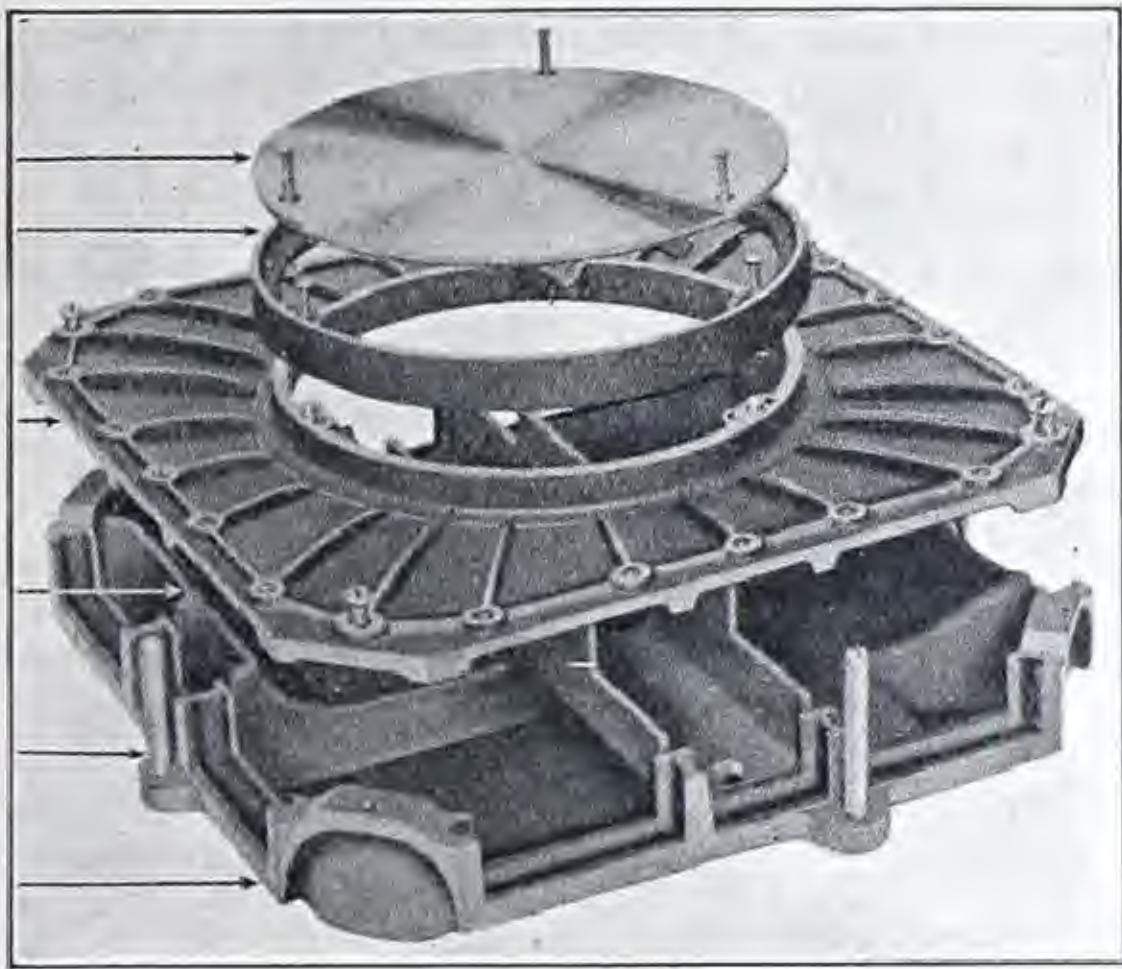
No. 1



No. 2

4 gauge cold rolled steel, having enamelled finish. Insert type "Preset" inserts 24 inches on centers, 1.3 inches diameter for No. 1 duct, and 1.9 inches in diameter for No. 2 t. Inserts 1 inch in height unless otherwise ordered. Inserts of special diameters, heights and threads can be furnished to order. Shipping weight—No. 1 duct, 180 pounds per 100 feet; No. 2 duct, 240 pounds per 100 feet.

JUNCTION BOXES



Grey iron castings, having enamelled finish, provided with opening on the 4 sides for either 1, 2 or 3 ducts as required in the arrangement required. Adjustable top assembly suits types of floor and height of inserts. Adjusting screws for levelling. All corners can be drilled and tapped for conduit holders. Special boxes for all types of service can be furnished on order.

Single Duct Boxes

List No.	Description	Shpg. Wgt. Lbs. Each
1	For No. 1 Duct.....	10
2	For No. 2 Duct.....	14

2 Duct Boxes

1	For No. 1 Duct.....	18
2	For No. 2 Duct.....	27
2	For Nos. 1 and 2 Duct.....	22

3 Duct Boxes

1	For Three No. 1 Ducts.....	27
2	For Three No. 2 Ducts.....	43
1	For Two No. 1 and One No. 2 Ducts.....	36
2	For One No. 1 and Two No. 2 Ducts.....	41
1	For Two No. 1 and One No. 2 Ducts.....	33
1	For One No. 1 and Two No. 2 Ducts.....	39

Prices and detailed information on request.

WALKER "ALSTEEL-PRESET" UNDER-FLOOR DISTRIBUTION SYSTEMS

DUCT SUPPORTS



Stamped steel, enameled finish. Vertical and horizontal adjustments, locking screws, and mounting holes. Arranged for 1, 2 or 3 duct systems as required. Vertical members furnished in accordance with thickness of floor slab. Average shipping weight per 100 pieces, 125 pounds. Prices on application.



DUCT COUPLINGS

List No.	Description	Ship. Wgt. per 100
C-1	For No. 1 Duct.....	60
C-2	For No. 2 Duct.....	80

END FITTINGS

Cast iron cap for closing the end of the duct. Contains marker screw for locating the end of duct runs.

List No.	Description	Ship Wgt. per 100
D-1	For No. 1 Duct.....	80
D-2	For No. 2 Duct.....	115



MARKER CAPS

Marker cap for locating preset inserts under floor covering.

List No.	Description	Ship. Wgt. Per 100
353	For 1.3-Inch Inserts.....	8
360	For 1.9-Inch Inserts.....	12

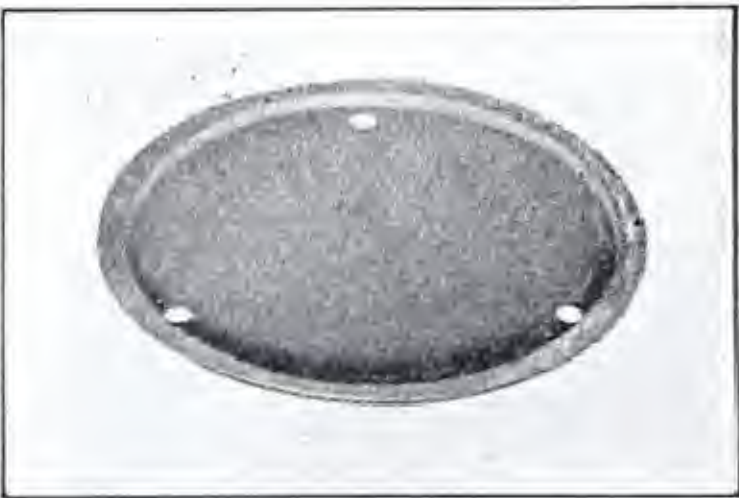


LINOLEUM HOLDERS

Brass holder for floor coverings such as linoleum.

Depth as ordered.

List No.	Size In.	Ship. Wgt. Per 100
364	4	35
366	6	57
367	7	100
368	8	120
370	10	190



SERVICE FITTINGS

Cast brass service fittings.

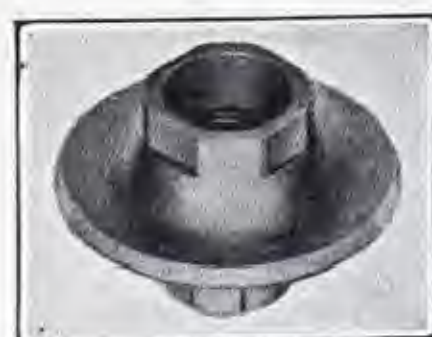
List No.	Description	Ship. Wgt. Per 100
101-L	Low Tension....	90
101-H	High Tension...	95

Prices and detailed information on request.

WALKER "ALSTEEL-PRESET" UNDER-FLOOR DISTRIBUTION SYSTEMS

SUPPORTS

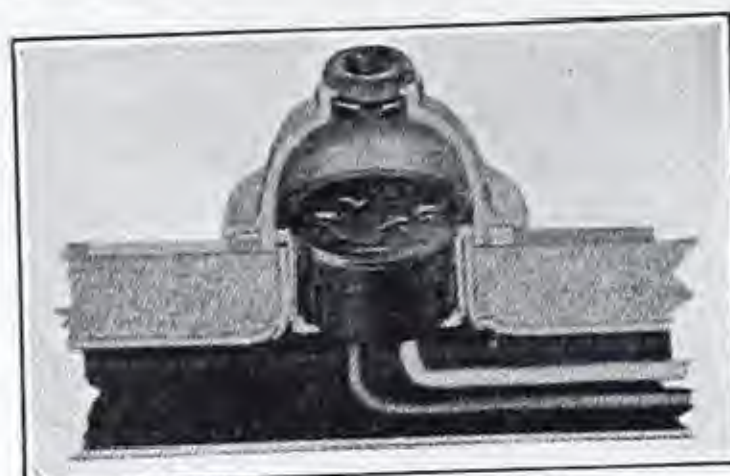
Cast brass service fitting supports.



List No.	For Insert Diam. In.	Shank Lgth. In.	Shpg. Wt. Per 100
221 -1	1.3	1	70
221 -1½	1.3	1½	90
1101-1	1.9	1	95
1101-1½	1.9	1½	115

FLUSH FITTINGS

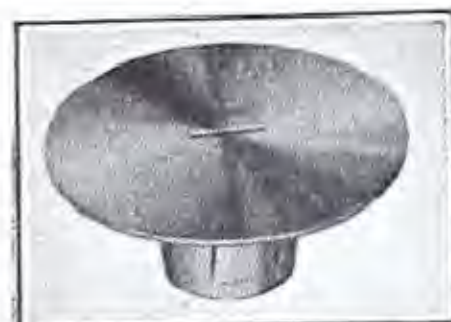
Polarized flush floor respectacle for use in 1.9-inch insert only.



List No.	Description	Shpg. Wt. Per 100
200	10 Amp., 2 Pole.....	100
205	10 Amp., 3 Pole.....	100
210	Low Tension.....	90

BLANKING PLATES

Cast brass blanking plates.



List No.	For Insert Diam. In.	Shank Lgth. In.	Shpg. Wt. Per 100
323-A	1.3	1	36
1323-C	1.9	1	65

Prices on application.

FLEXIBLE METALLIC CONDUIT



Size ' Inside Diameter	Weight in Lbs. Per 1000 feet	Standard Coils	List Price per 100 feet
5/16"	178	100-250	\$ 5.00
3/8"	290	100-250	7.50
1/2"	480	75-125	10.00
3/4"	610	25-50	13.00
1"	1080	25-50	21.00
1 1/4"	1320	25-50	26.00
1 1/2"	1710	25-50	35.00
2"	2240	25-50	45.00
2 1/2"	2770	25-50	52.00
3"	3320	25	59.00



TRIDUCT NON-METALLIC FLEXIBLE CONDUIT

Non-Metallic Conduit

Triduct is a perfectly uniform, closely woven single wall tube, non-collapsible, saturated and finished with a non-absorbent flame-proof compound. This tube has the unusual qualities of great wall strength and exceptional flexibility.

Nominal Size	Feet to Coil	Weight in Lbs. per 1000 feet	List Price per 100 feet
1/4"	250	55	\$ 6.00
3/8"	250	70	9.00
1/2"	250	82	12.00
5/8"	200	97	15.00
3/4"	150	113	18.00
1"	100	125	25.00

RIGID IRON CONDUIT



"Loricated" Conduit is a mild steel welded tube, enameled inside and outside.

"Galvaduct" Conduit is thoroughly galvanized and the tube is then treated on the interior only with special flexible enamel.

List Prices

"Galvaduct" and "Loricated" Conduit, Couplings and Elbows

CONDUIT

Size	Diameters Ext'n'l Int'n'l	Thick- ness	Thr'd per In.	Wgt. Foot	Std. Pkg. Feet	List Price Per F'
1/4	.540 .364	.088	18	.425	100	\$0.08
3/8	.675 .493	.091	18	.568	100	.08
1/2	.840 .622	.109	14	.852	100	.08
3/4	1.050 .824	.113	14	1.134	70	.11
1	1.315 1.094	.133	11½	1.684	50	.17
1 1/4	1.660 1.380	.140	11½	2.281	30	.23
1 1/2	1.900 1.610	.145	11½	2.731	30	.27
2	2.375 2.067	.154	11½	3.678	20	.37
2 1/2	2.875 2.469	.203	8	5.819	10	.58
3	3.500 3.068	.216	8	7.616	10	.76
3 1/2	4.000 3.548	.226	8	9.202	10	.92
4	4.500 4.026	.237	8	10.889	10	1.09
5	5.563 5.047	.258	8	14.810	10	1.48
6	6.625 6.065	.280	8	19.185	10	1.92

COUPLINGS

ELBOWS

Size	Wgt. Per 100 in Lbs.	Std. Pkg.	List Price Each	Offset In.	Radius In.	Wgt. Per 100 in Lbs.	Std. Pkg.	List Price Each
1/4	6.0	500	\$.05	7.50	4.25	42	200	\$0.
3/8	9.5	500	.06	7.50	4.25	53	150	
1/2	11.6	500	.07	7.37	4.25	75	125	
3/4	20.9	400	.10	8.37	5.37	120	100	
1	34.3	250	.13	9.50	5.75	200	50	
1 1/4	53.5	150	.17	10.87	7.25	300	25	
1 1/2	74.3	100	.21	12.62	8.25	427	20	
2	120.8	50	.28	15.25	9.50	700	15	1.
2 1/2	172.0	40	.40	17.37	10.50	1300	10	1.
3	249.8	25	.60	19.50	13.00	1700	8	4.
3 1/2	424.1	15	.80	21.25	15.00	2300	6	10.
4	474.1	10	1.00	22.50	16.00	2700	4	12.
5	700.0		1.65	32.00	24.00	5500		25.
6	750.0		2.40	39.75	30.00	9000		32.

Tubes in 10 feet lengths, threaded both ends, with coupling.

Prices quoted on special sizes, bends and lengths, on application.

Dimensions are nominal. Weights subject to usual variation of 5 per cent.

EVERDUR ELECTRICAL CONDUIT

It is a recognized fact that electrical conduit which is subject to deterioration by rust and other forms of corrosion constitutes not only a serious hazard, but also an avoidable maintenance expense that far outweighs the temporary first-cost advantages over conduit made of a much more durable metal.

Because most conduit is concealed, evidence of serious rust or corrosion is not readily apparent. Fortunately, trouble in electrical lines is apt to make itself manifest by fire and, in some instances, by explosion.

There are other more frequent but less serious forms of expense and annoyance. Excessive maintenance costs can frequently be attributed to delays in locating open circuits, shorts or grounds in inaccessible places, and to making repairs or replacements in wiring systems caused directly or indirectly by failure of rustable conduit. In some processing industries, power interruptions, with a resulting shut-down of equipment, may also involve a substantial loss in spoiled materials.

Everdur Electrical Conduit was developed by the American Brass Company to meet a long-felt need for a more durable conduit than was heretofore available for installations exposed to general corrosive conditions or hazardous locations.

CORROSIVE CONDITIONS AND LOCATIONS

Everdur Conduit offers exceptional resistance to many general corroding influences and agents, among which may be listed:

Various chemicals prevalent in surrounding air, soil or construction materials.

Atmospheres containing steam, ammonia fumes, bone dust, etc.

Humid atmospheres, and areas where unusual atmospheric condensation takes place.

Salt atmosphere encountered in coastal areas.

Atmospheres containing smoke, soot, or industrial gases.

Electrical conduit subjected to more than the normal corrosive conditions include such locations

Shore resorts, docks, ships, and the marine world in general.

Railroad roundhouses, yards and terminals, especially conduit protecting wires used for communication and signaling devices which are exposed to smoke fumes).

Dairies and ice cream plants.

Meat packing plants.

Building construction, or wherever conduit is embedded in plaster or cinder concrete.

Subways, tunnels, mines and underground workings.

Viaducts and bridges.

Battery rooms, plating rooms, etc.

Tank storage houses.

Alkali, salt, or potash works or warehouses.

EVERDUR ELECTRICAL CONDUIT

Plants producing heavy acids.

Sewage treatment plants.

Manufacturing processes involving acids.

Agitation tanks where sludge acids are handled.

Foundries, blast furnaces, coke production plants.

Breweries, distilleries, paper mills, etc.

HAZARDOUS LOCATIONS

The high factor of safety provided by Everdur Conduit is particularly advantageous for hazardous locations where inflammable volatile liquids, highly inflammable gasses or mixtures, combustible dusts of explosive nature, and easily ignitable fibres or materials are handled, manufactured, stored, or used.

It is a definitely established fact that in such locations, if combustible vapors or dust are emitted in sufficient quantities, mixtures highly susceptible to explosion will result.

Some such hazardous locations may be classified as follows:

Atmospheres containing acetylene, hydrogen, ethyl ether, gasoline, common petroleum, ethyl alcohol, methyl alcohol, acetone and lacquer solvent vapors.

Atmospheres containing metal dust, carbon black, coal or coke dust, and grain dust.

Among the various industries where exceptionally hazardous locations are encountered may be listed.

Dry cleaning and dry dyeing plants.

Paint and varnish factories.

Gas plants - Oil refineries - Gas and oil wells.

Gasoline storage, handling and pumping.

Storage and handling of nitro-cellulose products, such as celluloid, photographic films, etc.

Flour and feed mills.

Grain elevators - Starch plants.

Sugar, cocoa and coal pulverizing plants.

Coal mines, etc.

Everdur Electrical Conduit is manufactured in two wall thicknesses, marketed as Everdur E. M. T. and Everdur Rigid Conduit. Both conduits are seamless and accurately cold-drawn to size with smooth walls inside and out for use with standard fittings. They are of uniform temper and can be cut, threaded, bent and assembled in practically the same manner and with the same equipment employed for steel conduit or tubing.

Everdur Electrical Metallic Tubing and Everdur Rigid Conduit are listed and labeled by Underwriters' Laboratories and have successfully withstood the prescribed tests for:

1. Conductivity.
2. Short Circuit and Ground.
3. Resistance to Arcing.
4. Bonding and Fittings.
5. Tensile and Compression Strength.
6. Resistance to Impact.
7. Bending.

EVERDUR ELECTRICAL CONDUIT

EVERDUR ELECTRICAL METALLIC TUBING—Everdur E. M. T. is a thin-wall conduit made of Everdur Metal. Its physical properties are approximately equal to mild steel tubing of comparable wall thickness. It is available in sizes from $\frac{3}{8}$ " to 2" in diameter, in standard 10-foot lengths, for assembly with threadless fittings, which facilitate installation and dismantling.

The following table gives the dimensions of Everdur E. M. T. with minimum shipping weights per foot, in accordance with Underwriters' listing requirements:

Nominal Size Inches	O.D. Inches	I.D. Inches	Wall Inches	Lbs. Per Foot
$\frac{3}{8}$	.577	.493	.042	.268
$\frac{1}{2}$	.706	.622	.042	.332
$\frac{3}{4}$	.922	.824	.049	.510
1	1.165	1.049	.058	.765
$1\frac{1}{4}$	1.51	1.38	.065	1.12
$1\frac{1}{2}$	1.74	1.61	.065	1.30
2	2.19	2.06	.065	1.65

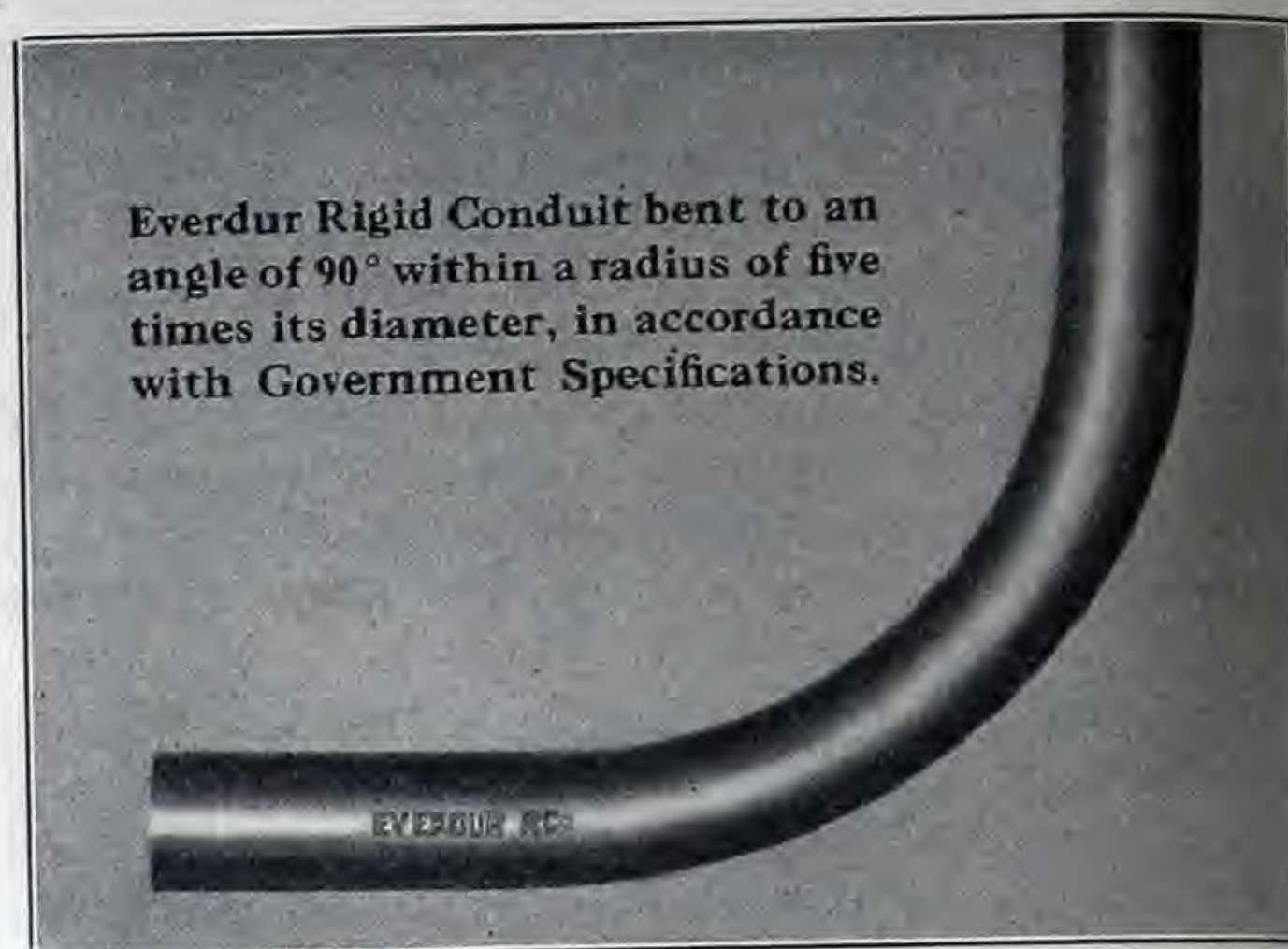
EVERDUR RIGID CONDUIT — Everdur R. C. is supplied in nominal sizes from $\frac{1}{4}$ " to 4" inclusive. Its physical properties are approximately equal to mild steel rigid conduit. As ordinarily supplied, the 10-foot lengths are threaded both ends with one Everdur coupling attached, but they may also be obtained unthreaded for use with threadless fittings. The following table gives the dimensions and weights of Everdur Rigid Conduit:

Nominal Size Inches	O.D. Inches	I.D. Inches	Wall Inches	Lbs. Per Foot
$\frac{1}{4}$	.540	.382	.079	.433
$\frac{3}{8}$	.675	.503	.086	.603
$\frac{1}{2}$	.840	.636	.102	.897
$\frac{3}{4}$	1.050	.834	.108	1.21
1	1.315	1.075	.120	1.71
$1\frac{1}{4}$	1.660	1.382	.139	2.52
$1\frac{1}{2}$	1.900	1.614	.143	2.99
2	2.375	2.077	.149	3.95
$2\frac{1}{2}$	2.875	2.519	.178	5.72
3	3.500	3.084	.208	8.16
$3\frac{1}{2}$	4.000	3.524	.238	10.67
4	4.500	4.024	.238	12.08

EVERDUR ELECTRICAL CONDUIT EASILY INSTALLED — The ease with which Everdur Electrical Conduit can be installed in the field, together with its permanently smooth non-rusting interior—an aid in wire drawing, not only when the tube is new, but indefinitely thereafter—are additional advantages of this new conduit.

CORROSION RESISTANCE OF EVERDUR — While Everdur Metal offers exceptional corrosion resistance, it should be borne in mind that it is not equally resistant to all corroding agents, nor equally resistant to the same agent under all conditions.

EVERDUR ELECTRICAL CONDUIT



When Everdur Electrical Conduit is installed in cinder fill, the recommended procedure for counteracting galvanic corrosion is to surround the tube with a 6" bed of clean sand mixed with lime, thereby preventing the metal from coming in direct contact with moist cinders. Another method is to surround the tube with limestone or broken plaster. (Lime, being alkaline, to some extent neutralizes the acid in cinders).

Requests for information on the resistance of Everdur Electrical Conduit and Everdur Fittings to various corroding agents under specified conditions will be given careful consideration.

NON-MAGNETIC ADVANTAGES — Single alternating current wires or leads may be taken off a generator and encased in non-magnetic Everdur Conduit without creating excessive inductive effects. With steel conduit, usually a complete circuit must be enclosed in an individual conduit to eliminate undesirable inductive effects.

Everdur Fittings

It is desirable, of course, to use Everdur fittings with Everdur Electrical Conduit. Several complete lines of such fittings are now available.

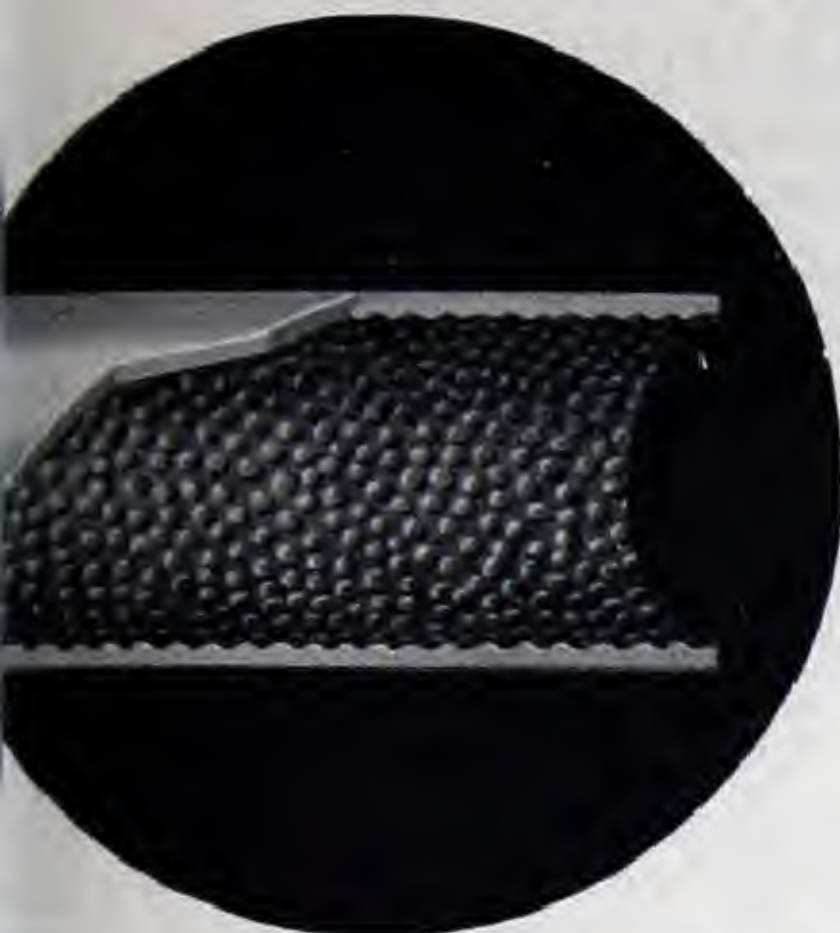
Connectors and couplings may be made of cast Everdur, or machined from free-cutting Everdur Rods.

Certain types of outlet boxes, junction boxes, switch boxes, covers and similar parts are usually fabricated from hot-rolled Everdur sheet or strip as this metal is readily stamped, drawn, and machined. Such parts are strong and ductile and possess excellent corrosion resistance. Other fittings are cast from Everdur Ingot Metal, which is an ideal casting alloy, producing dense-grained strong and sound castings of economical, light weight design.

Everdur also possesses excellent welding characteristics and lends itself to all the usual methods of welding. The corrosion-resistance of Everdur Fittings is substantially the same as that of Everdur Electrical Conduit.

Prices on application.

ELECTRUNITE STEELTUBES



Perfect bends made easily.
No threading.
Simplified and efficient Fittings.
Light yet rigid.
Lower cost.
Superior resistance to corrosion, and now
The new "knurled" inside finish which reduces effort in "wire pulling" as much as 30%.

The old premise that the inside of conduit should be as smooth as possible has been proved wrong. The cable in both finish conduit makes contact throughout the entire length, results in high friction, and requires more effort to pull cable through. Electrunite Steeltubes Conduit with the knurled inside finish showed by actual test a saving of 30 per cent in the effort required to pull cable through. The cable rests on the tops of the tiny knobs instead of making contact along the entire length.

Dimensions and Weights

	Approx. Wgt. Per 1000 Ft.	Diameter Int.	Ext.
3/8"	254 lbs.	.493	.577
1/2"	321 lbs.	.622	.706
3/4"	488 lbs.	.824	.922
1"	711 lbs.	1.049	1.163
1 1/4"	985 lbs.	1.380	1.508
1 1/2"	1141 lbs.	1.610	1.738
2"	1470 lbs.	2.067	2.195

COUPLINGS WITH STEEL RING

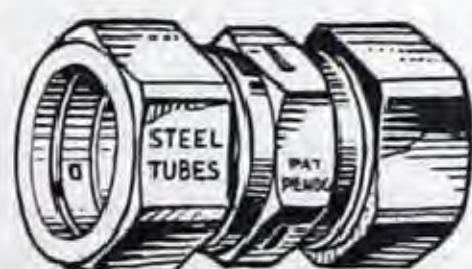


No. 6038
Furnished with wide, curved, split steel ring and hexagonal nut, easily tightened by means of a small hand wrench to make a secure joint. All parts are protected from corrosion by cadmium plating. Hexagonal nuts only furnished in sizes up to and including one inch.

Size	Std. Pkg.	Carton Quan.	Wgt. Lbs. per 100	List Price per 100
3/8"	200	50	12	\$12.00
1/2"	200	50	13	12.00
3/4"	100	50	15	17.00
1"	50	25	20	25.00
1 1/4"	25	25	50	50.00
1 1/2"	10	10	80	70.00
2"	5	5	140	100.00

NEW IMPROVED WATERTIGHT COUPLING

Furnished with a round, split, steel ring and a flat brass ring, making a secure and yet absolutely watertight joint. Hexagonal nuts only in sizes up to and including one inch. All parts are protected from corrosion by cadmium plating.

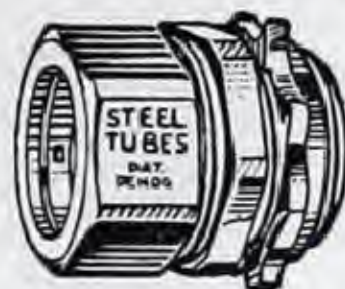


No. 6038W

Size	Std. Pkg.	Carton Quan.	Wgt. Lbs. per 100	List Price per 100
3/8"	200	50	12	\$12.00
1/2"	200	50	13	12.00
3/4"	100	50	15	17.00
1"	50	25	20	25.00
1 1/4"	25	25	50	50.00
1 1/2"	10	10	80	70.00
2"	5	5	140	100.00

ELECTRUNITE STEELTUBES

CONNECTOR WITH STEEL RING



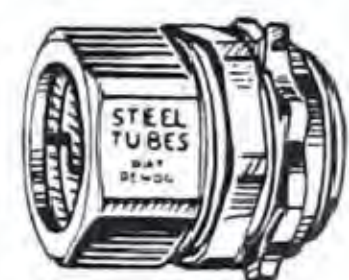
No. 7038

Furnished with wide curved split steel ring, hexagonal tightening nut and jagged-edged locknut. All parts are protected from corrosion by cadmium plating. Hexagonal tightening nuts only furnished in sizes up to and including one inch.

List No.	Size	Std. Pkge.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
7038	3/8"	200	50	10	\$12.00
7050	1/2"	200	50	11	12.00
7075	3/4"	100	50	13	17.00
7100	1"	50	25	20	25.00
7125	1 1/4"	25	25	50	50.00
7150	1 1/2"	10	10	60	70.00
7200	2"	5	5	100	100.00

NEW IMPROVED WATERTIGHT CONNECTOR

Furnished with a round, split, wire ring and a flat brass ring, making a secure and yet watertight joint. A jagged-edged locknut firmly secures the connector to any standard knock-out box. All parts protected from corrosion by cadmium plating. Hexagonal tightening nuts only used in sizes one inch and smaller.



No. 7038-W

List No.	Size	Std. Pkge.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
7038-W	3/8"	200	50	10	\$12.00
7050-W	1/2"	200	50	11	12.00
7075-W	3/4"	100	50	13	17.00
7100-W	1"	50	25	20	25.00
7125-W	1 1/4"	25	25	50	50.00
7150-W	1 1/2"	10	10	60	70.00
7200-W	2"	5	5	100	100.00

SPLIT STEEL ADAPTER



No. 1038

This simple tapered steel sleeve adapts Electrunite Steeltubes to all standard conduit fittings with the regular threaded hub. No obsolescence or disturbance of stock. This fitting makes everything threadless. Furnished with hexagonal grip and cadmium plated to resist corrosion.

List No.	Size	Std. Pkge.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
1038	3/8"	200	100	1 1/2	\$ 4.00
1050	1/2"	200	50	2 1/2	4.00
1075	3/4"	100	25	5	6.00
1100	1"	50	25	6	10.00
1125	1 1/4"	20	20	10	20.00
1150	1 1/2"	10	10	15	25.00
1200	2"	5	5	20	35.00

COUPLING WITH STEEL GLAND

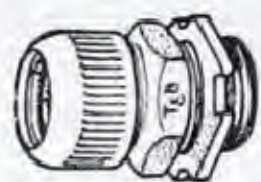
This coupling has sharp diagonal cuts in the gripping surfaces of the slotted, steel gland so as to take a positive bite in the tube. The tightening nuts are of steel while the threaded hub is of malleable iron. All pieces are galvanized to insure adequate corrosion resistance. Sizes 1 1/4" and larger have malleable iron nuts and wire springs.



List No.	Size	Std. Pkge.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
10038	3/8"	200	50	13	\$16.35
10050	1/2"	200	50	13	12.75
10075	3/4"	100	25	20	17.00
10100	1"	50	25	28	24.90
10125	1 1/4"	25	5	60	56.50
10150	1 1/2"	10	2	100	72.50
10200	2"	5	2	140	113.30

ELECTRUNITE STEELTUBES

CONNECTOR WITH STEEL GLAND



Furnished with a slotted steel gland having sharp diagonal cuts in the gripping surface which bites into the tube thus making a secure connection. Tightening nut and lock-nut are made from steel, while the threaded hub is of malleable iron. All parts are galvanized. Sizes larger than 1" have malleable iron rings and steel springs.

List No.	Size	Wgt. Lbs. per 100	Std. Pkg.	List Price per 100
11038.....	3/8"	12	200	\$16.30
11050.....	1/2"	12	200	10.60
11075.....	3/4"	18	100	14.70
11100.....	1"	26	50	24.90
11125.....	1 1/4"	60	25	56.50
11150.....	1 1/2"	100	10	72.50
11200.....	2"	140	5	113.30

MALLEABLE IRON PIPE STRAP

Here is a one-hole support made of tough malleable iron, designed specially for a snug fit on the tubing. Protected against corrosion by a galvanized coating.



List No.	Size	Std. Pkg.	Wgt. Lbs. Per 100	List Price Per 100
4175.....	3/8"	100	3	\$4.40
4176.....	1/2"	100	4	5.10
4177.....	3/4"	100	7	6.40
4178.....	1"	100	10	8.80
4179.....	1 1/4"	50	12	14.70
4180.....	1 1/2"	50	14	22.10
4181.....	2"	25	20	47.85

STEELTUBES BENDING TOOL



Especially designed for bending Electrunitesteel tubes, this tool provides the necessary support for side walls, eliminating all chance of kinking at the bend. All bends can be made either by a sweep of the handle or with bender reversed using the tubing as the lever.

So effective is this tool, that elbows have been found unnecessary in sizes one inch or smaller and consequently are not fabricated. Be sure to save the shipping tag on one of your next bundles of Electrunitesteel tubes as it has on the back side complete directions for making accurate bends.

List No.	Size	Std. Pkg.	Wgt. Lbs. Per 100	List Price Each
4195.....	1/2"	10	250	\$4.00
4196.....	3/4"	10	420	5.90
4197.....	1"	2	600	9.35

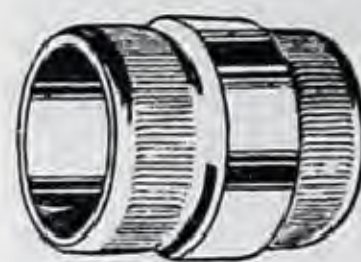
STEELTUBES HICKEY

Makes bends of any desired radius. To insure against kinking, the tube should be "inched" through, not more than ten degrees being pulled at a time. An excellent tool for stubbing-up in concrete work and for making short or close bends.

List No.	Size	Description	Std. Pkg.	Wgt. Lbs. Per 100	List Price Each
2195	1/2"	(Use 3/4" pipe handle)	10	200	\$2.65
2196	3/4"	(Use 1" pipe handle)	10	350	4.00
2197	1"	(Use 1" pipe handle)	5	500	6.80

ELECTRUNITE STEELTUBES

FLANGE-TYPE COUPLING



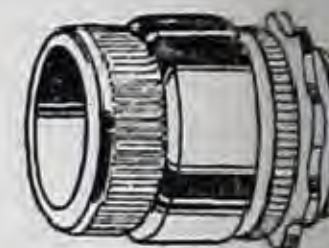
Composed of a female and male part, which when screwed together, securely locks the two flanged edges to make a mechanically positive joint. Fabricated from a high grade steel and galvanized to resist corrosion. No rough edges. Provided

with sharp, clean threads.

List No.	Size	Std. Pkg.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
8050	1/2"	200	50	15	\$12.00
8075	3/4"	100	50	23	17.00
8100	1"	50	25	34	25.00
8125	1 1/4"	25	25	50	50.00
8150	1 1/2"	10	10	80	70.00
8200	2"	5	5	140	100.00

FLANGE-TYPE CONNECTOR

Composed of a female sleeve, threaded hub and self-binding lock nut. The hub and sleeve screw together and wedge the flanged end secure. All parts protected from corrosion by galvanizing.



List No.	Size	Std. Pkg.	Carton Quan.	Wt. Lbs. Per 100	List Price Per 100
9050	1/2"	200	50	12	\$12.00
9075	3/4"	100	50	20	17.00
9100	1"	50	25	32	25.00
9125	1 1/4"	25	25	50	50.00
9150	1 1/2"	10	10	60	70.00
9200	2"	5	5	100	100.00

FLANGING TOOL



With a few blows of the hammer this hardened steel plunger provides the correct flange for a perfect connection. Care must be taken to drive the tool into the tube so that the end of the tube is just level with the top of the shoulder. Best results are obtained when the tubing is cut squarely. This flanging tool is accurately machined to fit and galvanized to prevent rusting. Catalog number 50 is provided with two shoulders to take both 1/2" and 3/4" sizes.

List No.	Size	Std. Pkg.	Wgt. Lbs. Per C	List Price each
50	1/2" & 3/4"	10	115	\$2.20
100	1"	5	141	2.80

FLANGING MACHINE

In flanging sizes larger than one inch it is necessary to employ the flanging machine. This machine has only two moveable parts—the die which holds the tubing in place during the flanging operation and the conical plunger which moves forward to form the correct flange. This machine is capable of flanging all sizes of Electrunitesteel tubes from 1/2" to 4". It may be mounted on a work bench or operated on legs as shown.

List Price..... \$97.00

For the ordinary small job which does not require the use of Electrunitesteel tubes in sizes larger than one inch, the use of the flanging machine is not necessary as the small sizes are easily flanged by means of the flanging tool shown above. The use of this machine is particularly applicable to production jobs where large quantities of tubing of all sizes are used.

ALUMINUM RIGID CONDUIT

Light in Weight and Corrosion Resisting

Aluminum Rigid Conduit is a drawn seamless tubing, light in weight and highly resistant to corrosion. It has been approved by the National Board of Fire Underwriters. It has peculiar characteristics which make it superior to steel conduit for many purposes, especially when installed where it is subject to attack from certain chemicals and corrosive vapors.

Aluminum Rigid Conduit is now being used on flood-lighting systems in connection with exterior illumination of buildings, memorial towers, and by engineers and mechanics on electrical systems in round-houses, railroad shops, train sheds, railroad yards, packing houses, chemical manufacturing plants, paper mills and for all electrical work in salt water districts.

Aluminum Rigid Conduit is particularly desirable in these classes of work, not only because of its resistance to corrosion under all atmospheric conditions, but because it does not stain or streak the surface of the structure on which it is attached.

The weight of Aluminum Rigid Conduit is about one-third that of steel and this together with its corrosion-resisting qualities has made valuable applications possible. Designers and builders of electric and steam railway cars. The dimensions of Aluminum Conduit are identical with those of steel conduit and manufacturers of cast conduit fittings are now prepared to furnish their entire lines in aluminum.

DESCRIPTION OF ALUMINUM CONDUIT

Aluminum Rigid Conduit is manufactured from a drawn seamless tubing of an aluminum manganese alloy with mechanical properties higher than those of commercially pure aluminum but with equal resistance to corrosion.

The tensile strength of this alloy is 21,000 to 26,000 lbs. per square inch. Aluminum Rigid Conduit is manufactured in standard iron pipe sizes and its dimensions are identical with those of steel conduit. It is furnished in ten foot lengths, and is enameled inside to conform with standard practice in manufacturing electrical conduit. It has threads of standard size on both ends and a coupling on one end and threads on the end opposite the coupling are protected from possible damage—all as recommended by Underwriters' Laboratories. In the Underwriters' report approving Aluminum Rigid Conduit they state that the well established rules will apply for the installation and use of rigid conduit outlined in the National Electrical Code.

Aluminum Rigid Conduit also can be furnished in lengths up to 48 feet, enameled as above described, on applications requiring seamless or jointless runs. Aluminum Conduit is a high-grade product and is constructed by methods adapted to produce a wireway of accurate dimensions and uniform quality. It can be fitted and installed with the same tools in the same manner as steel conduit. Aluminum straps are available for its installation. Recommendations for installation may be found hereinafter.

STRONG AND DURABLE

Aluminum Rigid Conduit, while not as strong as steel, has adequate strength for all electrical work when properly installed, supported and fastened according to the methods common to good practice in conduit work.

The threading is smooth, full and clean, permitting the perfect tight fitting of couplings, lock nut and bushings.

Aluminum Rigid Conduit will prove durable in service under all conditions of ordinary use and is superior to steel conduit under many special conditions, particularly when exposed to the action of corrosive vapors and gases.

ELECTRICAL PROPERTIES

The electrical properties of aluminum are such as to make its use for conduit desirable. The conductivity is greater than that of steel so that under the same conditions it provides adequate grounding connection throughout a conduit system. Its electrical action when in contact with steel or other metals is not such as to produce undesirable electrolytic effects.

Aluminum Rigid Conduit, because of its non-inductive properties, is recommended in power stations and electrical installations wherever it is desirable to run individual alter-

nating current conductors. For instance, generator and transformer leads, lightning arrester connections, and all alternating current conductors of similar character can well be run in aluminum conduit to avoid eddy current losses. Aluminum Rigid Conduit is recommended also on alternating current locomotives and multiple unit cars where individual conductors must be run in rigid conduit.

Radio installations and broadcasting stations, because of the high frequencies used, can undoubtedly obtain exceptional advantages from this non-inductive feature of Aluminum Rigid Conduit.

RECOMMENDATIONS FOR WORKING ALUMINUM CONDUIT

Sawing Aluminum Conduit. Aluminum Conduit can be sawed quite readily and a bandsaw is well suited for the purpose. A woodworking band saw operating at a linear blade speed of 1500 to 4000 feet per minute is recommended. The conduit is fed by hand into the saw, just as if wood were being cut.

A number of band saw blades, especially designed for cutting aluminum, are obtainable and most of them give good service. However, excellent results are obtained from the usual wood-cutting band saw blades and these can be re-sharpened from time to time. Coarse pitch teeth of 4 to 10 teeth per inch give best results.

As a cutting lubricant, parowax or ordinary candle wax may be applied by hand.

REMOVING BURRS FROM END OF ALUMINUM CONDUIT

These burrs are formed when the conduit is being cut, and they can be removed easily by using a reamer in the usual manner. However, we recommend the reamer with spiral flutes as better suited for the purpose than the straight fluted type. The use of a lubricant aids in the operation and we suggest the use of one of those listed below.

Threading Aluminum Conduit. In order to satisfactorily machine aluminum and its alloys, it must be remembered that these metals have machining characteristics that are distinctly different from those of steel or brass, and that the cutting tools required for aluminum and aluminum alloys are not at all like the tools required for cutting steel and tools for brass cutting. The fundamental requirements for aluminum-cutting tools must be understood if threading tools for aluminum conduit are to be prepared properly.

First, a satisfactory tool for aluminum must have considerably more top rake than a steel cutting tool. This gives a comparatively keen or a sharp angle to the cutting edge. For threading dies, we recommend a top rake angle of 25 degrees to 35 degrees. This gives a cutting edge angle of 55 degrees to 65 degrees.

Also, side rake is very desirable in an aluminum cutting tool. In most threading dies, this feature is very important, because it not only produces a more efficient cutting tool, but aids in eliminating cuttings that might interfere by clogging the die head. To obtain side rake on threading dies grind the nose of the chasers so that a spiral cutting tool is produced.

We recommend using, for threading dies, a side rake of 15 to 20 degrees and extending back about 3 teeth from the nose of the chaser. The spiral should be in the left hand direction so that the cuttings will be directed forward or out of the die. The effect is similar to that of the patented "Gun" tap which has its flutes ground on a slight left hand spiral at the nose of the tap, thus throwing the cuttings ahead of the tap.

In grinding tools for cutting aluminum, it is very essential to supplement the rough grinding with the use of a rather fine oilstone. This removes the grinding-wheel marks, scratches, or burrs which may result from cutting edge and from the surface over which cuttings rub.

We have found the following cutting compound suitable for use with aluminum threading dies:—

Lard Oil and Kerosene, Mixed 50-50

It is essential that the dies be flooded with cutting compound and this is obtained to best advantage by directing a copious stream under pressure directly onto the work.

We recommend a cutting speed from 100 to 200 feet per minute. Greater cutting speeds can be used but the durability of the cutting edge will be reduced.

ALUMINUM RIGID CONDUIT

Light in Weight and Corrosion Resisting

Table 1

ALUMINUM RIGID CONDUIT

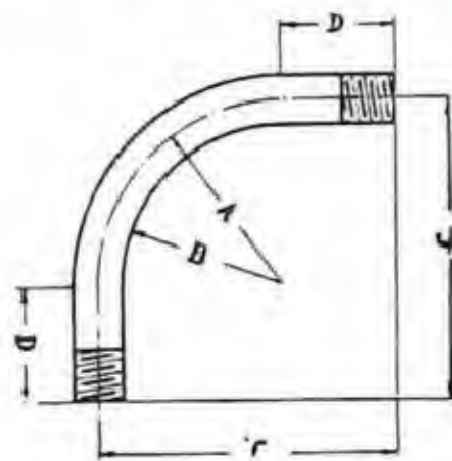
Weights and Dimensions

Electrical Trade Size	Weight in Pounds per Foot Aluminum Conduit	Weight in Pounds per Foot Steel Conduit	Outside Diameter Inches	Inside Diameter Inches
1/4"	.145	.415	.540	.364
3/8"	.197	.562	.675	.494
1/2"	.298	.85	.840	.623
3/4"	.399	1.115	1.050	.824
1"	.598	1.67	1.315	1.048
1 1/4"	.807	2.24	1.660	1.380
1 1/2"	.964	2.67	1.900	1.611
2"	1.29	3.61	2.375	2.067
2 1/2"	2.07	5.90	2.875	2.468
3"	2.70	7.54	3.500	3.067
3 1/2"	3.26	9.31	4.000	3.548
4"	3.88	11.07	4.500	4.026
4 1/2"	4.56	13.02	5.000	4.506
5"	5.26	15.00	5.563	5.047
6"	6.85	19.55	6.625	6.065

TABLE II

WEIGHT AND DIMENSIONS OF 90° ALUMINUM CONDUIT BENDS

ELBOW OR BEND 90°



Electrical Trade Size	Actual I.D. Inches	Actual or Inches	A	B	C	D	Wgt. in Pds. Each
1/4"	.36	.54	3 3/4	3 1/2	6 3/4	3	.15
3/8"	.49	.675	3 3/4	3 7/8	6 3/4	3	.20
1/2"	.62	.84	3 7/8	3 1/2	6 3/4	2 27/32	.30
3/4"	.82	1.05	4 1/2	4	6 3/4	2 11/32	.43
1"	1.04	1.315	5 3/4	5 3/8	8 1/2	2 3/4	.73
1 1/4"	1.38	1.66	6 5/8	5 3/2	9 3/2	3 3/2	1.11
1 1/2"	1.61	1.90	8 3/8	7 7/16	11 11/16	3 1/16	1.71
2"	2.06	2.375	9 1/4	8 1/16	13 3/4	4 1/2	2.48
2 1/2"	2.46	2.875	10 1/2	9 1/16	17	6 1/2	4.68
3"	3.06	3.50	11 3/4	10	17 1/4	5 1/2	6.74
3 1/2"	3.56	4.00	13 3/4	11 3/4	20 7/16	7	9.93
4"	4.02	4.50	16	13 3/4	22 7/16	6 7/8	13.00
4 1/2"	4.50	5.00	18	15 1/2	24 7/16	6 7/16	13.30
5"	5.04	5.563	24	21 1/4	32	8	23.4
6"	6.06	6.625	30	26 1/16	36 3/4	6 3/4	34.9

Table III

MINIMUM RADIUS FOR BENDING CONDUIT PIPE













Electrical Size	Min. Radius 90° Bend
1/4"	1 1/4"
3/8"	1 1/2"
1/2"	1 3/4"
3/4"	2"
1"	2 1/2"
1 1/4"	3"
1 1/2"	4"
2"	6"
2 1/2"	8"
3"	20"
3 1/2"	36"

These bends are practical with aluminum rigid conduit in the I. P. S. specified.

METAL XTENSIONDUCT and FITTINGS

Standard finish dark brown.

111 Moldings and Fittings can be supplied, on special order with cream white finish at an additional charge of 15 per cent. Shipment from factory approximately six days after receipt of order.

Illustration	List No.	Std. Pkg.	Std. Pkg. Wgt.	Price Per 100
5 ft. Lengths				
 Xtensionduct	111	100	17	\$12.5
 Cutting and Notching Gauge	122	1		180.0
 Coupling	144	100	1	3.0
 90° Flat Elbow	136	50	2	12.0
 External Elbow	137	50	1	16.0
 Internal Elbow	138	50	1	16.0
 Baseboard Offset Elbow	176	50	2	30.0
 1/2" Box Connector	180	25	3	55.0
 Show Case Lighting Unit	160	25	4	100.0
 Duplex Receptacle Unit	350	10	4	120.0
 Box Extension Adapter	139	10	3	80.0
 Box Extension Device	141	10	4	120.0

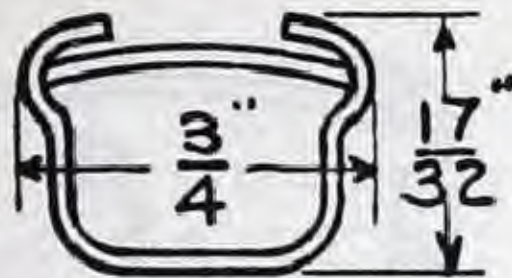
WIREMOLD RACEWAY AND FITTINGS

No. 500 RACEWAY

10 Ft. Lengths

100 Ft. to Carton

Weight per 1000 feet, 320 lbs.

No. 500
Actual Size

Capacity Single Conductor

—No. 8 2—No. 14*
—No. 10 6—No. 16
—No. 12 6—No. 18

Capacity Twisted Pair

2—No. 16
2—No. 18
3—No. 19

*No. 500 is designed for installations requiring circuits of two and short runs of three wires. List No. 500 Wiremold Raceway, List Price per 1000 feet.....\$15.00

CAT. NO.	ARTICLE
502	BUSHING
504	STRAP
506	CONNECTION COVER
511	NON SPLICE TYPE 90° FLAT ELBOW
512	NON SPLICE TYPE 45° FLAT ELBOW
515	TEE
516	CROSS
517	INTERNAL ELBOW
518	EXTERNAL ELBOW
519	CORNER BOX

CAT. NO.	ARTICLE
521	ROSETTE
523	FIXTURE ROSETTE
524	COMBINATION ROSETTE
525	RECEPTACLE BASE
526	KEYLESS RECEPTACLE
527	PLUG RECEPTACLE
532	2 1/2" OUTLET BOX
533	3" OUTLET BOX
588	OPEN WORK COUPLING
599	MOULDING CONNECTOR

WIREMOLD FITTINGS—500 Series

Fittings	Std. Qty.	Pkg. Wgt. Lbs.	Carton Qty.	List Price Per 100
Bushing.....	200	1	50	\$ 3.30
One or two hole strap.....	500	8	50	1.65
Connection cover.....	200	2	50	1.65
90° Flat elbow.....	50	4	5	25.50
45° Flat elbow.....	20	2	5	31.50
Tee.....	50	8	5	36.00
Cross.....	20	4	5	59.25
Internal elbow.....	50	8	5	31.50
External elbow.....	50	4	5	27.75
Corner box.....	20	4	5	72.75
2 1/2" Rosette.....	50	12	5	57.00
2 1/2" Round 1/8" fixture rosette.....	50	13	5	120.00
2 1/2" Round 3/8" fixture rosette.....	50	14	5	102.00
2 1/2" Round receptacle base.....	50	16	5	125.25
2 1/2" Round keyless receptacle.....	50	20	5	93.75
2 1/2" Round plug receptacle.....	50	19	5	148.50
2 1/2" Round outlet box.....	20	5	5	69.75
3" Round outlet box.....	20	5	5	69.75
Open work coupling.....	20	8	5	64.50
Moulding connector.....	20	1	4	6.00
Bender (For 500 and 700 Wiremold).....	1	3		ea. 5.25
Bender latch (For 500 and 700 Wiremold).....	10	8	1	ea. .70
Midget bender adapter.....	Furnished on request for each bender in use			

Also takes No. 5700 fittings listed hereinafter.

WIREMOLD RACEWAY AND FITTINGS

No. 700 RACEWAY

10 Ft. Lengths

100 Ft. to Carton

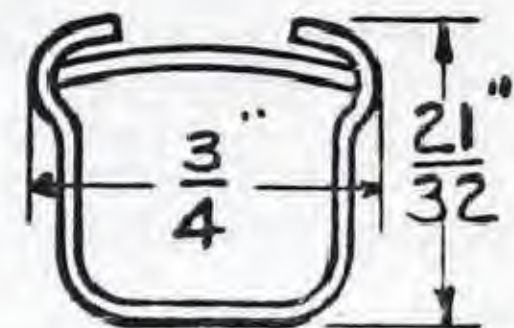
Weight per 1000 Ft., 320 Pounds

Capacity Single Conductor

1—No. 8
2—No. 10
2—No. 14*
6—No. 16
6—No. 18

Capacity Twisted Pair

2—No. 16
2—No. 18
3—No. 19

No. 700
Actual Size

*No. 500 is designed for installations requiring circuits of two and short runs of three wires. List No. 700 Wiremold Raceway, List Price per 1000 feet.....\$16.50

No. 5700 and 700 Series Wiremold Fittings

Fittings listed below having list numbers beginning with 57 are for use with either No. 500 or No. 700 Wiremold.

Use No. 500 series elbows with No. 500 Wiremold. They cost less and make a neater job.



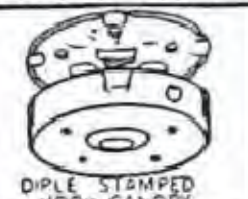
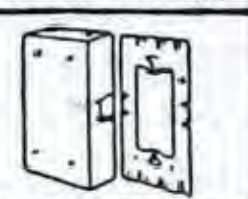
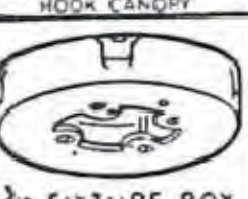
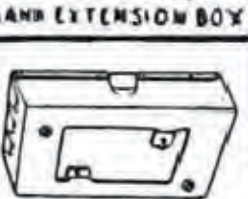

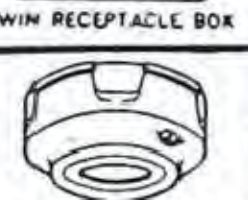
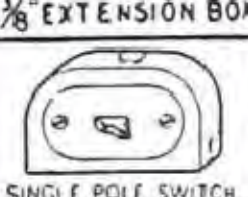
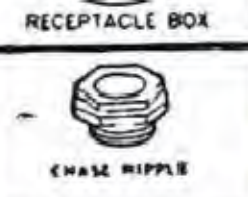
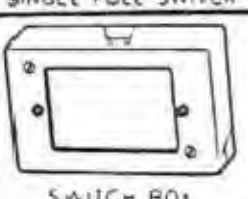

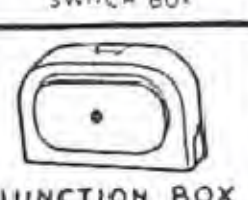


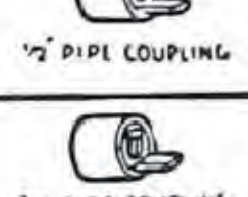

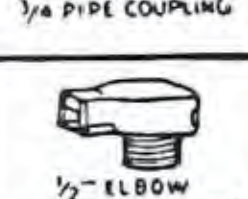



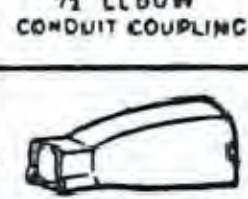






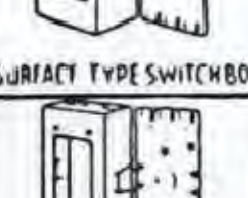



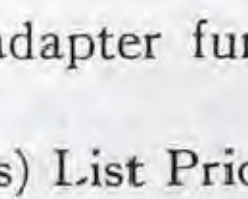
ARTICLE	Pack-Quan- Per age tity 100	ARTICLE	Pack-Quan- Per age tity 100
COUPLING	No. 5701 Std. 200 \$ 2.40 Unit 50 2.65	COMBINATION ROSETTE	No. 5724 Std. 20 91.50 Unit 5 100.50
BUSHING	No. 702 Std. 200 2.85 Unit 50 3.40	RECEPTACLE BASE	No. 5725 Std. 50 112.50 Unit 5 123.75
CLIP	No. 5703 Std. 500 3.40 Unit 50 3.75	KEYLESS RECEPTACLE	No. 5726 Std. 50 85.50 Unit 5 93.75
ONE OR TWO HOLE STRAP	No. 704 Std. 500 2.85 Unit 50 3.40	PLUG RECEPTACLE	No. 5727 Std. 50 132.00 Unit 5 144.75
CONNECTION COVER	No. 706 Std. 200 1.90 Unit 50 2.25	UTILITY BOX	No. 5728 Std. 50 67.50 Unit 10 74.25
MULTIPLE STRAP	No. 5707 Std. 50 7.15 Unit 0 7.90	CONDUIT TYPE UTILITY BOX	No. 5729 Std. 20 67.50 Unit 10 74.25
FIXTURE HOOK	No. 5708 Std. 20 26.65 Unit 10 28.75	CONTACT BLOCK	No. 5730 Std. 20 28.50 Unit 20 31.50
GROUND CLAMP	No. 5709 Std. 20 10.90 Unit 5 12.00	COVER FOR NO. 5731-32	No. 5731 Std. 50 17.65 Unit 5 19.50
90° FLAT ELBOW	No. 5711 Std. 100 27.75 Unit 10 30.75	2 1/2" OUTLET BOX	No. 5732 Std. 50 64.15 Unit 9 70.50
45° FLAT ELBOW	No. 5712 Std. 20 31.90 Unit 5 35.25	3" OUTLET BOX	No. 5733 Std. 50 64.15 Unit 9 70.50
TEE	No. 5715 Std. 100 39.00 Unit 5 42.75	CLOSED EXTENSION BOX	No. 5734 Std. 20 91.50 Unit 5 100.50
INTERNAL ELBOW	No. 5717 Std. 100 28.50 Unit 10 33.00	DISTRIBUTION BOX	No. 5735 Std. 20 126.00 Unit 1 138.75
ELBOW PULL BOX	No. 5717-A Std. 00 71.25 Unit 0 78.40	BLANK COVERS For Nos. 5737-38-39-39A	No. 5736 Std. 100 23.25 Unit 5 25.50
EXTERNAL ELBOW	No. 5718 Std. 100 38.50 Unit 10 31.50	4 1/2" EXTENSION BOX	No. 5737 Std. 50 92.62 Unit 5 102.00
CORNER BOX	No. 5719 Std. 20 75.00 Unit 5 82.50	4 1/2" FIXTURE BOX	No. 5738 Std. 50 88.90 Unit 5 97.50
NARROW FITTING	No. 5720 Std. 50 75.00 Unit 5 82.50		

WIREMOLD RACEWAY AND FITTINGS

No. 5700 Series Wiremold Fittings
(Continued)

The fittings listed below are for use with either No. 500 or No. 700 Wiremold.

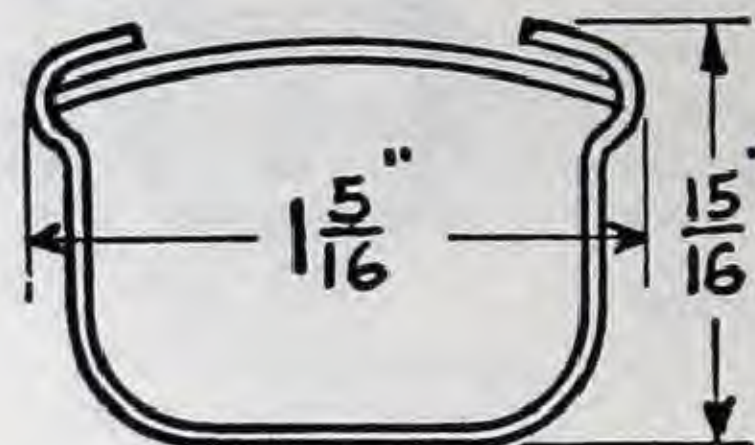
Use No. 500 series elbows with No. 500 Wiremold. They cost less and make a neater job.

ARTICLE	Pack-Quan-Per age tity 100	ARTICLE	Pack-Quan-Per age tity 100
	No. 5738-D Std. 20 \$247.50 Unit 1 272.25		No. 5751 Std. 20 105.00 Unit 1 115.50 Can also be furnished 2 and 3-gang
	No. 5738-E Std. 20 110.25 Unit 1 121.50		No. 5760 Std. 20 150.00 Unit 1 165.00
	No. 5739 Std. 20 124.50 Unit 5 137.25		No. 5761 Std. 20 96.00 Unit 1 105.00
	No. 5739-A Std. 20 132.00 Unit 5 145.50		No. 5762 Std. 20 51.75 Unit 5 57.00
	No. 5740 Std. 50 145.50 Unit 1 160.50		No. 5780 Std. 50 23.25 Unit 5 25.50
	No. 5741 Std. 20 110.25 Unit 1 121.30		No. 5781 Std. 50 34.50 Unit 5 37.50
	No. 5742 Std. 50 99.75 Unit 5 109.50		No. 5781-A Std. 50 46.15 Unit 5 51.00
	No. 5742-A Std. 20 132.00 Unit 5 145.50		No. 5782 Std. 20 42.75 Unit 5 47.25
	No. 5743 Std. 20 145.50 Unit 5 160.50		No. 5782-A Std. 20 49.50 Unit 5 54.00
	No. 5744 Std. 20 138.00 Unit 1 156.00 Can also be furnished 2 and 3-gang		No. 5783 Std. 20 61.75 Unit 5 57.00
	No. 5745 Std. 20 106.50 Unit 1 112.00		No. 5784 Std. 20 61.75 Unit 5 57.00
	No. 5747 Std. 20 114.00 Unit 1 125.25 Can also be furnished 2 and 3-gang		No. 5785 Std. 50 37.50 Unit 50 41.25
	No. 5748 Std. 20 119.25 Unit 1 131.25 Can also be furnished 2 and 3-gang		No. 5786 Std. 20 75.00 Unit 5 82.50
	No. 5748-S Std. 20 105.00 Unit 1 115.50		No. 5787 Std. 10 46.15 Unit 1 51.00
	No. 5749 Std. 20 165.00 Unit 1 181.50		No. 5788 Std. 20 56.25 Unit 5 61.90
			No. 5790 Std. 50 9.00 Unit 5 10.15
			No. 600 Each Std. 1 5.25 Unit 5.25
			No. 600-L Std. 10 53.00 Unit 1 53.00

No. 600-M Midget bender adapter furnished on request for each bender in use.

Wiremold enamel (1/2 Pt. cans) List Price \$0.40 per can.

WIREMOLD RACEWAY AND FITTINGS



No. 1000
Actual Size

Capacity
Single Conductor

3—No. 6*
6—No. 8
7—No. 10
9—No. 12
9—No. 14
24—No. 16
24—No. 18

No. 1000
RACEWAY

10 Ft. Lengths

100 Ft. to Carton

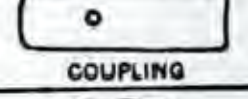
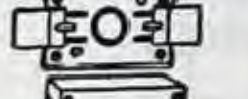



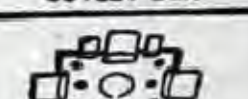

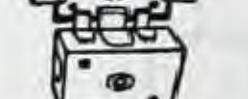

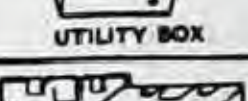



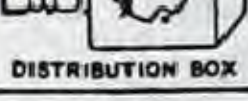











Wgt. per 1000', 800 lbs.

Capacity
Twisted Pair
10—No. 16
10—No. 18
11—No. 19

*No. 1000 is designed for main and sub-feeders and various wire groupings such as:—telephone, radio, signal and cable systems. Where local approval can be obtained 3 No. wires may be fished in straight runs if a pull box is used every thirty feet.

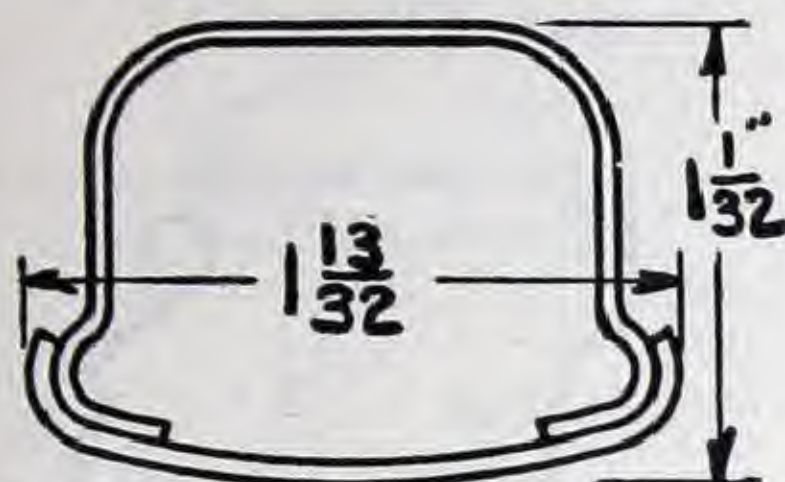
List No. 1000 Wiremold Raceway, List Price per 100 feet \$31.50.

No. 1000 Series Wiremold Fittings

ARTICLE	Pack-Quan-Per age tity 100	ARTICLE	Pack-Quan-Per age tity 100
	No. 1001 Std. 100 \$ 7.50 Unit 10 8.25		No. 1020-B Std. 10 \$73.1 Unit 1 80.2
	No. 1002 Std. 100 3.75 Unit 10 4.15		No. 1028 Std. 5 108.7 Unit 1 119.6
	No. 1003 Std. 100 3.75 Unit 10 4.15		No. 1035 Std. 10 177.0 Unit 1 195.0
	No. 1004 Std. 200 7.50 Unit 50 8.25		No. 1039 Std. 10 144.4 Unit 1 109.0
	No. 1005 Std. 200 7.50 Unit 50 8.25		No. 1048 Std. 5 163.0 Unit 1 180.0
	No. 1008 Std. 10 157.50 Unit 1 227.50		No. 1082 Std. 10 88.9 Unit 1 97.1
	No. 1008-A Std. 10 35.25 Unit 1 39.00		No. 1085 Std. 10 46.0 Unit 1 51.0
	No. 1009 Std. 100 27.75 Unit 1 27.00		No. 1086 Std. 10 113.0 Unit 1 125.0
	No. 1011 Std. 10 60.00 Unit 1 66.00		No. 1087 Std. 5 53.0 Unit 1 58.0
	No. 1013 Std. 10 67.50 Unit 1 75.00		No. 1089 Std. 10 21.0 Unit 1 23.0
	No. 1017 Std. 10 67.50 Unit 1 75.00		No. 1000-F Std. 6 255.0 Unit 1 288.0
	No. 1018 Std. 10 55.15 Unit 1 60.75		
	No. 1020 Std. 10 127.50 Unit 1 140.25		
	No. 1020-A Std. 10 269.50 Unit 1 285.00		

WIREMOLD RACEWAY AND FITTINGS

No. 1100-B
Actual Size
No. 1100-C



No. 1100
WIREMOLD
LIGHTING
STRIP

No. 1100 WIREMOLD LIGHTING STRIP

List No.	Description	Lengths Ft.	Carton Ft.	Wt., Lbs. Per 1000	List Price Per 100ft.
1100-B	Base	10	100	570	00.00
1100-C	Cover	10	100	260	00.00

CAT NO	ARTICLE
1100 B	CHANNEL
1100 C	SNAP ON CAP
1101	COUPLING
1104	STRAP
1108	HANGER ASSEMBLY
1108 A	HANGER CLAMP
1108 B	BRACKET HANGER
1110	BLANK END FITTING
1110 A	END FITTING WITH 1/2" BUSHING
1113	ADJUSTABLE ELBOW
1114	TURN-OVER CONNECTOR

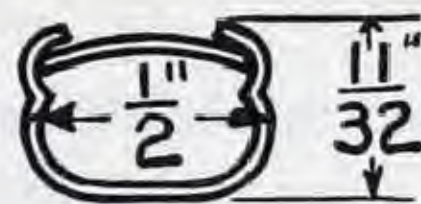
CAT NO	ARTICLE
1117	INTERNAL ELBOW
1118	EXTERNAL ELBOW
1123	ATTACH FITTING
1123 A	ATTACHMENT FITTING 1/2" MALE
1124	W" ATTACH FITTING
1126	PORCELAIN KEYLESS SOCKET
1126 A	BAYONET REFLECTOR SOCKET
1126 B	ANGLE KEYLESS PORCELAIN SOCKET
1127	PLUG RECEPTACLE
1127 A	DUPLEX LUMILINE LAMPHOLDER BASE
1128	UTILITY BOX
1181 A	1/4" BOX CONNECTOR

Nos. 1126
and 1127A
Prices on
application.

LIGHTING STRIP FITTINGS—1100 Series

List No.	Description	Std. Qty.	Pkg. Wgt. Lbs.	Carton Quantity	List Price Per 100
101	Coupling	10	2	1	\$ 37.50
104	Strap	50	3	5	13.50
108	Hanger assembly	10	8	1	227.50
108-A	Hanger clamp	10	2	1	39.00
108-B	Bracket hanger	10	11	1	92.25
110	Blank end fitting	50	3	5	34.50
110-A	End fitting with 1/2" bushing	10	3	1	61.15
113	Adjustable flat elbow	10	6	1	82.50
114	Turn-over connector	20	3	1	39.00
117	Internal elbow	10	4	1	64.50
118	External elbow	10	3	1	73.50
123	3/8" Socket attachment fitting	20	2	1	73.50
123-A	3/8" (Male Nipple) attachment fitting	20	4	1	73.50
124	1/2" Fixture attachment fitting	20	3	1	73.50
126	Porcelain keyless socket	20	7	1	84.00
126-A	Bayonet type reflector socket	20	8	1	93.75
127	Plug receptacle	20	3	1	75.00
128	Utility box	10	5	1	140.25
181-A	3/4" Box connector	20	3	1	75.00

WIREMOLD RACEWAY AND FITTINGS



No. 200
Actual Size

No. 200 RACEWAY

5 Ft. Lengths

100 Ft. to a Carton

Weight per 1000 feet—180 lbs.

Capacity Single Conductor

2—No. 12 4—No. 16
2—No. 14 4—No. 18

Capacity Twisted Pair

2—No. 16
2—No. 18
2—No. 19

List No. 200 Wiremold Raceway, list price per 100 feet \$9.75

CAT NO	ARTICLE
201	COUPLING
203	CLIP
205	ONE HOLE STRAP
206	COVER CONNECTION
211	90° FLAT ELBOW
214	PULL BOX
217	ADJUSTABLE INTERNAL ELBOW
218	EXTERNAL ELBOW
220	LUMILINE LAMPHOLDER BOX
228	ADJUSTABLE JUNCTION BOX

No. 220
Price on
application.

CAT NO	ARTICLE
240	SINGLE POLE SWITCH
242	UTILITY BOX
243	DUPLEX RECEPTACLE
243 A	RADIO RECEPTACLE
251	EXTENSION BOX
289	REDUCING CONNECTOR
600 M	MIDGET BENDER ADAPTER

WIREMOLD FITTINGS—200 Series

List No.	Fittings	Std. Qty.	Pkg. Wgt. Lbs.	Carton Quantity	List Price Per 100
201	Coupling	50	3 1/2	10	\$ 2.65
203	Clip	50	1 1/2	10	2.65
205	One hole strap	50	1	10	1.90
206	Connection cover	50	1 1/8	10	1.90
211	90° Flat elbow	50	2	5	22.50
214	Pull box	20	1	5	22.50
217	Adjustable internal elbow	50	4	5	24.75
218	External elbow	50	2	5	19.15
228	Adjustable junction box	20	1	5	45.00
*240	Single pole switch (10A, 125V, 5A, 250V.)	20	5	1	132.00
242	Utility box	20	4	1	64.50
243	Duplex receptacle	20	4	1	107.25
*243-A	Radio receptacle (Power-Ground Aerial)	20	6	1	72.75
251	Extension receptacle box	20	5 1/2	1	75.00
251-A	Extension box	20	5	1	71.25
289	Reducing connector	20	1 1/2	5	20.65
600-M	Midget bender adapter	Furnished on request for each bender in use.			

DAHLSTROM METAL MOULDINGS and Shapes

Dahlstrom Mouldings are distinguished by their smooth surfaces, their true profiles and their sharp, well defined corners and angles. They are light in weight, yet very rigid because of their special treatment.

INFORMATION

required when requesting quotations or ordering rolled mouldings and pressed shapes.

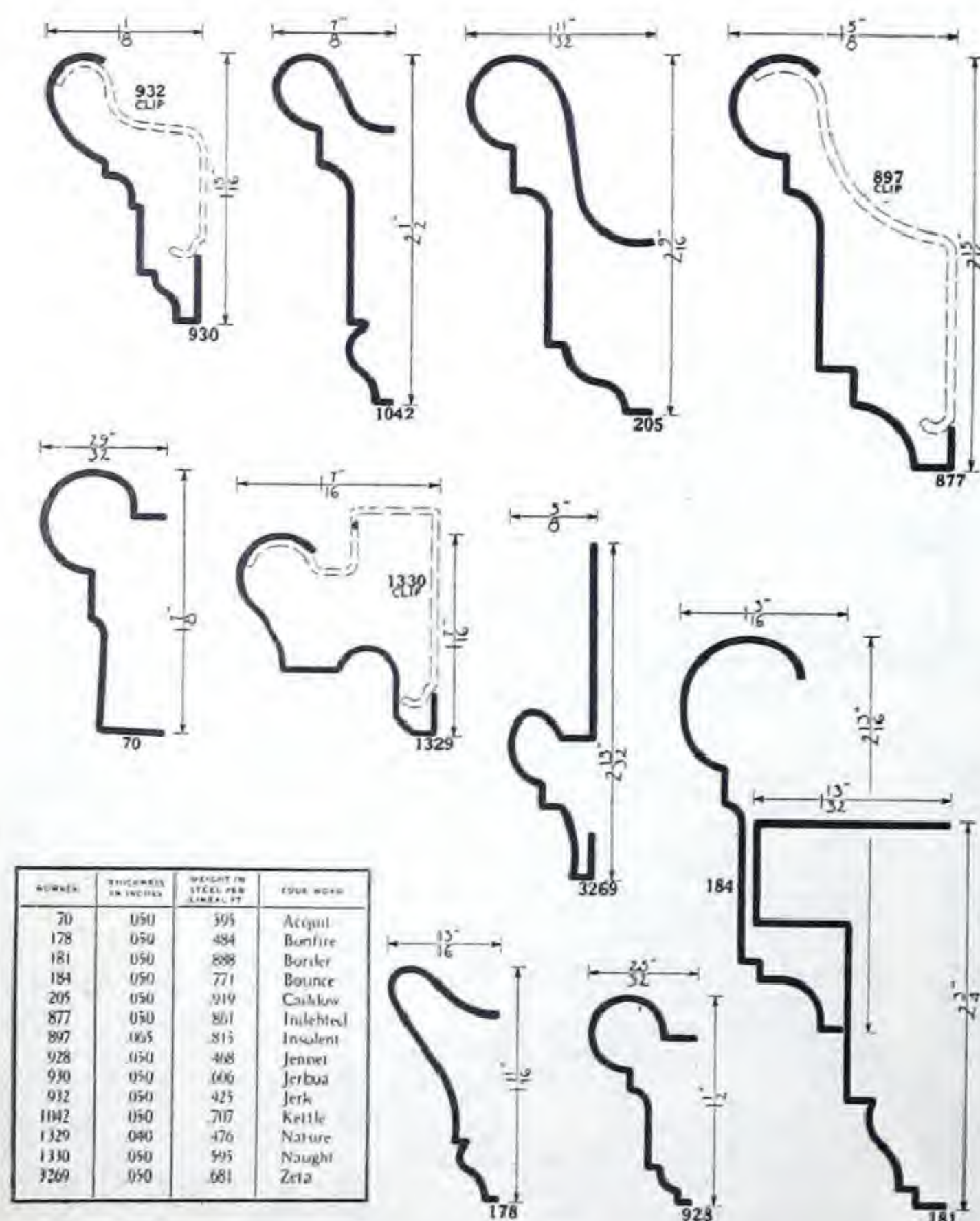
Rolled Mouldings

1. Moulding number.
2. Kind of metal required (steel, brass, bronze, etc.).
3. Quantity and lengths. (16 foot lengths are standard).
4. All lengths cut square unless we are instructed to mitre. If mitred, give sketch showing position of moulding at mitre.
5. Finish required, if any.
6. Shipping instructions.

Special Mouldings and Shapes

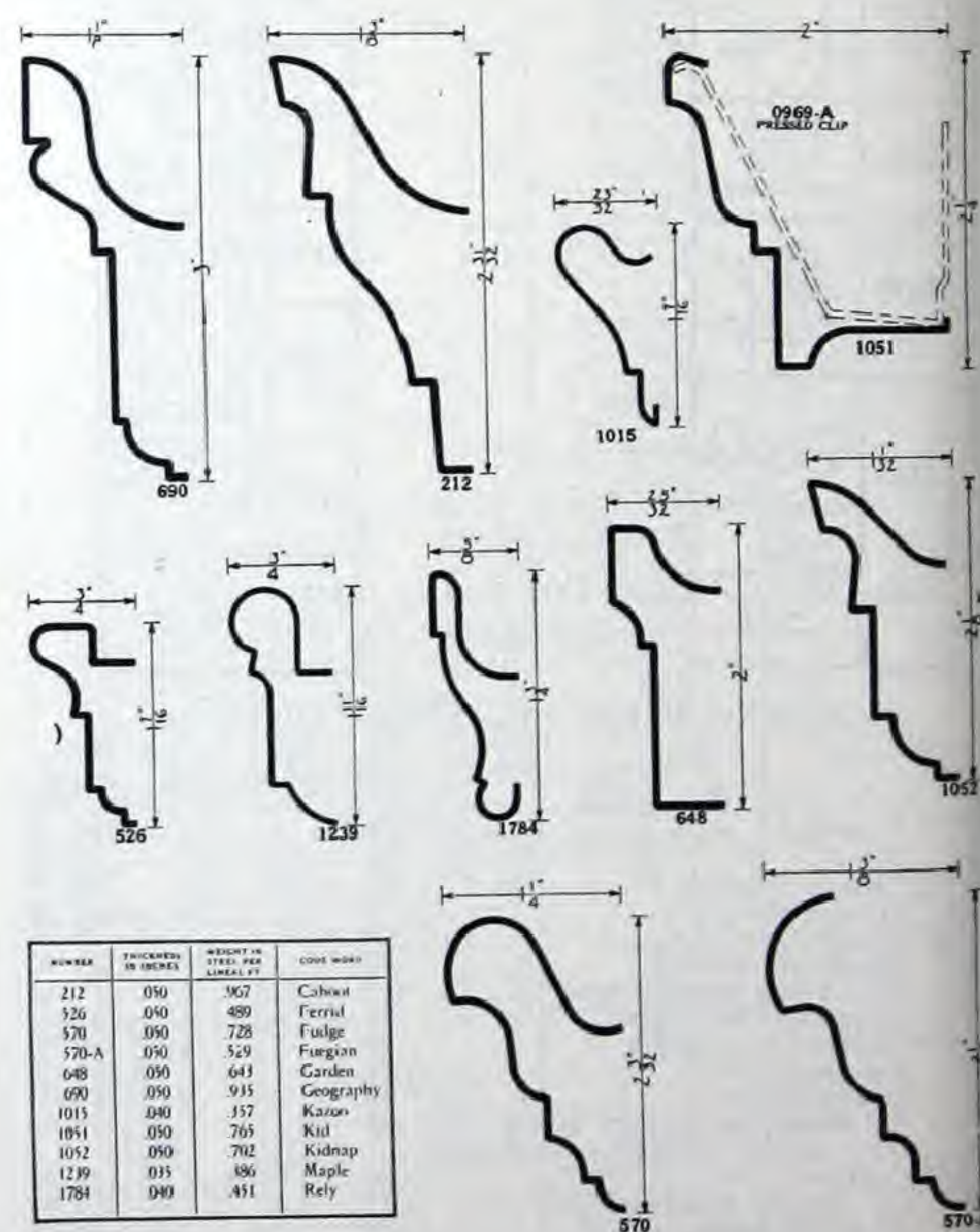
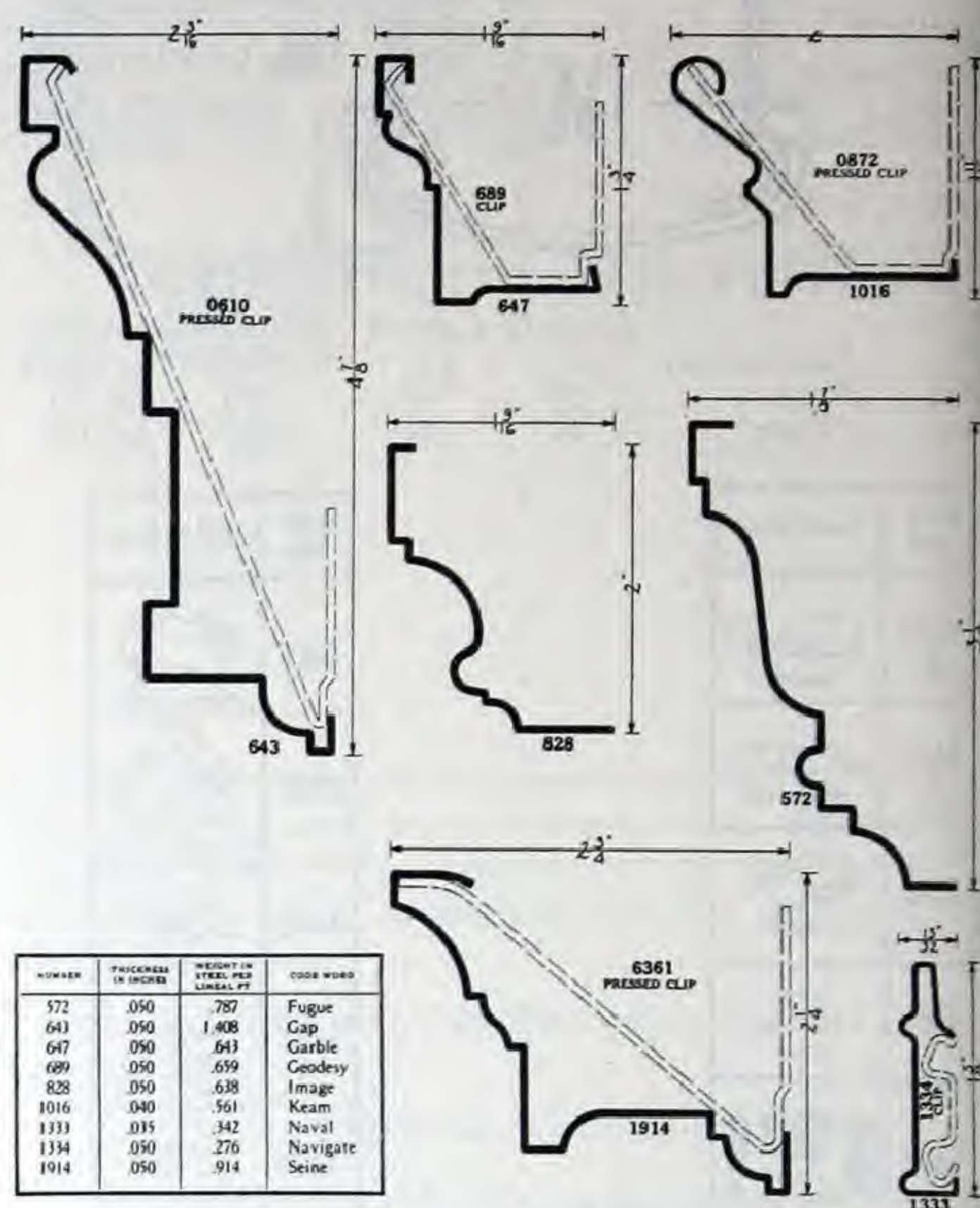
If you do not find the exact profile you require in this catalogue send in your sketches. Let us help you solve your problems.

If lengths are not specified we will furnish regular 16-foot mill lengths. Unless otherwise instructed, mouldings will be furnished in unfinished steel.



Prices on application.

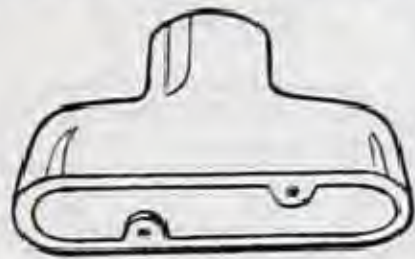
DAHLSTROM METAL MOULDINGS and Shapes



Prices on application.

CONDUIT FITTINGS

TYPE A



Std. Pkg.	Std. Pkg. Wgt.	List Price Each
200	145	\$0.24
100	100	.31
50	65	.43
25	60	.62
10	40	.80
5	30	1.66
5	50	4.20
5	55	5.00
5	70	8.15
5	70	9.00
1	20	11.50
1	25	14.00
1	25	20.25

TYPE B

For use with Small Conductors
For Large Conductors use Type BE



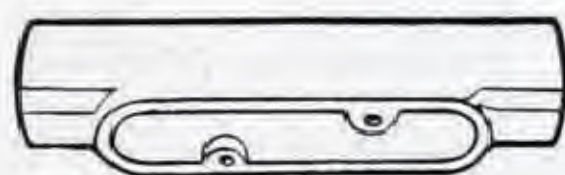
Std. Pkg.	Std. Pkg. Wgt.	List Price Each
200	155	\$0.29
100	100	.36
50	70	.50
25	60	.80
10	40	1.04
5	30	2.14
5	50	4.20
5	60	5.00
5	70	8.15
5	105	9.00

TYPE BE

The removable top makes it possible to pull conductors straight through the body. This is found quite handy in handling large conductors.

Std. Pkg.	Std. Pkg. Wgt.	List Price Each
200	300	\$0.60
100	175	.75
50	150	1.10
25	100	1.75
10	60	2.25
5	60	3.90
5	90	8.15
5	160	9.00
5	225	15.25
5	250	17.00
1	80	37.00
1	85	40.00
1	90	45.00

TYPE C



Std. Pkg.	Std. Pkg. Wgt.	List Price Each
200	185	\$0.36
100	120	.41
50	90	.59
25	70	.94
10	45	1.22
5	40	2.43
5	45	4.80
5	60	6.20
5	85	9.00
5	100	11.00

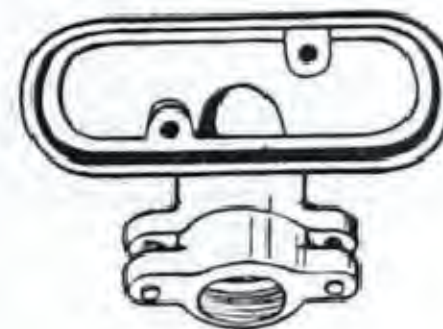
CONDUIT FITTINGS

TYPE E



Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	200	150	\$0.29
3/4	100	95	.35
1	50	70	.50
1 1/4	20	60	.80
1 1/2	10	40	1.04
2	5	30	2.14
2 1/2	5	45	4.20
3	5	55	5.00
3 1/2	5	70	8.15
4	5	80	9.00

TYPE F



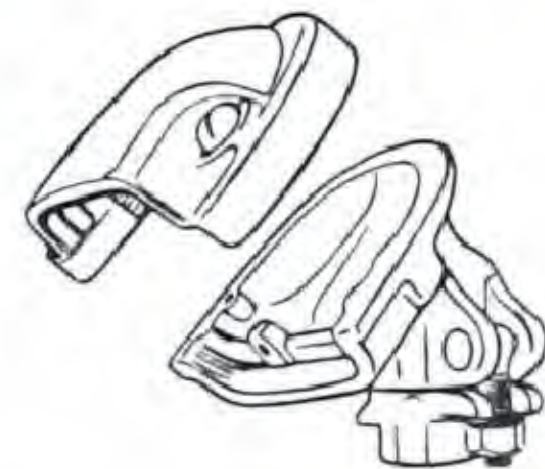
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	100	100	\$0.35
3/4	100	190	.50
1	50	140	.75

TYPE FE

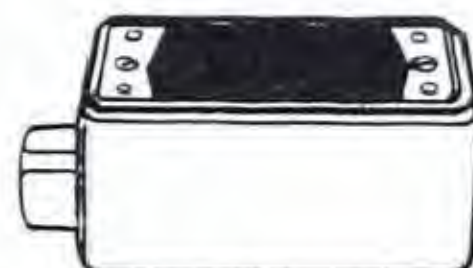
For Service Entrances

It consists of three parts: cap, body and coupling. The threaded coupling is screwed on the conduit, the conductors drawn in and then the coupling is secured to the conduit by means of the eye-bolts. Conductors are then

bent into place, the cap attached and a porcelain cover then completes the job.



Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	100	220	\$0.50
3/4	100	240	.65
1	50	155	1.05
1 1/4	25	140	1.64
1 1/2	10	75	2.52
2	5	65	4.40
2 1/2	5	115	8.20
3	5	120	10.20
3 1/2	5	175	18.10
4	5	180	25.00
4 1/2	1	90	55.00
5	1	75	57.00
6	1	75	60.00



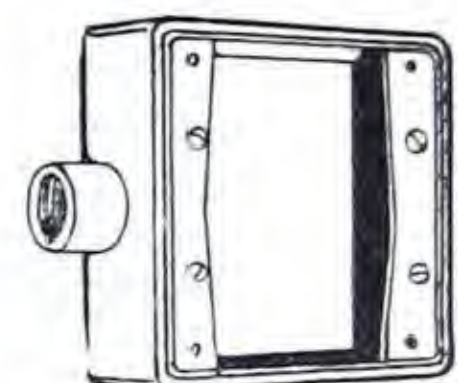
No. FS, Single Gang

TYPE FS

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	50	100	\$0.65
3/4	50	105	.75
1	25	60	.85

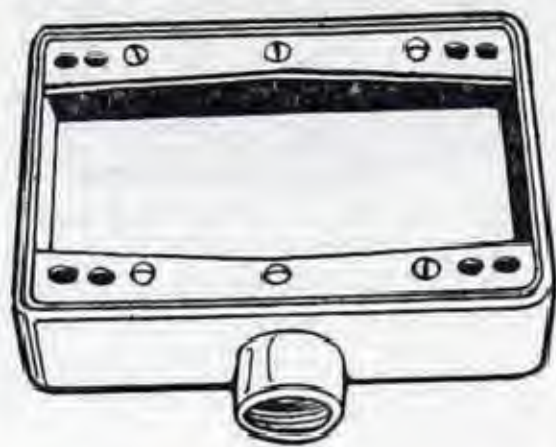
TYPE FS—TWO-GANG

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	50	140	\$1.20
3/4	25	75	1.30
1	10	35	1.40

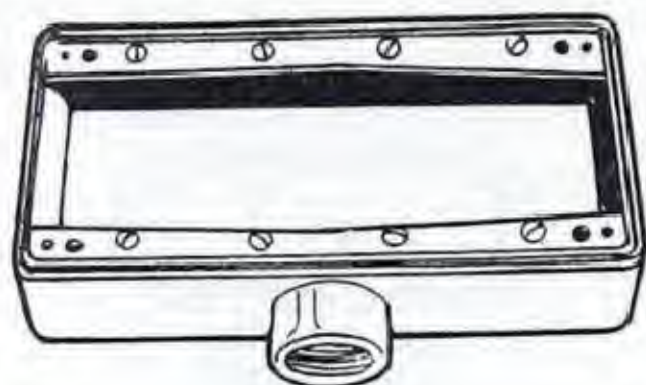


No. FS, Two Gang

CONDUIT FITTINGS

TYPE FS—
THREE-GANG

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	25	100	\$1.80
3/4	10	40	1.95
1	Not Made		

TYPE FS—
FOUR-GANG

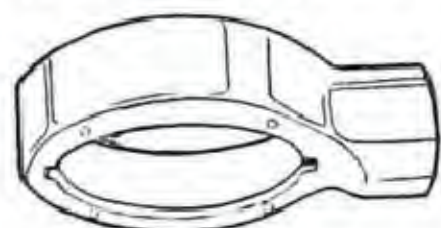
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	25	115	\$2.20
3/4	10	60	2.40
1	Not Made		

TYPE G—WITH ADJUSTABLE BAR



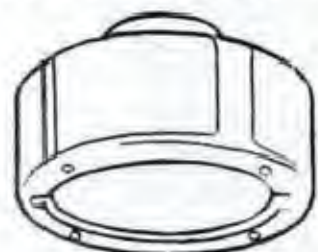
Size Inches	Amperes	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	5	100	115	\$0.40
3/4	5	50	75	.50
1	5	25	40	.75
1/2	10	50	55	.50
3/4	10	25	50	.65
1	10	25	50	.85
1/2	20	50	75	.70
3/4	20	25	55	.75
1	20	25	65	1.00

TYPE H—WITH ADJUSTABLE BAR



Size Inches	Amperes	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	5	100	110	\$0.30
3/4	5	50	70	.40
1	5	25	45	.65
1/2	10	50	55	.40
3/4	10	25	45	.55
1	10	25	50	.75
1/2	20	50	70	.60
3/4	20	25	50	.65
1	20	25	55	.90

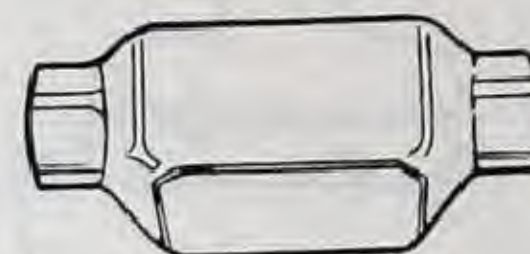
TYPE HA—WITH ADJUSTABLE BAR



Size Inches	Amperes	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	5	100	110	\$0.35
3/4	5	50	70	.45
1	5	25	45	.70
1/2	10	50	55	.45
3/4	10	25	45	.60
1	10	25	50	.80
1/2	20	50	70	.65
3/4	20	25	50	.70
1	20	25	55	1.00

CONDUIT FITTINGS

TYPE J



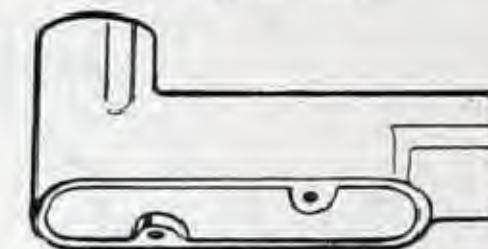
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	100	130	\$0.80
3/4	50	75	.70
1	25	40	1.00

TYPE K



Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	100	100	\$0.50
3/4	50	60	.60
1	25	40	.90

TYPE LB



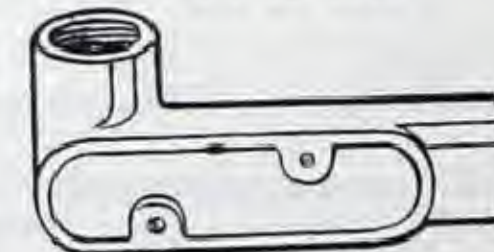
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	200	185	\$0.40
3/4	100	125	.40
1	50	90	.60
1 1/4	25	95	1.00
1 1/2	10	45	1.40
2	5	40	2.00
2 1/2	5	50	5.00
3	5	65	6.00
3 1/2	5	90	10.00
4	5	100	12.00

TYPE LF



Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	200	235	\$0.40
3/4	100	135	.40
1	50	110	.60
1 1/4	25	85	1.00
1 1/2	10	50	1.40
2	5	45	2.00
2 1/2	5	60	5.00
3	5	75	6.00
3 1/2	5	105	10.00
4	5	120	12.00

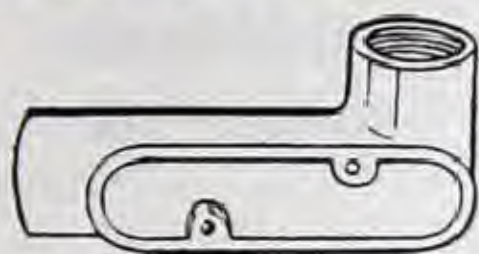
TYPE LL



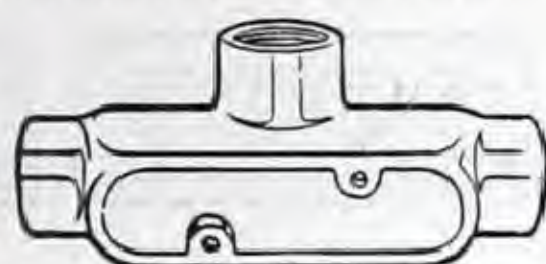
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	200	185	\$0.40
3/4	100	125	.40
1	50	90	.60
1 1/4	25	95	1.00
1 1/2	10	45	1.40
2	5	40	2.00
2 1/2	5	50	5.00
3	5	65	6.00
3 1/2	5	90	10.00
4	5	100	12.00

CONDUIT FITTINGS

TYPE LR



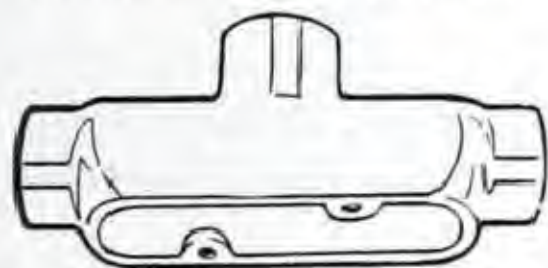
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	200	185	\$.40
3/4	100	125	.45
1	50	90	.65
1 1/4	25	95	1.05
1 1/2	10	45	1.40
2	5	40	2.50
2 1/2	5	50	5.00
3	5	65	6.50
3 1/2	5	90	10.50
4	5	100	12.00



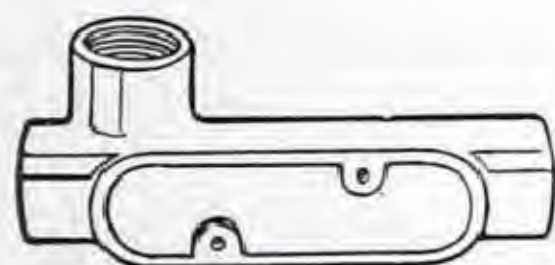
TYPE T

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2x 1/2x 1/2	100	100	\$.48
3/4x 3/4x 3/4	75	75	.57
1 x1 x1	50	50	.80
1 1/4x1 1/4x1 1/4	20	20	1.22
1 1/2x1 1/2x1 1/2	10	10	1.69
2 x2 x2	5	5	2.55
2 1/2x2 1/2x2 1/2	5	5	5.00
3 x3 x3	5	5	7.50
3 1/2x3 1/2x3 1/2	5	5	11.00
4 x4 x4	5	5	13.00

TYPE TB



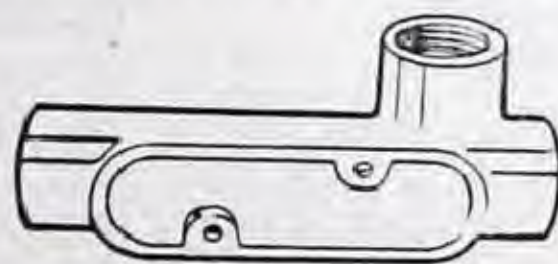
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	100	130	\$.48
3/4	50	80	.57
1	25	60	.80
1 1/4	10	40	1.22
1 1/2	10	50	1.69
2	5	45	2.55
2 1/2	5	60	5.00
3	5	80	7.50
3 1/2	5	110	11.00
4	5	120	13.00



TYPE TL

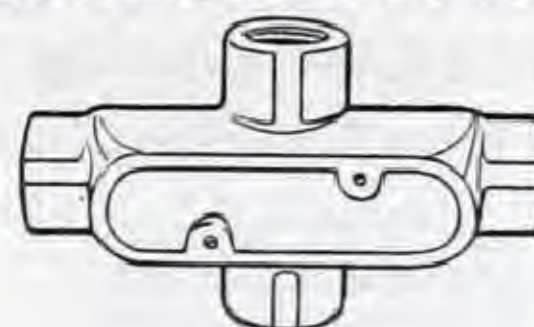
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2x 1/2x 1/2	100	130	\$0.48
3/4x 3/4x 3/4	50	80	.57
1 x1 x1	25	60	.80
1 1/4x1 1/4x1 1/4	10	45	1.22
1 1/2x1 1/2x1 1/2	10	60	1.69

TYPE TR



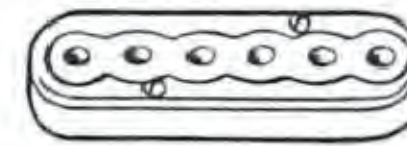
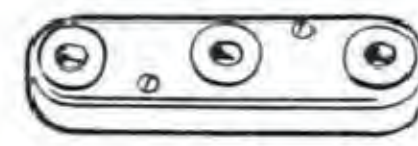
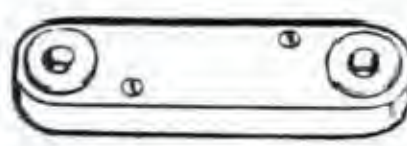
Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2x 1/2x 1/2	100	130	\$0.48
3/4x 3/4x 3/4	50	80	.57
1 x1 x1	25	60	.80
1 1/4x1 1/4x1 1/4	10	45	1.22
1 1/2x1 1/2x1 1/2	10	60	1.69

CONDUIT FITTINGS



TYPE X

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2x 1/2x 1/2x 1/2	75	105	\$0.60
3/4x 3/4x 3/4x 3/4	50	70	.77
1 x1 x1 x1	35	95	1.05
1 1/4x1 1/4x1 1/4x1 1/4	20	70	1.40
1 1/2x1 1/2x1 1/2x1 1/2	10	70	1.78
2 x2 x2 x2	5	55	3.50
2 1/2x2 1/2x2 1/2x2 1/2	5	65	6.00
3 x3 x3 x3	5	85	10.00
3 1/2x3 1/2x3 1/2x3 1/2	5	100	13.00
4 x4 x4 x4	5	120	16.00

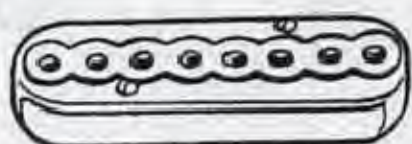
PORCELAIN
COVERS
With Wire Holes

Size Inches	Wire Openings	Diam. Holes	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	1	13/32	200	50	\$0.10
3/4	1	13/32	100	35	.15
1	1	13/32	50	30	.25
1 1/4	1	13/32	25	25	.36
1 1/2	1	1 3/8	10	20	.48
2	1	1 3/4	5	15	.60
2 1/2 or 3	1	2 5/16	5	20	.80
3 1/2 or 4	1	3 1/4	5	30	.90
4 1/2, 5 or 6	1	3 1/4	1	10	2.00
1/2	2	3/8	200	50	.10
3/4	2	15/32	100	35	.15
1	2	1/2	50	30	.25
1 1/4	2	11/16	25	25	.36
1 1/2	2	13/16	10	20	.48
2	2	1 1/16	5	15	.60
2 1/2 or 3	2	1 7/16	5	20	.80
3 1/2 or 4	2	1 15/16	5	30	.90
4 1/2, 5 or 6	2	2 1/4	1	10	2.00
1/2	3	5/16	200	50	.10
3/4	3	15/32	100	35	.15
1	3	1/2	50	30	.25
1 1/4	3	11/16	25	25	.36
1 1/2	3	13/16	10	20	.48
2	3	1 1/16	5	15	.60
2 1/2 or 3	3	1 7/16	5	20	.80
3 1/2 or 4	3	1 15/16	5	30	.90
4 1/2, 5 or 6	3	2 1/4	1	10	2.00
1/2	4	5/16	200	50	.10
3/4	4	15/32	100	35	.15
1	4	1/2	50	30	.25
1 1/4	4	11/16	25	25	.36
1 1/2	4	13/16	10	20	.48
2	4	1 1/16	5	15	.60
2 1/2 or 3	4	1 7/16	5	20	.80
3 1/2 or 4	4	1 15/16	5	30	.90
4 1/2, 5 or 6	4	2 1/4	1	10	2.00
1/2	5	5/16	Not Made		
3/4	5	11/16	100	35	.15
1	5	13/16	50	30	.25
1 1/4	5	17/32	25	25	.36
1 1/2	5	5/8	10	20	.48
2	5	13/16	5	15	.60
2 1/2 or 3	5	1 1/16	5	20	.80
3 1/2 or 4	5	1 1/2	5	30	.90
4 1/2, 5 or 6	5	1 9/16	1	10	2.00
1/2	6	5/16	Not Made		
3/4	6	11/16	100	35	.15
1	6	3/8	50	30	.25
1 1/4	6	1/2	25	25	.36
1 1/2	6	17/32	10	20	.48
2	6	5/8	5	15	.60
2 1/2 or 3	6	7/8	5	20	.80
3 1/2 or 4	6	1 3/16	5	30	.90
4 1/2, 5 or 6	6	1 5/16	1	10	2.00

CONDUIT FITTINGS

PORCELAIN COVERS

With Wire Holes



Size Inches	Wire Open- ings	Diam. Holes	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	7		Not Made		
3/4	7		Not Made		
1	7	11/32	50	30	\$0.25
1 1/4	7	7/16	25	25	.36
1 1/2	7	15/32	10	20	.48
2	7	3/2	5	15	.60
2 1/2 or 3	7	19/32	5	20	.80
3 1/2 or 4	7	1	5	30	.90
4 1/2, 5 or 6	7	1 1/8	1	10	2.00
1/2	8		Not Made		
3/4	8		Not Made		
1	8	5/16	50	30	.25
1 1/4	8	3/8	25	25	.36
1 1/2	8	13/32	10	20	.48
2	8	1/2	5	15	.60
2 1/2 or 3	8	21/32	5	20	.80
3 1/2 or 4	8	27/32	5	30	.90
4 1/2, 5 or 6	8	1	1	10	2.00
1/2	9		Not Made		
3/4	9		Not Made		
1	9	19/64	50	30	.25
1 1/4	9	21/64	25	25	.36
1 1/2	9	23/64	10	20	.48
2	9	29/64	5	15	.60
2 1/2 or 3	9	19/32	5	20	.80
3 1/2 or 4	9	25/32	5	30	.90
4 1/2, 5 or 6	9	7/8	1	10	2.00

BLANK METAL COVERS



Size Ins.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2	Sheet Steel.....	200	30	\$0.08
3/4	Sheet Steel.....	100	15	.11
1	Sheet Steel.....	50	10	.23
1 1/4	Sheet Steel.....	25	10	.32
1 1/2	Sheet Steel.....	10	10	.45
2	Sheet Steel.....	5	5	.56
2 1/2 or 3	Sheet Steel.....	5	10	.75
3 1/2 or 4	Sheet Steel.....	5	15	.80
4 1/2, 5 or 6	Sheet Steel.....	Not Made		
1/2	Cast Iron (Flat).....	200	50	.16
3/4	Cast Iron (Flat).....	100	40	.22
1	Cast Iron (Flat).....	50	30	.35
1 1/4	Cast Iron (Flat).....	25	25	.50
1 1/2	Cast Iron (Flat).....	10	15	.70
2	Cast Iron (Flat).....	5	10	.90
2 1/2 or 3	Cast Iron (Flat).....	5	10	1.15
3 1/2 or 4	Cast Iron (Flat).....	5	15	1.25
4 1/2, 5 or 6	Cast Iron.....	Not Made		
1/2	Cast Iron (Dome).....	200	50	.16
3/4	Cast Iron (Dome).....	100	40	.22
1	Cast Iron (Dome).....	50	30	.35
1 1/4	Cast Iron (Dome).....	25	25	.50
1 1/2	Cast Iron (Dome).....	10	15	.70
2	Cast Iron (Dome).....	5	10	.90
2 1/2 or 3	Cast Iron (Dome).....	5	10	1.15
3 1/2 or 4	Cast Iron (Dome).....	5	15	1.25
4 1/2, 5 or 6	Cast Iron.....	Not Made		

CONDUIT FITTINGS

FS SERIES

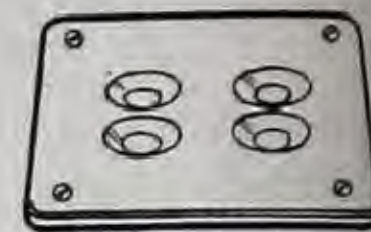
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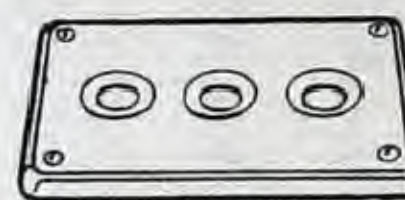
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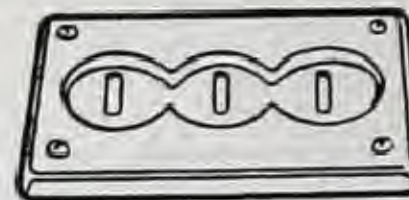
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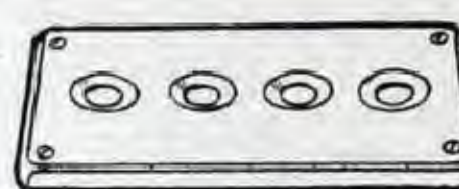
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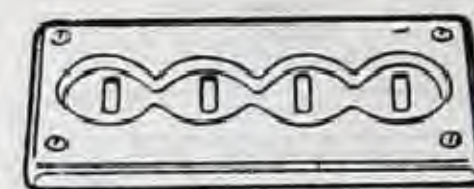
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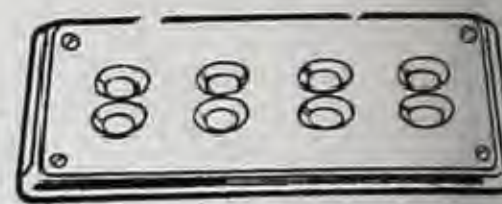
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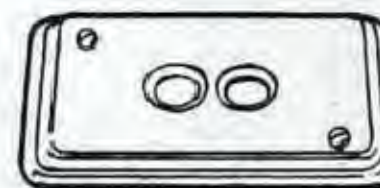


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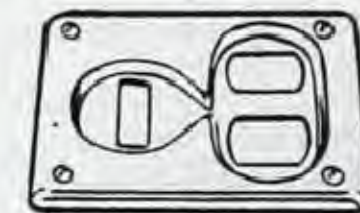


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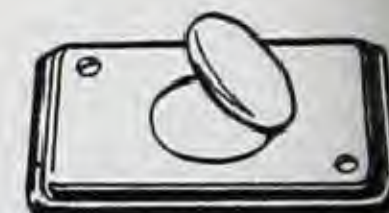
List No.	Gangs	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
For Hart & Hegeman Tumbler Flush Switches with Round Handles				
S272	2	50	20	\$0.30
S273	3	25	30	.45
S274	4	25	40	.60
For G.E., Arrow E, Bryant, Hart & Hegeman, and Hubbell Tumbler Flush Switches with Square Handles.				
S322	2	50	20	.30
S323	3	25	30	.45
S324	4	25	40	.60
For Double Push Button, Double Push Button Momentary Contact, and Double Push Lock Switches, and Flush Receptacles.				
S82	2	50	30	.30
S83	3	25	25	.45
S84	4	25	25	.60



DS-8



S32232



DS-10

List No.	Std. Pkg.	List Price Each
For Double Push Button, Double Push Button Momentary Contact, and Double Push Lock Switches, and Flush Receptacles.		
DS8.....	50 25	\$0.15
For G.E., Arrow E, Bryant, H. & H., and Hubbell Tumbler Flush Switches with Square Handles, and for Standard Duplex Flush Receptacles.		
S32232.....	50 20	\$0.50
For Round Flush Receptacles.		
DS10.....	50 25	\$0.60



DS-23



DS-32

List No.	Std. Pkg.	List Price Each
For Standard Duplex Flush Receptacles.		
DS23.....	50 25	\$0.30
For G.E., Arrow E, Bryant, Hart & Hegeman, and Hubbell Tumbler Flush Switches with Square Handles.		
DS32.....	50 10	\$0.15

CONDUIT FITTINGS

REDUCERS

Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
2-3/8	50	5	\$0.15
4-1/2	50	5	.15
1-1/2	50	10	.20
3/4	50	10	.20
4-1/2	50	20	.30
4-3/4	50	20	.30
4-1	50	15	.30
2-1/2	50	25	.40
2-3/4	50	25	.40
2-1	50	20	.40
2-1 1/4	50	15	.40
1-1/2	25	20	.50
3/4	25	20	.50
1	25	20	.50
1 1/4	25	15	.50
1 1/2	25	10	.50
2-1/2	25	20	1.00
2-3/4	25	20	1.00
2-1	25	30	1.00
2-1 1/4	25	30	1.00
2-1 1/2	25	25	1.00
2-2	25	15	1.00
1-1/2	25	30	1.35
3/4	25	30	1.35
1	25	30	1.35
1 1/4	25	40	1.35
1 1/2	25	40	1.35
2	25	35	1.35
2 1/2	25	25	1.35
2-1/2	10	20	2.00
2-3/4	10	20	2.00
2-1	10	20	2.00
2-1 1/4	10	25	2.00
2-1 1/2	10	25	2.00
2-2	10	30	2.00
2-2 1/2	10	20	2.00
2-3	10	20	2.00
1-1/2	10	30	2.75
3/4	10	30	2.75
1	10	25	2.75
1 1/4	10	25	2.75
1 1/2	10	30	2.75
2	10	35	2.75
2 1/2	10	35	2.75
3	10	25	2.75
3 1/2	10	20	2.75

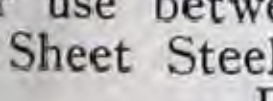
GASKETS

For use between Conduit Fittings and Receptacles, Sheet Steel Covers and Cast Iron Flanged Covers.



Size Inches	Std. Pkg.	List Price Each	Size Inches	Std. Pkg.	List Price Each
2	200	\$0.10	2	25	\$0.25
1	100	.10	2 1/2 or 3	25	.40
3/4	50	.15	3 1/2 or 4	25	.50
1 1/2	25	.20	4 1/2, 5 or 6	25	.70
2	25	.20			

For use between Conduit Fittings and Sheet Steel Covers or Cast Iron Dome Covers.



Size Inches	Std. Pkg.	List Price Each	Size Inches	Std. Pkg.	List Price Each
2	200	\$0.10	2	25	\$0.40
1	100	.10	2 1/2 or 3	25	.60
3/4	50	.15	3 1/2 or 4	25	1.00
1 1/2	25	.20	4 1/2, 5 or 6	25	1.50
2	25	.20			

For use between Cap and Base of Obround Porcelain Attachment or Polarity Plug Receptacles, or any Two-Part Obround Porcelain Receptacles.



Size Inches	Std. Pkg.	List Price Each	Size Inches	Std. Pkg.	List Price Each
2	200	\$0.10	1	50	\$0.15
1	100	.10			

CONDUIT FITTINGS

GASKETS

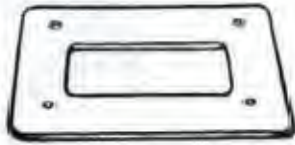
For use between Conduit Fittings and Threaded Couplings of Type F or TE Conduit Fittings



Size Inches	Std. Pkg.	List Price Each	Size Inches	Std. Pkg.	List Price Each
1/2	100	\$0.05	2	25	\$0.15
3/4	100	.05	2 1/2 or 3	25	.20
1	50	.08	3 1/2 or 4	25	.25
1 1/4	25	.10	4 1/2, 5 or 6	25	.50
1 1/2	25	.10			

For FS Series

For use between Conduit Fittings and Covers (Not Recommended as Water-tight)



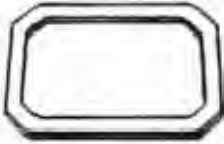
Description	Std. Pkg.	List Price Each
Single	50	\$0.20
Two-Gang	50	.25
Three-Gang	25	.30
Four-Gang	25	.40



For J-K Series

Cut Gasket for use between Conduit Fittings and Receptacles or Cover.

Standard Package 200—List Price, each\$0.10



For J-K Series

Molded Gasket for use between Conduit Fittings and Receptacles or Cover

Standard Package 200—List Price, each\$0.10



For V Series

For use between Conduit Fittings and Sealing Plates

Size	Description	Std. Pkg.	List Price Each
60 Watt	Rubber	25	\$0.15
60 Watt	Cork	25	.15
100 Watt	Rubber	25	.20
100 Watt	Cork	25	.20
For Use Under Globes			
60 Watt	Rubber	25	.15
60 Watt	Cork	25	.15
100 Watt	Rubber	25	.20
100 Watt	Cork	25	.20

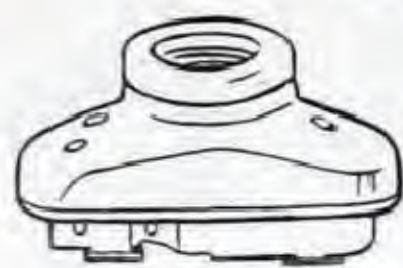
ADJUSTABLE BARS



Range of screw centers on adjustable bars: 5 Amp. 5/8 to 1 3/16 inches; 10 amp. 5/8 to 1 7/8 inches; 20 amp. 5/8 to 2 1/16 ins.

Size	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
5 Amp.	\$0.20
10 Amp.20
20 Amp.25

CONDUIT FITTINGS



LAMP RECEPTACLE
With Shade Holder Groove

List No.	Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
JR-16	1/2	200	100	\$0.30
JR-26	3/4	100	60	.35
JR-36	1	50	55	.40

With Shade Holder Groove				
List No.	CC227G			
Standard Package	200			
Weight, lbs., Standard Package	130			
List Price, each	\$0.45			



ATTACHMENT PLUG RECEPTACLES



No. JR-125



No. JR-15



No. CC-5

List No.	Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
Hubbell, 6-Ampere				
JR-125	1/2	100	60	\$0.40
JR-225	3/4	100	70	.45
JR-325	1	50	45	.50
Hubbell, 20-Ampere				
JR-12	1/2	100	60	\$0.55
JR-22	3/4	100	70	.60
JR-32	1	50	45	.65
Hubbell, 6-Ampere				
JR-15	1/2	100	60	\$0.40
JR-25	3/4	100	70	.45
JR-35	1	50	45	.50
CC-5	...	100	60	.50



No. JR-11

CORD ROSETTES
One Outlet



No. CC-332

List No.	Size Inches	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
JR-11	1/2	200	120	\$0.30
JR-21	3/4	100	65	.35
JR-31	1	50	50	.40
CC-332	...	200	140	.35

CLAMP GUARDS

Type V—Iron



Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	60	25	120	\$4.50
3/4*	60	25	130	4.55
1*	60	10	65	4.60
1/2†	60	25	70	1.90
3/4†	60	25	75	1.95
1†	60	10	35	2.00
Type VH—Iron				
1/2*	100	25	120	5.40
3/4*	100	25	130	5.45
1*	100	10	65	5.50
1/2†	100	25	100	2.35
3/4†	100	25	110	2.40
1†	100	10	60	2.45

*Complete with Globe and Guard.
†Without Globe and Guard.

CONDUIT FITTINGS

CLAMP GUARDS

Type VA—Iron

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	60	25	120	\$4.50
3/4*	60	25	130	4.55
1*	60	10	65	4.60
1/2†	60	25	70	1.90
3/4†	60	25	75	1.95
1†	60	10	35	2.00

Type VHA—Iron

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	100	25	160	5.40
3/4*	100	25	170	5.45
1*	100	10	90	5.50
1/2†	100	25	100	2.35
3/4†	100	25	110	2.40
1†	100	10	60	2.45

*Complete with Globe and Guard.
†Without Globe and Guard.



Type VC—Iron



Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	60	25	125	\$4.60
3/4*	60	25	135	4.70
1*	60	10	70	4.80
1/2†	60	25	75	2.00
3/4†	60	25	80	2.10
1†	60	10	40	2.20

Type VHC—Iron

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	100	25	165	5.50
3/4*	100	25	175	5.60
1*	100	10	90	5.65
1/2†	100	25	105	2.45
3/4†	100	25	115	2.55
1†	100	10	65	2.60

*Complete with Globe and Guard.
†Without Globe and Guard.

Type VL—Iron

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	60	25	125	\$4.60
3/4*	60	25	135	4.70
1*	60	10	70	4.80
1/2†	60	25	75	2.00
3/4†	60	25	80	2.10
1†	60	10	40	2.20

Type VHL—Iron

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	100	25	165	5.50
3/4*	100	25	175	5.60
1*	100	10	90	5.65
1/2†	100	25	105	2.45
3/4†	100	25	115	2.55
1†	100	10	65	2.60

*Complete with Globe and Guard.
†Without Globe and Guard.



Type VT



Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	60	25	130	\$4.75
3/4*	60	25	140	4.85
1*	60	10	75	5.05
1/2†	60	25	80	2.15
3/4†	60	25	85	2.25
1†	60	10	45	2.45

Type VHT

Size Ins.	Lamp Watts	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1/2*	100	25	170	5.60
3/4*	100	25	180	5.75
1*	100	10	95	5.85
1/2†	100	25	110	2.55
3/4†	100	25	115	2.70
1†	100	10	70	2.80

*Complete with Globe and Guard.
†Without Globe and Guard.

AMALGAMATED WIRING DEVICES

Sectional Switch Boxes

GAUGE STEEL—ELECTRO-GALVANIZED FINISH
—CLEAN CUT KNOCKOUTS



No. 775



No. 1004



No. 1006



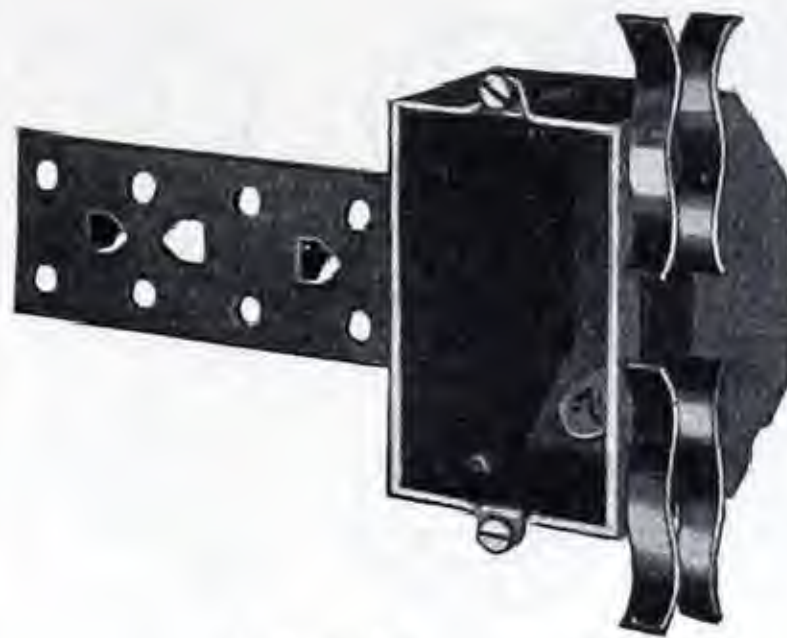
No. 1104

	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
75	Sectional Loom Switch Box. Depth $2\frac{3}{8}$ ", length 3", width 2". Eight knockouts for loom (two in each bevel corner and two in each side). One $\frac{1}{2}$ " knockout in bottom.....	100	62	\$0.22
4	Deep Sectional Conduit Switch Box. Depth 3", length 3", width 2". Eight $\frac{1}{2}$ " knockouts (one in each end, two in bottom, and two in each side).....	100	83	.33
5	Shallow Spacer for No. 1006 Box. Four $\frac{1}{2}$ " knockouts (one in each end and two in bottom).....	100	34	.32
6	Shallow Sectional Conduit and Loom Switch Box. Depth $1\frac{7}{8}$ ", length 4", width 2". One $\frac{1}{2}$ " knockout at each end and two in bottom. Two knockouts in each side for loom.....	100	66	.35
4	Sectional Conduit Switch Box. Depth $2\frac{1}{2}$ ", length 3", width 2". Eight $\frac{1}{2}$ " knockouts (two in each side, one in each end, two in bottom).....	100	70	.27

AMALGAMATED WIRING DEVICES

Sectional Switch Boxes with Mounting Strap and Lath Holder

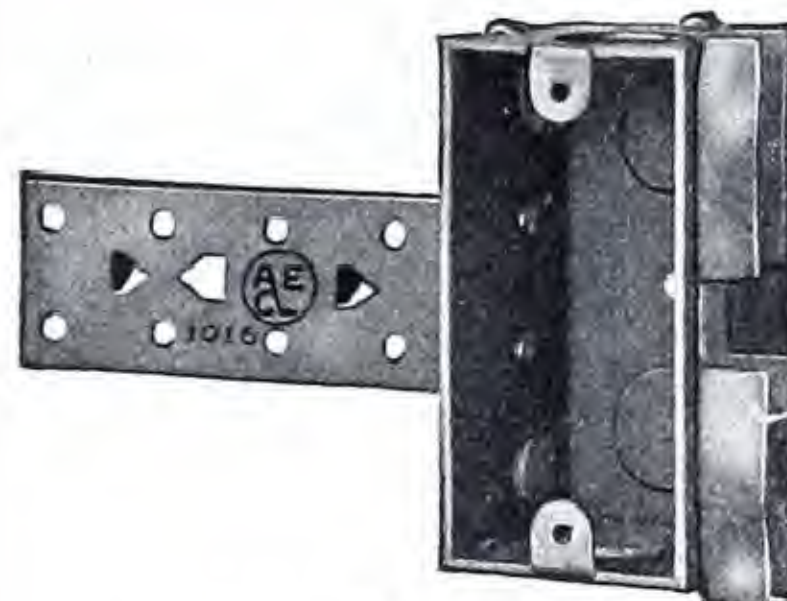
14 Gauge Steel—Electro-Galvanized Finish—Clean Cut
Knockouts



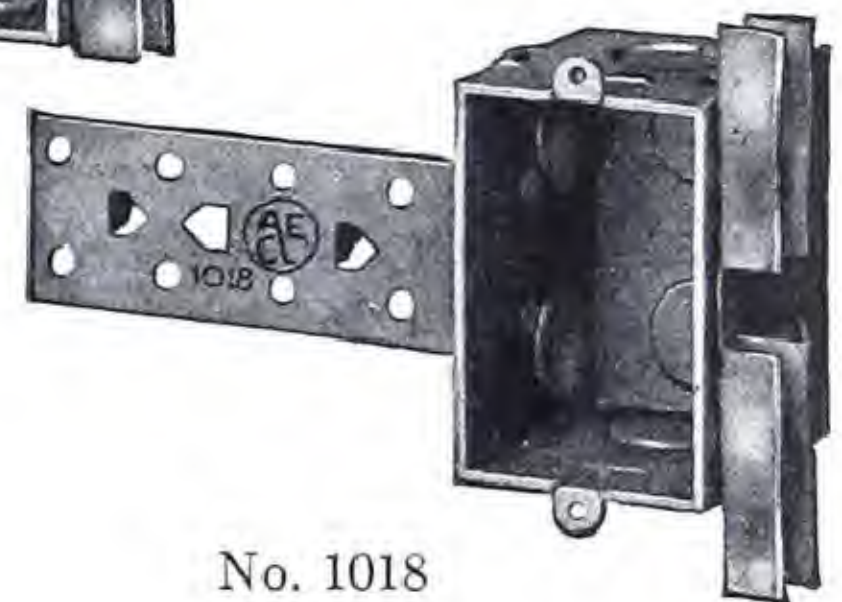
No. 785



No. 1015



No. 1016



No. 1018

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
785	Sectional Loom Switch Box. Depth $2\frac{3}{8}$ ", length 3", width 2". Eight knockouts for loom (two in each bevel corner and two in each side). One $\frac{1}{2}$ " knockout in bottom.....	50	41	\$0.32
1015	Deep Sectional Conduit Switch Box. Depth 3", length 3", width 2". Eight $\frac{1}{2}$ " knockouts, one in each end, two in bottom and two in each side.....	50	52	.48
1016	Shallow Sectional Conduit and Loom Switch Box. Depth $1\frac{7}{8}$ ", length 4", width 2". One $\frac{1}{2}$ " knockout at each end and two in bottom. Two knockouts in each side for loom.....	50	45	.55
1005	Shallow Spacer for No. 1016 Box. Four $\frac{1}{2}$ " knockouts, one in each end and two in bottom.....	100	34	.32
1018	Sectional Conduit Switch Box. Depth $2\frac{1}{2}$ ", length 3", width 2". Eight $\frac{1}{2}$ " knockouts.....	50	45	.48

AMALGAMATED WIRING DEVICES

3½-inch Octagonal Boxes and Covers

14 GAUGE STEEL—ELECTRO GALVANIZED FINISH
—CLEAN CUT KNOCKOUTS



No. 24151-C



No. 24-C1



No. 24-C2



No. 24-C6



No. 24-C7



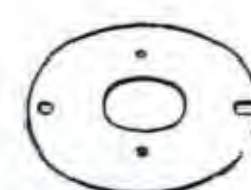
No. 24-C12



No. 24-C28

No. 24151-C
Bottom K.O.'S

No. 24-C35



No. 24-C64



No. 24-C65

Standard Package: 100

List No.	Description	Std. Pkg. Wgt.	List Price Each
24151-½"	3½" Octagonal Box, depth 1½". Four ½" knockouts in sides and three ½" and four loom knockouts in bottom.....	48	\$0.20
24151-C	3½" Octagonal Box, depth 1½". Four ½" knockouts in sides and three in bottom; four knockouts in corners and four in bottom for loom.....	48	.25
24-C 1	Closed Cover, flat.....	20	.08
24-C 2	Closed Cover, raised centre.....	20	.09
24-C 6	Closed Cover, flat, with ½" conduit knockout.....	20	.08
24-C 7	Closed Cover, raised centre, with ½" conduit knockout.....	20	.09
24-C12	Pendant Cover, raised centre, bushed ⅜".....	20	.12
24-C28	Flat Cover for 3-10 Amp. Surface Switches with bolts and nuts inserted.....	15	.14
24-C35	Cover, raised centre, for Screw Ring Sign Receptacles, grooved opening 1½" diameter.....	17	.11
24-C64	Flat Cover, for Single No. 140 Flush Receptacle.....	15	.18
24-C65	Flat Cover, for No. 142 Duplex Flush Receptacle.....	15	.18

All No. 24 series of Covers fit any standard 3¼" or 3½" octagonal or round box.

AMALGAMATED WIRING DEVICES

4-Inch Octagonal Boxes and Covers

14 GAUGE STEEL ELECTRO-GALVANIZED FINISH
CLEAN CUT KNOCKOUTS



No. 54151C



No. 54171-½"

All No. 54 series of Covers fit any standard 4" octagonal or round box.



No. 54-C1



No. 54-C2



No. 54-C3



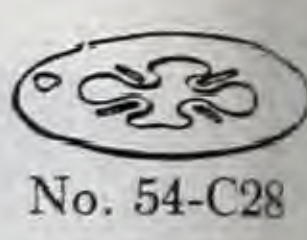
No. 54-C6



No. 54-C7



No. 54-C12



No. 54-C28



No. 54-C48



No. 54-C55



No. 54-C64



No. 54-C65

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
54151-½"	4" Octagonal Box, depth 1½". Four ½" knockouts in sides and five in bottom.....	100	70	\$0.27
54151C	4" Octagonal Box, depth 1½". Four ¾" knockouts in sides, and four ½" knockouts in corners, and three ½" and two ¾" knockouts in bottom.....	100	70	.31
54171-½"	4" Octagonal Box, depth 2⅛". Four ½" knockouts in sides and five ½" knockouts in bottom.....	100	82	.52
54171-1"	4" Octagonal Box, depth 2⅛". Four 1" knockouts in sides, four ¾" and one ½" knockout in bottom.....	100	82	.52
54171C	4" Octagonal Box, depth 2⅛". Four ¾" knockouts in sides, and four ½" knockouts in corners, and three ½" and two ¾" knockouts in bottom.....	100	82	.56
54-C 1	Closed Cover, flat.....	100	30	.10
54-C 2	Closed Cover, raised centre....	100	37	.14
54-C 3	Plaster Ring with inside ears, drilled and tapped, 2⅜" centre to centre.....	100	25	.14
54-C 6	Closed Cover, flat, with ½" conduit knockout.....	100	30	.14
54-C 7	Closed Cover, raised centre, with ½" conduit knockout..	100	40	.15
54-C12	Pendant Cover, raised centre, with ⅜" bushing.....	100	36	.15
54-C28	Flat Cover for three 10-Amp. Surface Switches with bolts and nuts inserted.....	100	26	.15
54-C35	Cover, raised centre, for Screw Ring Sign Receptacle, grooved opening 1½" diameter.....	100	37	.15
54-C48	Plaster Ring Cover.....	100	25	.15
54-C55	Flat Cover with five ½" conduit knockouts, stud and nail holes.....	100	28	.20
54-C64	Cover for Receptacle No. 140..	100	28	.21
54-C65	Cover for Receptacle No. 142..	100	25	.21

AMALGAMATED WIRING DEVICES

4-inch Square Outlet Boxes and Covers

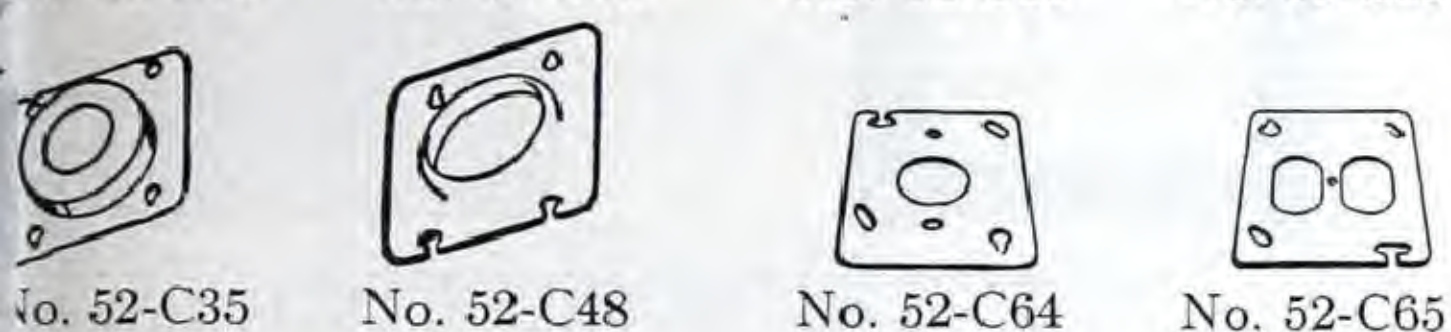
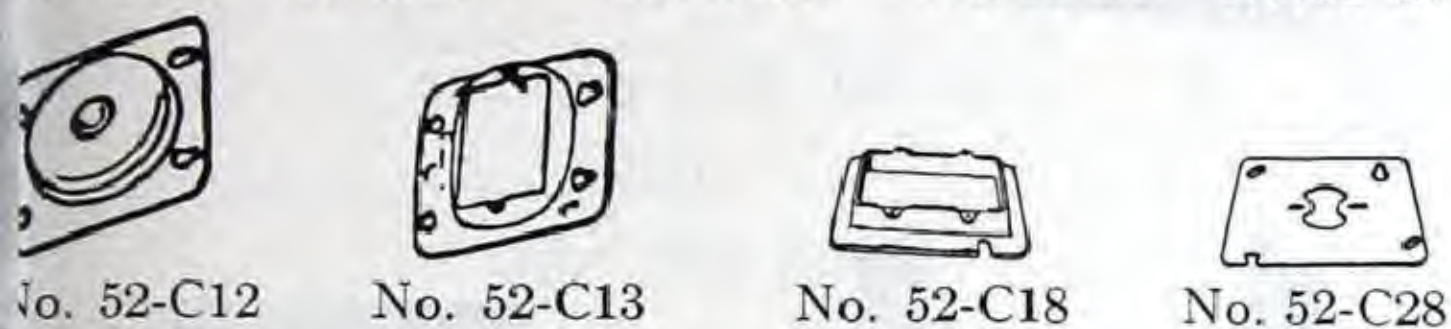
4 GAUGE STEEL—ELECTRO-GALVANIZED FINISH
CLEAN CUT KNOCKOUTS



No. 52151-3/4"

All No. 52 series of Covers fit any standard 4" square box.

All standard packages are 100 except List Nos. 52181-1/2", 3/4" and 1", which are 50.



List No.	Description	Std. Pkg. Wgt.	List Price Each
2151-1/2"	4" Square Conduit Box. Depth 1 1/2". Ten knockouts in sides and five in bottom for 1/2" conduit.....	81	\$0.32
2151-3/4"	4" Square Conduit Box. Depth 1 1/2". Eight 3/4" knockouts in sides and four 3/4" and one 1/2" knockouts in bottom.....	81	.35
2181-1/2"	4" Square Conduit Box. Depth 2 1/2". Eight 1/2" knockouts in sides and five 1/2" knockouts in bottom....	56	.60
2181-3/4"	4" Square Conduit Box. Depth 2 1/2". Eight 3/4" knockouts in sides and four 3/4" and one 1/2" knockouts in bottom.....	56	.60
2181-1"	4" Square Conduit Box. Depth 2 1/2". Four 1" knockouts in sides and four 3/4" and one 1/2" knockouts in bottom.....	56	.60
2-C 1	Closed Cover, flat.....	37	.15
2-C 2	Closed Cover, raised center.....	43	.20
2-C 3	Plaster Ring Cover with inside ears drilled and tapped 2 3/32" center to center.....	30	.25
2-C 6	Closed Cover, flat, with 1/2" conduit knockout.....	37	.20
2-C 7	Closed Cover, raised center, with 1/2" conduit knockout.....	42	.26
2-C10	Single Gang Switch Cover, 1/8" deep	26	.22
2-C12	Pendant Cover, raised center, with 3/8" bushing.....	45	.22
2-C13	Single Gang Switch Cover, 1/2" deep	30	.20
2-C14	Single Gang Switch Cover, 3/4" deep	35	.20
2-C15	Single Gang Switch Cover, 7/8" deep	38	.28
2-C17	Two Gang Switch Cover, 1/2" deep	28	.26
2-C18	Two Gang Switch Cover, 3/4" deep	31	.28
2-C28	Cover, flat, for three 10 Ampere Snap Switches with bolts and nuts inserted.....	36	.28
2-C35	Cover, raised center, for Screw Ring Sign Receptacle, grooved opening, 1 1/2" diameter.....	38	.26
2-C48	Plaster Ring Cover.....	32	.20
2-C64	Cover for No. 140 Receptacle.....	36	.22
2-C65	Cover for No. 142 Receptacle.....	33	.22

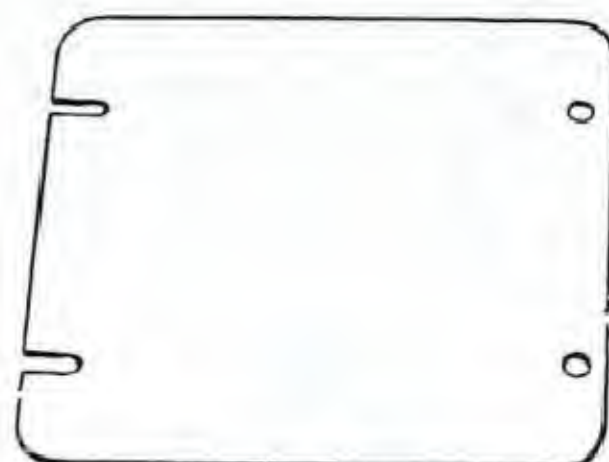
AMALGAMATED WIRING DEVICES

4-11/16" Square Outlet Boxes and Covers

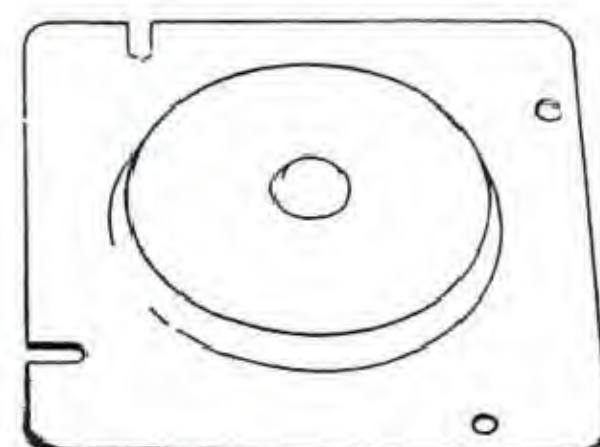
14 GAUGE STEEL—ELECTRO-GALVANIZED FINISH
CLEAN CUT KNOCKOUTS



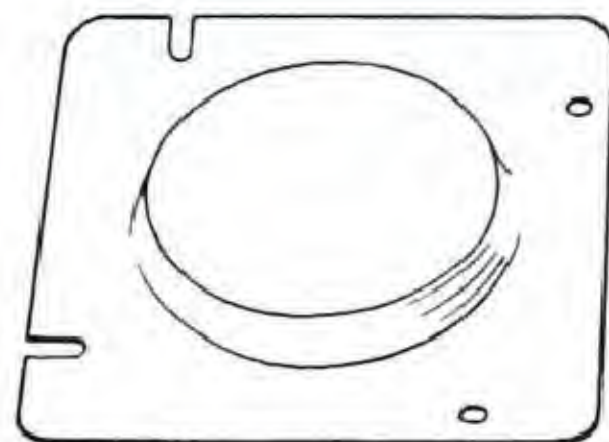
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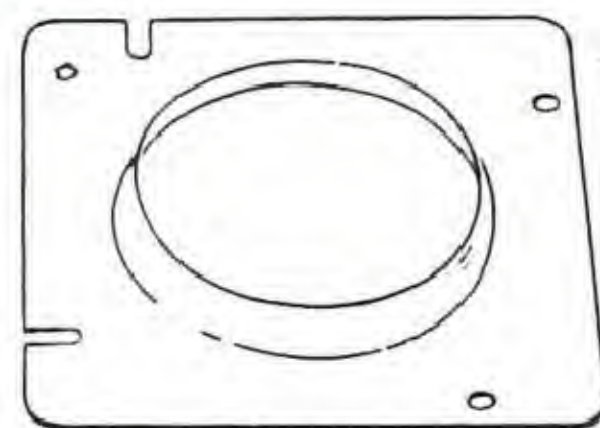
No. 72-C1



No. 72-C12



No. 72-C2



No. 72-C48

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
72151-1/2"	4 11/16" Square Conduit Box, 1 1/2" deep, eight knockouts in sides and five in bottom for 1/2" conduit.....	50	56	\$0.56
72151-3/4"	4 11/16" Square Conduit Box, 1 1/2" deep, eight 3/4" knockouts in sides, four 3/4" and one 1/2" knockouts in bottom.....	50	56	.56
72171-1/2"	4 11/16" Square Conduit Box, 2 1/8" deep, eight knockouts in sides and five in bottom for 1/2" conduit.....	50	66	.67
72171-3/4"	4 11/16" Square Conduit Box, 2 1/8" deep, eight 3/4" knockouts in sides, four 3/4" and one 1/2" knockouts in bottom.....	50	66	.67
72171-1"	4 11/16" Square Conduit Box, 2 1/8" deep, eight 1" knockouts in sides, four 3/4" and one 1/2" knockouts in bottom.....	50	66	.67
72-C 1	Closed Cover, Flat.....	100	53	.27
72-C 2	Closed Cover, Raised Centre.	100	55	.32
72-C12	Pendent Cover, Raised Centre, with 3/8" bushing.....	100	53	.34
72-C48	Plaster Ring Cover.....	100	42	.34

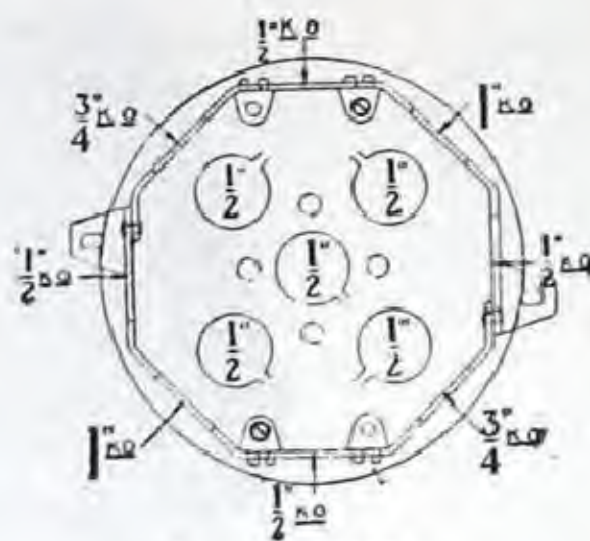
AMALGAMATED WIRING DEVICES

4-inch Octagonal Concrete Boxes

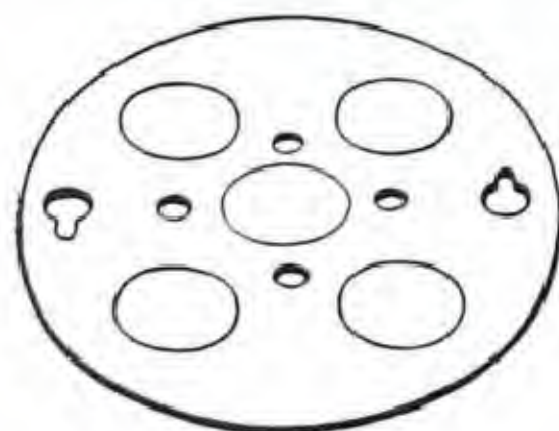
14 GAUGE STEEL—ELECTRO-GALVANIZED FINISH
CLEAN CUT KNOCKOUTS



No. 54531



No. 54531



No. 54560

These boxes are 4 inches in diameter, with riveted seam, and have two inside ears top and bottom, tapped to take concrete plates or 4-inch round covers. They also have two outside ears on the bottom, with holes for nailing box to forms. Furnished in depths from 1 1/2 inches to 6 inches.

Knockouts on No. 54521 and No. 54531 boxes are four 1/2-inch and four 3/4-inch in sides. On all other numbers, knockouts are supplied as shown on chart above.

Plates are round and slightly larger than box, furnished with 1/2-inch knockouts in the bottom and with or without fixture stud.

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
54521	4" diameter, 1 1/2" deep.....	50	42	\$0.52
54531	4" diameter, 2" deep.....	50	50	.62
54541	4" diameter, 2 1/2" deep, with knockouts arranged as diagram	50	61	.70
54551	4" diameter, 3" deep, with knockouts arranged as diagram	50	68	.74
54561	4" diameter, 3 1/2" deep, with knockouts arranged as diagram	50	75	.92
54571	4" diameter, 4" deep, with knockouts arranged as diagram.....	50	85	1.00
54581	4" diameter, 5" deep, with knockouts arranged as diagram.....	50	95	1.08
54591	4" diameter, 6" deep, with knockouts arranged as diagram.....	50	105	1.25
54560	The Round Plate fits over either end of the box and laps over the edge, preventing concrete from entering. The plate is pierced for fixture stud and has five 1/2" knockouts. Diameter 4 5/16".....	100	31	.14

If required with Fixture Stud installed, add letters F. S.

AMALGAMATED WIRING DEVICES

Flush Call Boxes

Especially designed for use with Edwards Flushcall Systems



No. 534—Four-gang Box



No. 530—Offset Barrier



No. 531—Solid Barrier

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
530	Offset Barrier only.....	100	15	\$0.30
531	Solid Barrier only.....	100	20	.30
532	Two-gang Box.....	50	85	1.00
533	Three-gang Box.....	50	110	1.20
534	Four-gang Box.....	50	135	1.60

Round Outlet Boxes

14 Gauge Steel—Electro-Galvanized Finish—Clean Cut Knockouts



No. 26113



No. 56111-1/2"

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
26113	Shallow Round Loom Outlet Box with lugs. Diameter 3 1/4", depth 1/2". Four knockouts for loom and one 1/2" knockout in bottom...	100	32	\$0.15
56111-1/2"	Shallow Round Outlet Box with lugs. Diameter 4", depth 1/2". Five knockouts in bottom for 1/2" conduit..	100	47	.20

AMALGAMATED WIRING DEVICES



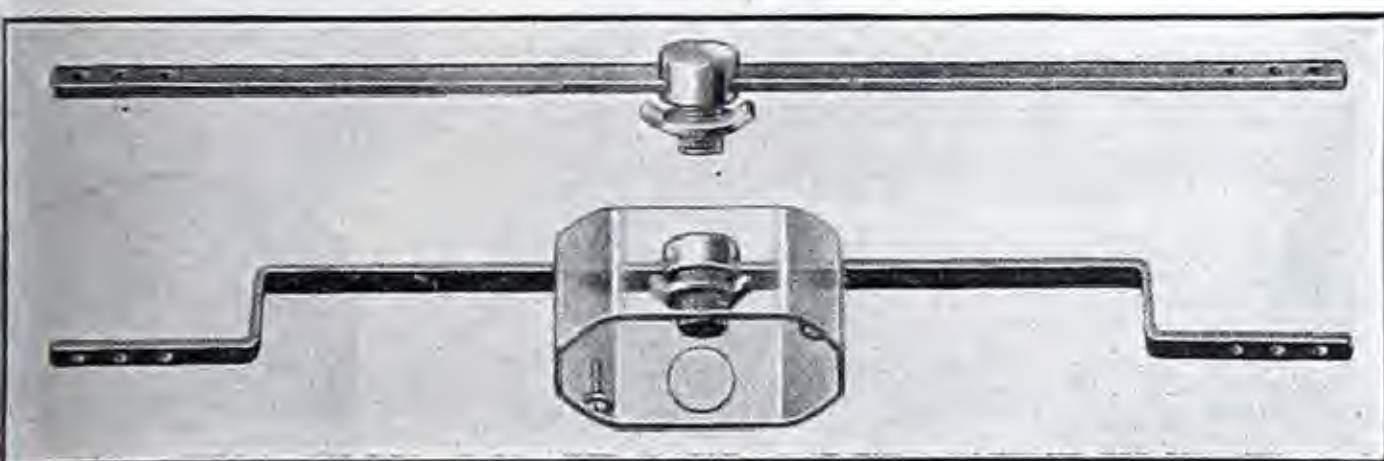
No. 1030

Blank Pipe Fitting Covers

List No.	Size	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
030	1/2"	200	30	\$0.08
032	3/4"	100	15	.11
034	1"	50	10	.23
035	1 1/4"	20	10	.32
036	1 1/2"	10	10	.45
037	2"	5	5	.56
038	2 1/2"	5	10	.75
039	3"	5	10	.75
040	3 1/2"	5	15	.80
041	4"	5	15	.80

No screws supplied.

Bar Hangers



Top 1049 Bottom 1050



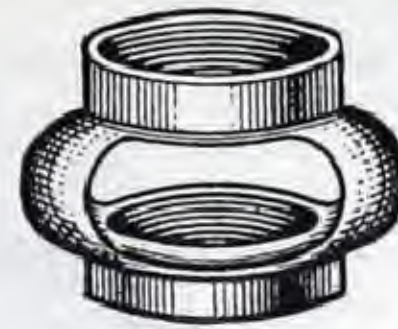
No. 1052



No. 1064

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
049	Flat Formed Bar Hanger, 3/8" I.P.S. Stud and Locknut, 18" length.....	100	27	\$0.23
050	Offset Bar Hanger, 3/8" I.P.S. Stud and Locknut, 18" length, for 1 1/2" depth Boxes.....	100	55	.30
051	Flat 1" Channel Iron Bar, with nuts and bolts for Box mounting, pierced for Spacing Box, and at ends for fastening to Truscon or Massillon beams. 24" in length. For use with 54151 Box.....	100	54	.50
052	Flat 1" Channel Iron Bar, with nuts and bolts for Box mounting, pierced at ends for fastening to Truscon or Massillon beams. 28" in length. For use with 54151 Box.....	100	62	.50
064	Switch Box Mounting Strips, 16 1/2" long. Galvanized folded strip with clamps for spacing of Box between standard studdings. Adaptable to all Switch Boxes equipped with lath cleats.....	100	20	.10

AMALGAMATED WIRING DEVICES



No. 40



No. 349

Fixture Hickeys

CAST IRON

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
40	3/8" x 1/8", I.P.S., Female.....	200	23	\$0.08
41	3/8" x 1/4", I.P.S., Female.....	100	9	.08
42	3/8" x 3/8", I.P.S., Female.....	100	11	.10

PRESSED STEEL

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
349	3/8" x 1/8", I.P.S., Female.....	500	21	\$0.05
350	3/8" x 1/4", I.P.S., Female.....	500	21	.05
351	1/8" x 1/8", I.P.S., Female.....	500	21	.05
352	1/8" x 1/4", I.P.S., Female.....	500	21	.05



No. 338



No. 43

Hickey Fixture Stud

List No.	Size	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
338	3/8"	Hollow.....	500	35	\$0.05
348	3/8"	Solid.....	500	90	.05

Cast-Iron Crowfeet

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
43	1/8", Female, I.P.S.....	500	58	\$0.05
44	1/4", Female, I.P.S.....	500	58	.05
45	3/8", Female, I.P.S.....	200	23	.06

Messenger Suspension Hanger

Galvanized 14-Gauge Steel
for
1/2" and 3/4" Conduits



No. 388

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
388	For 1/2" Conduit....	100	7 1/2	\$0.10
389	For 3/4" Conduit....	100	9	.10

Ground Clamps

Ground Clamps 1-3 consist of a single heavy gauge copper strap with an adjustable bolt, thus adapting them for various sizes of pipes. Rectangular nut enables good purchase, slotted teeth.

No. 1 is Ground Clamp for 3/8-1/2-1" Pipe.
No. 2 is Ground Clamp for 1 1/4-2" Pipe.
No. 3 is Ground Clamp for 2-3" Pipe.



No. 1

List No.	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
1	500	60	\$0.15
2	250	37 1/2	.20
3	250	50	.30

LOCKNUTS AND BUSHINGS

Galvanized

Locknuts and Bushings are packed in neat, strong boxes, plainly marked to show contents.



Bushing



Locknut

Size	Std. Pkg.	Bushings			Locknuts		
		List No.	Wgt. per 100 in Lbs.	List Price Per 100	List No.	Wgt. Per 100 in Lbs.	List Price Per 100
$\frac{3}{8}$	1000	121	2	\$6.00	140	$1\frac{1}{2}$	\$ 2.50
$\frac{1}{2}$	2500	122	$2\frac{1}{2}$	6.00	141	$1\frac{1}{2}$	2.50
$\frac{3}{4}$	1000	123	4	8.00	142	$2\frac{1}{2}$	3.50
1	500	124	9	15.00	143	4	6.00
$1\frac{1}{4}$	200	125	11	20.00	144	7	10.00
$1\frac{1}{2}$	100	126	13	25.00	145	8	15.00
2	50	127	22	40.00	146	12	20.00
$2\frac{1}{2}$	30	128	30	60.00	147	22	30.00
3	25	129	40	90.00	148	38	50.00
$3\frac{1}{2}$	25	130	76	200.00	149	48	70.00
4	25	131	108	300.00	150	52	100.00
$4\frac{1}{2}$	10	132	120	400.00	151	65	140.00
5	10	133	165	500.00	152	90	160.00
6	10	134	260	600.00	153	110	200.00

CAPPED BUSHINGS

For sealing the conduit while the building is under construction. The cap is securely "crimped" into the bushing and cannot be jarred out of place yet it is easily removed. The cap is designed so the end of the conduit does not come into contact with the cap. There is no danger of the conduit forcing the cap out of the bushing. The cap is made of thin metal. To remove puncture with screw-driver and pry out. Sold assembled.



List No.	Size	Unit Pkg.	Standard Package	Wgt. Lbs. Per 100	List Price Per 100
1460	$\frac{1}{2}$	100	1000	$2\frac{1}{2}$	\$7.50
1461	$\frac{3}{4}$	100	100	4	10.00
1462	1	100	100	9	17.50
1463	$1\frac{1}{4}$	50	100	12	22.50
1464	$1\frac{1}{2}$	25	100	15	27.50
1465	2	50	50	24	32.50

HARD RUBBER BUSHINGS



Size Inches	Carton Quan.	Std. Pkg.	List Price per 100
$\frac{1}{8}$	100	2500	\$6.40
$\frac{1}{4}$	100	2500	8.50
$\frac{3}{8}$	100	5000	10.40
$\frac{1}{2}$	100	5000	12.00

INSULATED BUSHINGS

No. 1265

For use with fixtures tapped $\frac{1}{2}$ " where it is desirable to use drop cord suspension. Made of composition.

List No.	Std. Pkg.	Wgt. Lbs. Std. Pkg.	List Price
1265	100	1½	\$0.05



No. 1265

THE "ERICKSON" COUPLING



No. 674

Conduit Union

Conduit union does away with running threads, saving dies and labour. Permits you to open a run of conduit at any desired point. Enable

you to start a circuit from two outlets and make a good string connection to any point in the run. The pipe ends about so that no space is left between the lengths of conduit, therefore it is unnecessary to draw the two ends of the conduit together.

Vibration will not loosen a connection made with an Erickson Coupling. The hexagon shoulder and ridges on the outside of the coupling make an easy grip for a pipe wrench.

List No.	Size	For Conduit	Unit Pkg.	Std. Pkg.	Wt., Lbs. Per 100	List Price Per 100
674	3/8"	3/8"	50	100	13	\$32.00
675	1/2"	1/2"	50	100	24	32.00
676	3/4"	3/4"	25	50	34	40.00
677	1"	1"	5	25	52	56.00
678	1 1/4"	1 1/4"	5	25	92	100.00
679	1 1/2"	1 1/2"	5	25	116	150.00
680	2"	2"	5	20	195	260.00
681	2 1/2"	2 1/2"	20	20	380	500.00
682	3"	3"	10	10	420	800.00
683	3 1/2"	3 1/2"	5	5	520	1200.00
684	4"	4"	5	5	620	1600.00

CHASE COUPLINGS

Chase couplings are plain finish but can be galvanized to order.

List No.	Size In.	Std. Pkg.	Wt. per 100 in Lbs.	List Price per 100
830	$\frac{1}{4}$	100	4	\$10.00
831	$\frac{3}{8}$	200	6	10.00
832	$\frac{1}{2}$	200	7	10.00
833	$\frac{3}{4}$	100	11	12.00



CHASE NIPPLES

No. 830

List No.	Size	Std. Pkg.	Weight	List
			per 100 in lbs.	Price per 100
840	$\frac{1}{4}$ "	100	2	\$5.00
841	$\frac{3}{8}$ "	200	3	5.00
842	$\frac{1}{2}$ "	200	4	5.00
843	$\frac{3}{4}$ "	100	7	8.00
844	1"	100	14	15.00
845	$1\frac{1}{4}$ "	100	22	18.00
846	$1\frac{1}{2}$ "	50	30	20.00
847	2"	50	58	30.00
848	$2\frac{1}{2}$ "	25	76	50.00
849	3"	25	104	80.00
850	$3\frac{1}{2}$ "	20	130	250.00



Chase Nipple

If you use Chase Nipples and Chase Couplings you can remove the box without disturbing the conduit. Chase Nipples are galvanized.

CONDUIT REDUCERS AND ENLARGERS

T & B Enlargers and Reducers are bushed in accordance with the Underwriters' requirements so that the rough ends of the conduit are protected. The fitting is designed for securing conduit in an outlet of the next larger size.



No. 1245

No. 1245		List	
List No.	Size	Std. Wt. Lbs.	Price Per 100
1245	$\frac{3}{4}$ " to $\frac{1}{2}$ " Male Reducer	100	13 \$20.00
1246	1" to $\frac{3}{4}$ " Male Reducer	50	20 30.00
1244	$1\frac{1}{4}$ " to 1" Male Reducer	50	36 40.00
1250	$\frac{1}{2}$ " to $\frac{3}{4}$ " Female Enlarger	100	8 10.00
1251	$\frac{3}{4}$ " to 1" Female Enlarger	50	12 20.00
1252	1" to $1\frac{1}{4}$ " Female Enlarger	50	22 35.00
1253	$1\frac{1}{4}$ " to $1\frac{1}{2}$ " Female Enlarger	50	29 50.00

& B. TITE-BITE BOX CONNECTORS

WITH CORRUGATED GRIP



No. 3100

Are designed to hold non-metallic sheathed cable without cutting the fabric of the cable sheath.

The rounded surfaces of the corrugations on the grip displace in corrugated form the flexible windings and compounds of the cable but cannot cut or penetrate the covering. Made of malleable iron, protected with Tabolite, Underwriters' Laboratories.

tented and approved

Unit package: 50. Standard package: 1000.

Weight per 100: 9 lbs.

st o.	Size	Made to hold	List Price per 100
00	3/8"	14W2, 14W3, 12W2, 12W3.....	\$7.50

EZ SQUEEZE CONNECTOR



No. 2163

Different sizes of Cable slip quickly into the long throat of the 2163 EZ Connector without twisting or squeezing. The loosely hinged, EZ clamped straps open far enough to let the Cable slide in without any fussing. It offers no resistance to pulling down of Cable and eliminates breakage.

The EZ clamp straps tightens around Cable with uniform pressure that will not crush or distort steel

evolutions. The big screw with a deep slot quickly pulls amp tight with a few turns of the screwdriver.

List No.	Size Inches	Open I.D. 3/8"	Closed I.D. 1/2"	K.O. Size Inches 1/2"	Std. Pkg. 500	No. Per Carton 50	Wght. Per Std. Pkg. 40	List Price Per 1000 \$66.00
2163	3/8"	3/8"	1/2"	1/2"	500	50	40	\$66.00

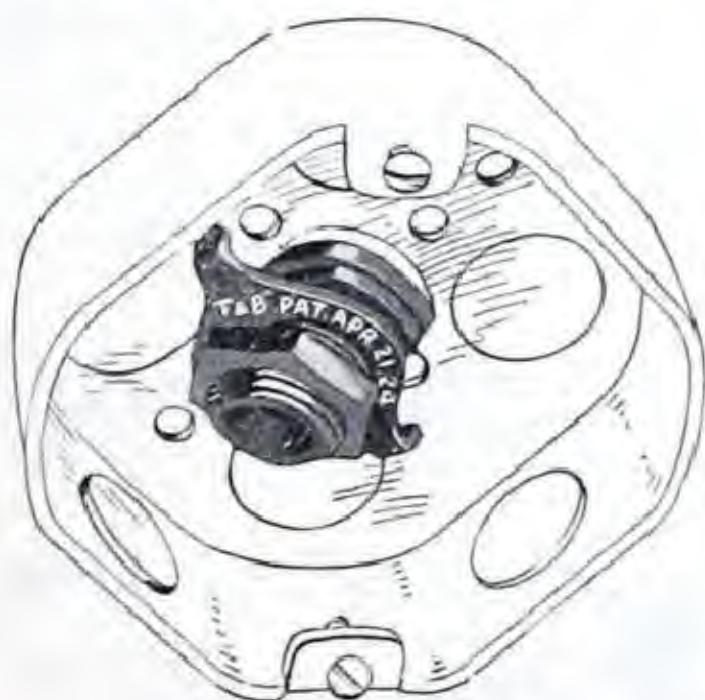
For use with

A.B.C. Cable	Lead-Covered Armoured Cable	Flexible Steel Conduit
14/2	14/2	3/8"
14/2	6/1	
12/2		
4/1		

T. & B. "SLIP-IN" FIXTURE STUD



No. 1601



Just back off the locknut and saddle a bit, slip the base into the knockout and allow the prongs to slip into the fixture stud holes. Then tighten up on the locknut—that's all.

The T. & B. "Slip-In" Fixture Stud can be installed from interior of box, without the removal of parts, in a jiffy. It occupies the minimum of space, allowing plenty of room for wires. There are no small nuts and bolts to lose or fuss with. Approved by Underwriters Laboratories and plated with Tabolite Superior Galvanizing.

List No.	Size	(Hollow Stem Type)	Unit Pkg.	Std. pkg.	Wght. per 100 in lbs.	List Price per 100
1601	3/8"	(Hollow Stem Type)	50	100	7	\$5.00
1600	3/8"	(Solid Stem for Concrete Work)	50	100	8	5.00

MACALLEN INSULATING JOINTS

ELECTROLIER OR SEPARABLE JOINTS

Electrolier or Separable Joints

With Iron Hickey



List No.	Size Ins.	List Price Each	List No.	Size In.	List Price Each
7601	3/8 x 1/8	\$0.78	7607	1/2 x 1/2	\$1.14
7602	3/8 x 1/4	.78	7608	3/4 x 3/8	3.00
7603	3/8 x 3/8	.80	7609	3/4 x 1/2	3.05
7604	1/2 x 1/8	1.08	7610	3/4 x 3/4	3.25
7605	1/2 x 1/4	1.08	7611	1 x 3/4	4.35
7606	1/2 x 3/8	1.09	7612	1 x 1	4.45

BLANK JOINTS

For Externally Wired Fixtures

List No.	Size In.	List Price Each
7701	3/8 x 1/8	\$0.72
7702	3/8 x 1/4	.72
7703	3/8 x 3/8	.72
7704	1/2 x 1/8	1.00
7705	1/2 x 1/4	1.00
7706	1/2 x 3/8	1.00
7707	1/2 x 1/2	1.00
7708	3/4 x 3/8	2.50
7709	3/4 x 1/2	2.50
7710	3/4 x 3/4	2.50
7711	1 x 1/2	3.50
7712	1 x 3/4	3.50
7713	1 x 1	3.50
7714	1 1/4 x 1 1/4	7.50
7715	1 1/2 x 1 1/2	12.00
7716	2 x 2	18.00



Blank Joint

Female End Same Size or Larger Than Male End

List No.	Size In.	List Price Each	List No.	Size In.	List Price Each
7521	3/8 F x 1/8 M	\$0.72	7528	3/4 F x 3/8 M	\$2.90
7522	3/8 F x 1/4 M	.72	7529	3/4 F x 1/2 M	2.90
7523	3/8 F x 3/8 M	.72	7530	3/4 F x 3/4 M	2.90
7524	1/2 F x 1/8 M	1.00	7531	1 F x 1/2 M	4.00
7525	1/2 F x 1/4 M	1.00	7532	1 F x 3/4 M	4.00
7526	1/2 F x 3/8 M	1.00	7533	1 F x 1 M	4.00
7527	1/2 F x 1/2 M	1.00			

Male End Same Size or Larger Than Female End

List No.	Size In.	List Price Each	List No.	Size In.	List Price Each
7534	3/8 M x 1/8 F	\$0.72	7537	1/2 M x 1/4 F	\$1.00
7535	3/8 M x 1/4 F	.72	7538	1/2 M x 3/8 F	1.00
7523	3/8 M x 3/8 F	.72	7527	1/2 M x 1/2 F	1.00
7536	1/2 M x 1/8 F	1.00			

HICKEY FIXTURE STUD



This stud is of malleable iron, and is furnished either galvanized or japanned. As shown by cut all four prongs have extra long slots to allow adjustment. With this stub no Hickeys are required on straight electric work if combination insulated joint is used.

List No.	Weight Standard Package	Per 100 in lbs.	List Price Per 100
16	3/8" Stud.....	100	8 \$5.00
17	1/2" Stud.....	100	3 6.50
	Stove Bolts and Nuts.....	1000	1 .50

T. & B. DEAD GROUND CABLE BOXES

For Armored Conductors.

This box has a simple, yet effective connecting and grounding device, based on the wedge and inclined plane principle, which entirely does away with the multiplicity of parts required in boxes of other makes.

The mechanical and electrical connection between box and armor is perfect. It is easy to install.

Box is galvanized.

Shallow boxes are 3 inches in diameter by $\frac{3}{4}$ inch deep.

Standard package, 100.



Type Nos. 553-554

List No.	Description	Wt. Lbs.	Price Per 100
553	Shallow Box for Straight Electric Work, $\frac{3}{8}$ -inch Fixture Stem	50	\$22.00
554	Shallow Box for Comb. Gas and Electric, to Slip $\frac{3}{8}$ -inch Gas Pipe	47	22.00



CABLE BOXES

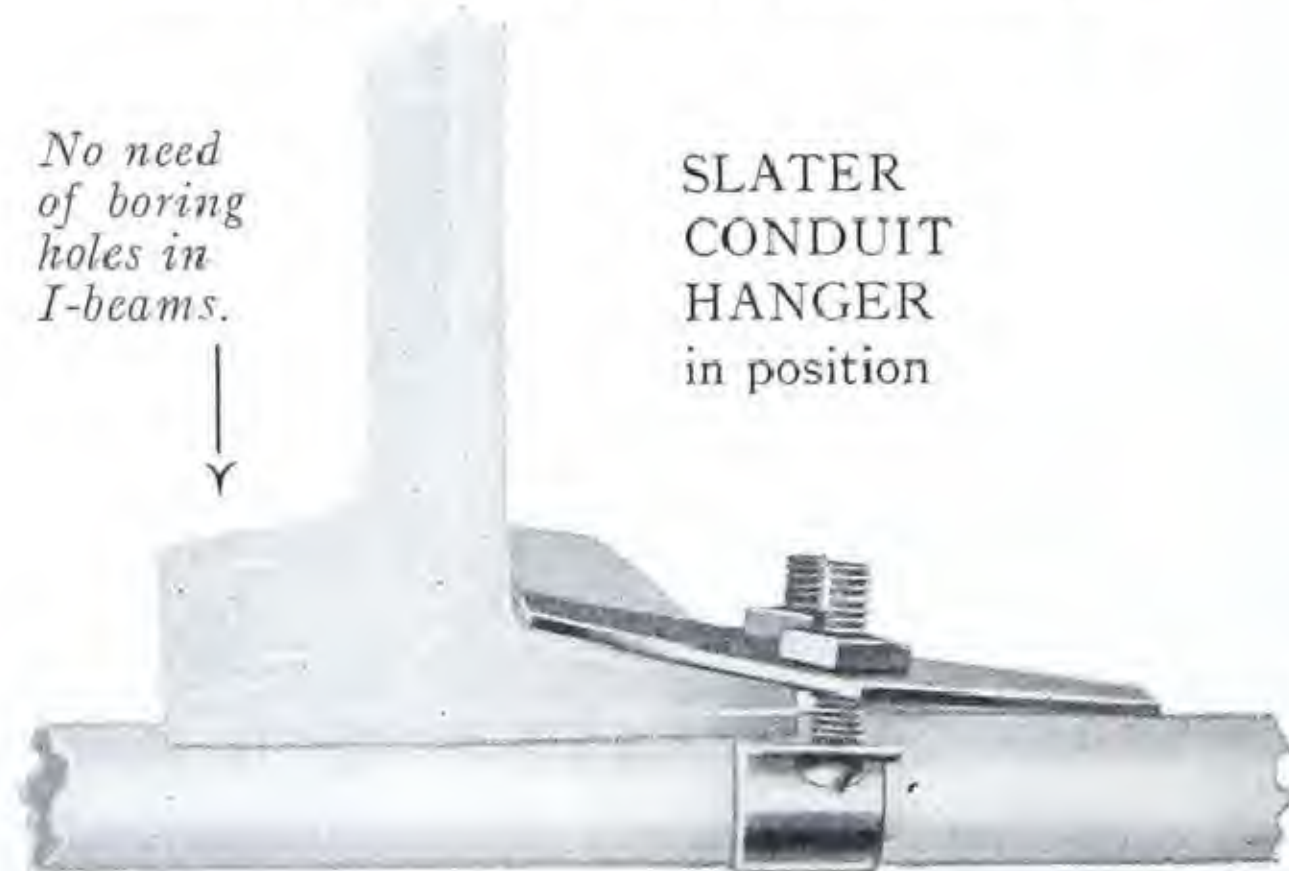
Approved by National Board. Particularly well adapted to narrow bracket installations because of its small diameter.

List No.	Description	Wgt. Lbs.	Price Per 100
565	Box for straight electric $\frac{3}{8}$ " Fixture Stem	100 50	\$22.00
566	Box for combination gas and electric, to slip $\frac{3}{8}$ " pipe	100 50	22.00
Boxes are $2\frac{3}{4}$ inches diameter by $\frac{3}{4}$ inches deep.			
567	Loom Box for straight Electric work, $\frac{3}{8}$ " Fixture Stem	100 50	22.00
568	Loom Box for combination Gas and Electric to slip $\frac{3}{8}$ " Gas pipe	100 50	22.00

SLATER CONDUIT HANGERS

No need of boring holes in I-beams.

SLATER CONDUIT HANGER in position



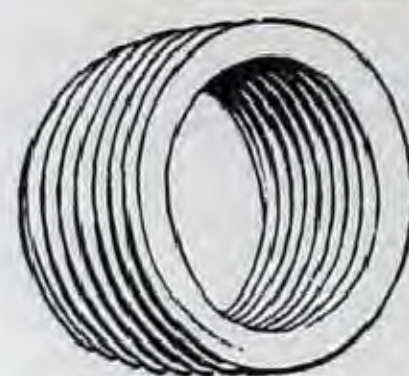
The Slater Conduit Hanger consists of a close-fitting conduit strap with a corresponding plate connected by two standard round slothead bolts. The hanger is assembled over the conduit. The plate is slipped over the flange of the I-beam and the hanger tightened in position with a screw driver.

This is a simple, inexpensive conduit hanger that is easily installed and has amazing strength. Slater Conduit Hangers are made to fit the standard conduit diameters and are shipped in any desired combination ready for use.

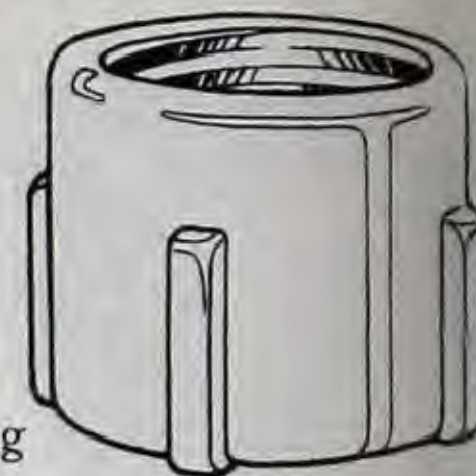
Sizes are as follows:—

Plate Size	1	1	1	2	2	2
Conduit Diameter	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	2"
Strap Size	13	16	20	24	30	36

GALVANIZED CONDUIT REDUCER AND COUPLING



Conduit Reducer



Coupling

Size	Description	List Price Each
4" x $3\frac{1}{2}$ "	—Every reduction down to 4" x $\frac{1}{2}$ "	\$2.00
$3\frac{1}{2}$ " x 3"	—Every reduction down to $3\frac{1}{2}$ " x $\frac{1}{2}$ "	1.60
3" x $2\frac{1}{2}$ "	—Every reduction down to 3" x $\frac{1}{2}$ "	1.20
$2\frac{1}{2}$ " x 2"	—Every reduction down to $2\frac{1}{2}$ " x $\frac{1}{2}$ "	.72
2" x $1\frac{1}{2}$ "	—Every reduction down to 2" x $\frac{1}{2}$ "	.48
$1\frac{1}{2}$ " x $1\frac{1}{4}$ "	—Every reduction down to $1\frac{1}{2}$ " x $\frac{1}{2}$ "	.32
$1\frac{1}{4}$ " x 1"	— $1\frac{1}{4}$ " x $\frac{3}{4}$ "— $1\frac{1}{4}$ " x $\frac{1}{2}$ "	.24
1" x $\frac{3}{4}$ "	—1" x $\frac{1}{2}$ "—1" x $\frac{3}{8}$ "—1" x $\frac{1}{4}$ "—1" x $\frac{1}{8}$ "	.16
$\frac{3}{4}$ " x $\frac{1}{2}$ "	— $\frac{3}{4}$ " x $\frac{3}{8}$ "— $\frac{3}{4}$ " x $\frac{1}{4}$ "— $\frac{3}{4}$ " x $\frac{1}{8}$ "	.14
$\frac{1}{2}$ " x $\frac{3}{8}$ "	— $\frac{1}{2}$ " x $\frac{1}{4}$ "— $\frac{1}{2}$ " x $\frac{1}{8}$ "	.10
$\frac{3}{8}$ " x $\frac{1}{4}$ "	— $\frac{3}{8}$ " x $\frac{1}{8}$ "	.08
$\frac{1}{4}$ " x $\frac{1}{8}$ "		.07

Special galvanized cast-iron coupling for connecting the galvanized conduit to fibre duct in underground service entrances. This coupling makes it possible to replace rusted off conduit without disturbing the fibre duct on the concrete base which protects the fibre at ground level.

Available in $2\frac{1}{2}$ ", 3" and $3\frac{1}{2}$ " sizes.

$2\frac{1}{2}$ x $2\frac{1}{2}$	\$2.40
3 x 3	3.30
$3\frac{1}{2}$ x $3\frac{1}{2}$	5.60

T & B BOX HANGERS-LOOPS



No. 792 View in use



No. 792

Ideal for supporting heavy fixtures or devices. A slot is provided on the inside of the fitting to allow for a nail to be driven in to prevent the loop or nipple from turning after the fitting has been installed. Made of malleable iron, plated with Tabolite Superior Galvanizing.

List No.	Threaded Loops	Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
792	$\frac{1}{2}$ " Drop, $\frac{1}{2}$ " Run	50	100	11	\$8.25
793	$\frac{1}{2}$ " Drop, $\frac{3}{4}$ " Run	25	100	15	9.75



No. 6

AMALGAMATED WIRING DEVICES

Grip-Tite Loom Clip

QUICK — POSITIVE — NEAT

List No.	Std. Pkg.	Weight	List Price Each
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1000	5	\$0.02
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Cord Grip

With $\frac{1}{2}$ " I.P.S. Male Thread.

List No.	Std. Pkg.	Weight	List Price Each
1261	50	$2\frac{1}{4}$	\$0.15



No. 1261

T & B FISH-WIRE



No danger of losing wire

When using T & B fish-tape with balls, thread the wire through the eyelet.

The balls are on both ends of the tape. They are made of steel. The eyelet is rounded to prevent cutting the soft copper wire while being fished. The balls can be easily removed by unscrewing them. The tape is flat tempered spring wire. It will not curl after use. Packed in handy strong cartons. All sizes of T & B Fish Wire, with or without balls, furnished in 100', 150', or 200' coils.

List No.	Size	Std. Pkg.	Approximate Weight per 100 ft. in lbs.				List Price per 100'
			50' Coils	100' Coils	150' Coils	200' Coils	
3601	1/8" x .060"	1000'	46	35	31	30	\$2.00
3602	3/16" x .060"	1000'	58	47	42	41	3.00
3603	1/4" x .060"	1000'	72	62	58	56	4.00

List Nos. 3602 and 3603 cannot be fished through 1/2" conduit.

T & B Fish Wire in all sizes listed above will be furnished without the balls when so specified.

SUPERIOR FISH WIRE



Superior Fish Wire

Superior Fish Wire is a specially prepared flat-tempered spring wire made by the crucible process, which means great strength, toughness and flexibility.

The flat shape makes the wire more flexible which is necessary for long runs of conduit having several bends, and tempering prevents the wire from curling after constant use. Superior Fish Wire also has the necessary stiffness for pushing through long runs of conduit.

The standard sizes are all .060-inch thick (about 1/16 inch). The widths are 1/8-inch, 3/16-inch and 1/4-inch.

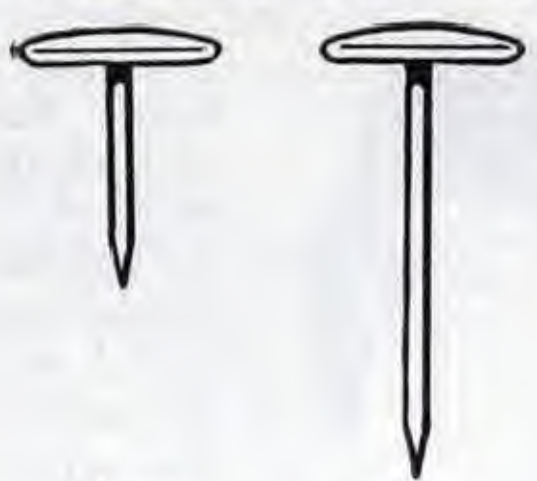
Superior Fish Wire for conduit fishing machines is also furnished.

The thickness is .030 inch and the widths are 1/8-inch, 3/16-inch and 1/4-inch.

List No.	Size	Ship. Wt. per 1000 ft.	List Price per 100 ft.
000	1/8 inch x .060 inch.....	24 lb.	\$2.00
001	3/16 inch x .060 inch.....	35 lb.	3.00
002	1/4 inch x .060 inch.....	46 lb.	4.00
003	1/8 inch x .030 inch.....	13 lb.	1.50
004	3/16 inch x .030 inch.....	19 lb.	2.00
005	1/4 inch x .030 inch.....	25 lb.	2.50

Note—Wire will be furnished in any assortment of lengths from 100 ft. to 500 ft. in coils without extra charge. If wire is desired in continuous lengths of approximately 2000 ft. or over it will be furnished on reels when specified. A net extra charge of \$3.50 will be made for reels with rigid sides. A net extra charge of \$5.00 will be made for reels with removable sides. Reels may be returned for full credit if charges are repaid.

WIRING NAILS



Size	Diam. Top	Colour	Carton Quantity	Standard Package	List Price Per 1000
1/2"	7/16"	Brown	100	1000	\$2.00
1/2"	7/16"	Ivory	100	1000	2.00
7/8"	7/16"	Brown	100	1000	2.00
7/8"	7/16"	Ivory	100	1000	2.00

MILONITE PERFECTION INSULATED NAILS



List No.	Nails (Plain Top)	List Price per 1000
15	" " "	\$1.15
18	" " "	1.25
20	" " "	1.35
22	" " "	1.60

Colour, white, 20 cents per 1000 extra.

LEATHER NAIL HEADS



Required where porcelain insulators or porcelain cleats are installed by the use of nails, as they provide protection to the insulator or cleat when the nail is driven in.

Packed in boxes which weigh one pound each and contain about 1000 nail heads.

List Price.....per box \$1.00

GALVANIZED SHEET METAL PIPE STRAPS

Gauge of Metal	Size	Approx. Straps Per Lb.
24	1/4" BX	80
24	3/8" Ribbed Type	40
20	1/2" Ribbed Type	34
18	3/4" Ribbed Type	19
18	1" Ribbed Type	16
18	1 1/4" Ribbed Type	14
17	1 1/2" Ribbed Type	10
17	2" Ribbed Type	7
17	2 1/2" Ribbed Type	6
17	3" Ribbed Type	5

List Price per lb., \$0.25.

Packed in 25 lb. packages or 100 lb. bags.

DIAMOND TWO-HOLE CONDUIT AND CABLE STRAPS



Diamond Galvanized

They are designed to withstand heavy strains and vibration. They should not be confused with the ordinary thin pipe straps often used for this purpose. On account of their greater strength, a fewer number need be used in conduit or cable runs.

Number	List Price per 100	Conduit Size	Cable Size	Dimensions of Steel Used
		Normal Inside Diameter	or Outside Diameter Conduit	
4-0	\$3.00	1/8"	7/16"	1/2" x .044"
2-0	5.30	1/4"	5/8"	1/2" x .044"
0	5.50	3/8"	1 1/16"	5/8" x .054"
1	6.40	1/2"	3/4"	1 1/16" x .060"
1A	6.60	1 1/2"	7/8"	1 1/16" x .060"
2A	7.20	1"	1"	3/4" x .080"
2	7.40	3/4"	1 1/8"	3/4" x .080"
3A	8.70	1"	1 1/4"	7/8" x 1/8"
3	12.50	1 1/4"	1 1/2"	7/8" x 1/8"
3B	12.50	1 1/4"	1 5/8"	7/8" x 1/8"
4A	13.00	1 1/2"	1 3/4"	7/8" x 1/8"
4	13.00	1 1/2"	1 7/8"	7/8" x 1/8"

STEEL PIPE STRAPS



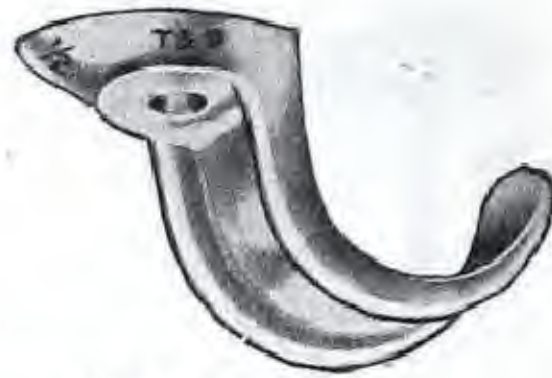
1/2" to 3 1/2" Type

These straps are made of extra heavy steel and are ribbed to give them added stiffness and strength. Nos. 65 and 68 have projection on inside to fit the groove in the spiral and prevent slipping of conduit or conductor after the strap is in place.

List No.	Size	Unit Pkg.	Standard Pkg.	Weight 100 pcs. in lbs.	List Price per 100
*65	1/4"	500	500	3	\$2.00
64	3/8"	100	500	3	3.00
66	1/2"	100	500	4	3.50
69	3/4"	100	200	7	4.00

*No 65 designed for armored conductors.

MALLEABLE IRON PIPE STRAPS



List No.	Size	Size of Screw Hole	Weight Standard Pkg.	Weight 100 pcs. in lbs.	List Price per 100
1275	3/8"	1/4"	100	4	\$ 4.00
1276	1/2"	5/16"	100	6	5.00
1277	3/4"	5/16"	100	9	6.00
1278	1"	5/16"	100	13	8.00
1279	1 1/4"	3/8"	50	20	14.00
1280	1 1/2"	7/16"	50	32	20.00
1281	2"	1/2"	25	68	40.00
1282	2 1/2"	5/8"	25	104	60.00
1283	3"	5/8"	25	148	80.00
1284	3 1/2"	11/16"	10	200	120.00
1285	4"	11/16"	10	260	180.00
1286	4 1/2"	11/16"	10	360	260.00
1287	5"	1 1/16"	10	460	350.00

DIAMOND MALLEABLE ONE-HOLE CLAMPS



Diamond conduit clamps are made to fit standard conduit or steel pipe from 3/8" up to 4" inside diameter.

The ribbing of the clamp is such as to provide maximum strength with minimum weight.

Furnished at the same price either in a baked black japanned

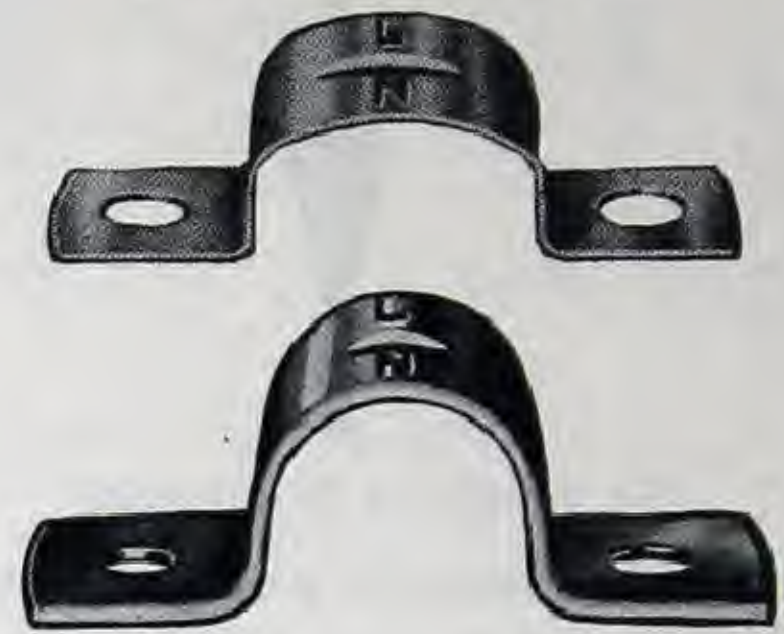
finish or diamond galvanized-hot process.

Conduit or Pipe Size Normal Inside Diam.	Cable Size or Outside Diam. of Conduit	Diameter of Screw Hole	Size Expansion Shield or Screw Anchor	Weight per 100	List Price per 100
1/4"	.50"	3/16"	3/16"x1"	3 1/2 lbs.	\$ 4.80
3/8"	.67"	3/16"	3/16"x1"	4 lbs.	4.80
1/2"	.84"	1/4"	3/16"x1"	6 lbs.	6.00
3/4"	1.05"	5/16"	1/4"x1"	9 lbs.	7.20
1"	1.31"	5/16"	1/4"x1"	15 lbs.	9.60
1 1/4"	1.66"	3/8"	5/16"x1"	24 lbs.	16.80
1 1/2"	1.90"	7/16"	3/8"x2"	38 lbs.	24.00
2"	2.37"	9/16"	1/2"x2"	64 lbs.	48.00
2 1/2"	2.87"	5/8"	1/2"x2"	115 lbs.	72.00
3"	3.50"	5/8"	1/2"x3 1/2"	150 lbs.	96.00
3 1/2"	4.00"	11/16"	5/8"x3 1/2"	250 lbs.	144.00
4"	4.50"	1 1/16"	5/8"x3 1/2"	325 lbs.	156.00

In ordering designate inside diameter of conduit or outside diameter of lead cable with which clamps are to be used.

CABLE STRAPS

Conduit Straps



List No.	For Use With	Number Straps per Carton	Cartons Per Std. Pkg.	List Price Per 1000
1	14-2 A.B.C. 3/8" Cond. 14-3 A.B.C. 14-3 Loomex 12-2 A.B.C.	200	10	\$4.00
2	Same as above Stronger straps.....	200	10	6.00
3	12-3 A.B.C. 12-3 Loomex 10-2 A.B.C. 10-3 Loomex 10-3 A.B.C. 8-2 Loomex 8-2 A.B.C. 14-2 A.C.L. 14-3 A.C.L.	100	10	7.00
4	8-3 A.B.C. 1/2" Cond. 6-2 A.B.C. 8-3 Loomex 6-3 A.B.C.	100	10	8.00
5	4-2 A.B.C. 3/4" Cond. 4-3 A.B.C. 2-2 A.B.C.	50	10	10.00
11	14-2 Loomex	200	10	4.00
12	12-2 Loomex 10-2 Loomex	200	10	7.00



List No.	Number Lbs. Per Carton	Lbs. Per Standard Package	List Price Per Lb.
3/8"	5 Lbs.	100 Lbs.	\$0.24
1/2"	5 Lbs.	100 Lbs.	0.24
3/4"	5 Lbs.	100 Lbs.	0.24
1"	5 Lbs.	100 Lbs.	0.24
1 1/4"	5 Lbs.	100 Lbs.	0.24
1 1/2"	2 1/2 Lbs.	50 Lbs.	0.24
2"	2 1/2 Lbs.	50 Lbs.	0.24
2 1/2"	2 1/2 Lbs.	50 Lbs.	0.24
3"	2 1/2 Lbs.	50 Lbs.	0.24

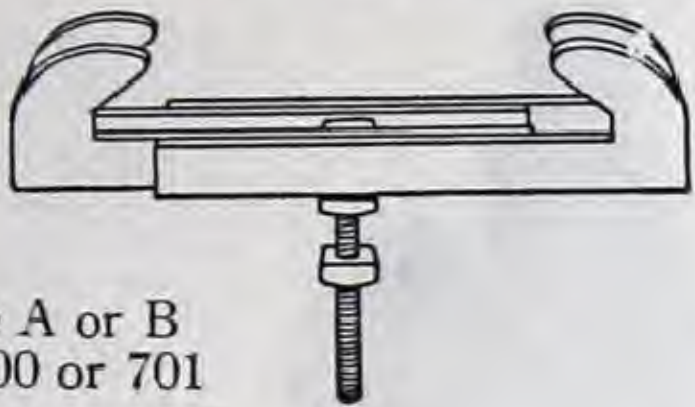
GALVANIZED MALLEABLE IRON ONE HOLE CONDUIT CLAMPS



One Hole Conduit Clamp

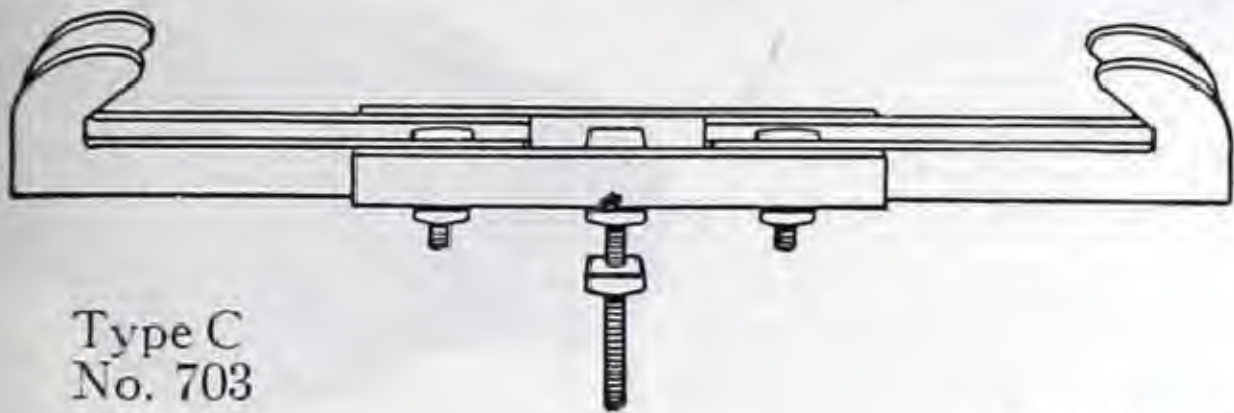
Size	Std. Pkg.	List Price per 100
3/8"	100	\$4.00
1/2"	100	5.00
3/4"	100	6.00
1"	50	8.00
1 1/4"	25	14.00
1 1/2"	25	20.00
2"	20	40.00
2 1/2"	15	60.00
3"	10	80.00
3 1/2"	5	120.00
4"	5	180.00

CONDUIT SUPPORTS



Type A or B
No. 700 or 701

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
0	Type A Clamp (inc. bolts) fits Flange from 2 3/4" to 7 3/8".....	25	100	33	\$30.00
1	Type B Clamp (inc. bolts) fits Flange from 7" to 12".....	10	100	62	45.00



Type C
No. 703

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
02	Type C Clamp (inc. bolts) fits Flange 8 1/2 x 11 3/8".....	10	100	46	\$45.00

*(Two inner parts of Type A, with extension).

ADDITIONAL BOLTS

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3	Special Bolts.....	100	100	6	\$5.00



Double Pipe Support
Nos. 741-3-5-6-7



Quadruple Pipe Support
Nos. 742 and 744

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
1	Mal. iron supports for 2 1/2" conduits.....		100	25	\$12.00
3	3/4" conduits.....		50	32	14.00
5	1" conduits.....		25	40	20.00
6	1 1/4" conduits.....		25	52	24.00
7	1 1/2" conduits.....		25	62	28.00

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
2	Mal. iron supports for 4 1/2" conduits.....		100	39	18.00
4	3/4" conduits.....		50	47	22.00



Close Pipe Support
Nos. 733 to 740

st o.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3	Steel supports for 1 1/2" conduit.....	25	100	12	\$ 8.00
4	3/4" conduit.....	25	100	13	10.00
5	1" conduit.....		50	15	16.00
6	1 1/4" conduit.....		50	18	20.00
7	1 1/2" conduit.....		25	19	24.00
8	2" conduit.....		25	23	32.00
9	2 1/2" conduit.....		25	26	40.00
0	3" conduit.....		25	30	50.00

CONDUIT SUPPORTS

For clarity and convenience we list the combinations of Type A and Type B clamps with various conduit supports.

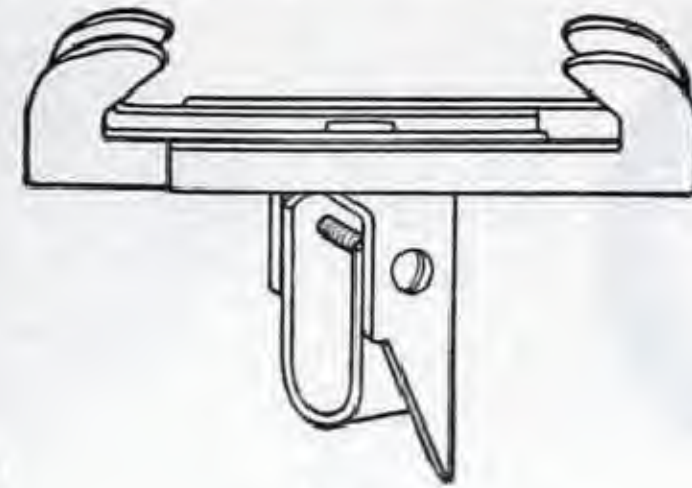


Fig. 1

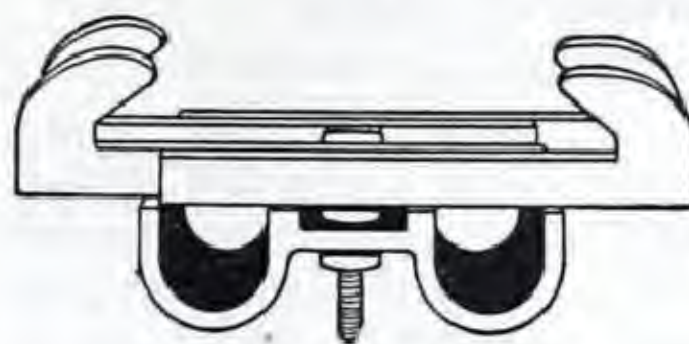


Fig. 2

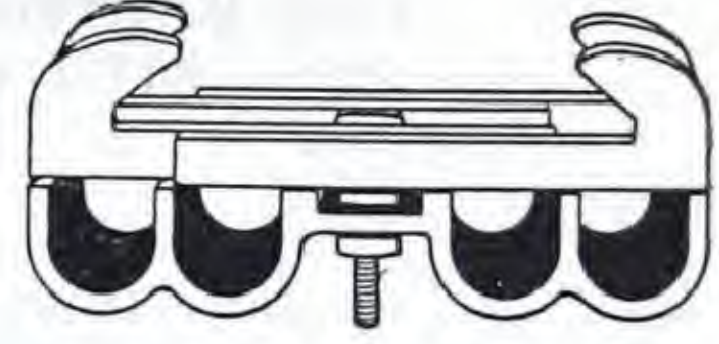


Fig. 3

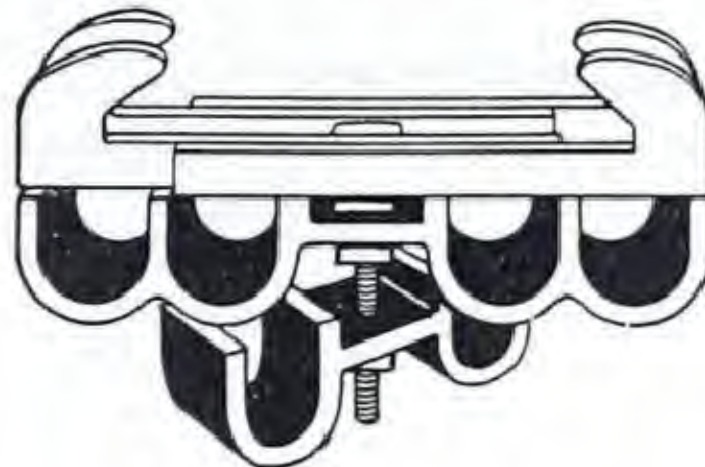


Fig. 4

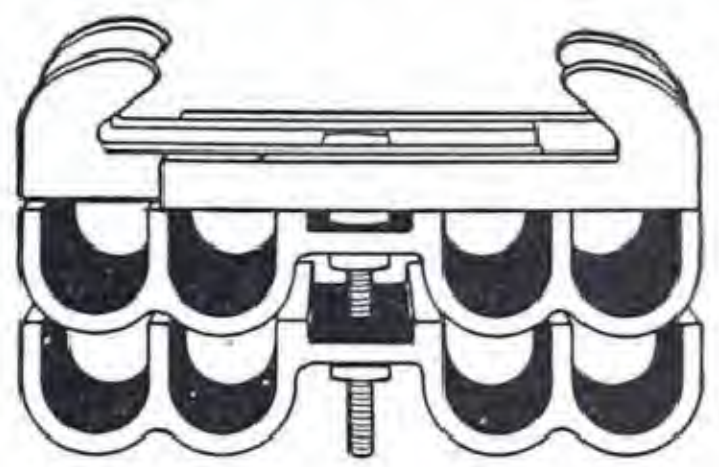


Fig. 5

FIG. 1—Type A, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
710	1— 1/2"	100	45	\$34.00
711	1— 3/4"	100	46	38.00
712	1— 1"	50	48	44.00
713	1— 1 1/4"	50	51	48.00
714	1— 1 1/2"	25	52	52.00
715	1— 2"	25	56	60.00
716	1— 2 1/2"	25	59	68.00
717	1— 3"	25	63	78.00

FIG. 1—Type B, Clamp Complete with Support as below

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
760	1— 1/2"	100	74	49.00
761	1— 3/4"	100	75	53.00
762	1— 1"	50	77	59.00
763	1— 1 1/4"	50	80	63.00
764	1— 1 1/2"	25	81	67.00
765	1— 2"	25	85	75.00
766	1— 2 1/2"	25	88	83.00
767	1— 3"	25	92	93.00

FIG. 2—Type A, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
718	2— 1/2"	100	58	38.00
719	2— 3/4"	100	65	42.00
726	2— 1/2" and 2— 3/4"	25	90	50.00
727	2— 1/2" and 4— 3/4"	25	105	58.00
730	2— 1"	25	73	48.00
731	2— 1 1/4"	25	85	52.00
732	2— 1 1/2"	25	95	56.00

FIG. 2—Type B, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
768	2— 1/2"	100	87	53.00
769	2— 3/4"	100	94	57.00
776	2— 1/2" and 2— 3/4"	25	119	65.00
777	2— 1/2" and 4— 3/4"	25	134	73.00
780	2— 1"	25	102	63.00
781	2— 1 1/4"	25	114	67.00
782	2— 1 1/2"	25	124	71.00

FIG. 3—Type A, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
720	4— 1/2"	50	72	46.00
721	4— 3/4"	50	80	50.00
728	4— 1/2" and 2— 3/4"	25	104	58.00
729	4— 1/2" and 4— 3/4"	25	119	66.00

FIG. 3—Type B, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
770	4— 1/2"	50	101	61.00
771	4— 3/4"	50	109	65.00
778	4— 1/2" and 2— 3/4"	25	133	73.00
779	4— 1/2" and 4— 3/4"	25	148	81.00

FIG. 4—Type A, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
722	6— 1/2"	25	97	54.00
723	6— 3/4"	25	112	62.00

FIG. 4—Type B, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
772	6— 1/2"	25	126	69.00
773	6— 3/4"	25	141	77.00

FIG. 5—Type A, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
724	8— 1/2"	25	111	62.00
725	8— 3/4"	25	127	70.00

FIG. 5—Type B, Clamp Complete with Support as below.

List No.		Std. Pkg.	Weight per 100 in lbs.	List Price per 100
774	8— 1/2"	25	140	77.00
775	8— 3/4"	25	160	85.00

T. & B. GROUND FITTINGS



No. 3650



No. 3850

T. & B. Grounding Wedges

DO AWAY WITH ALL JUMPER WIRES

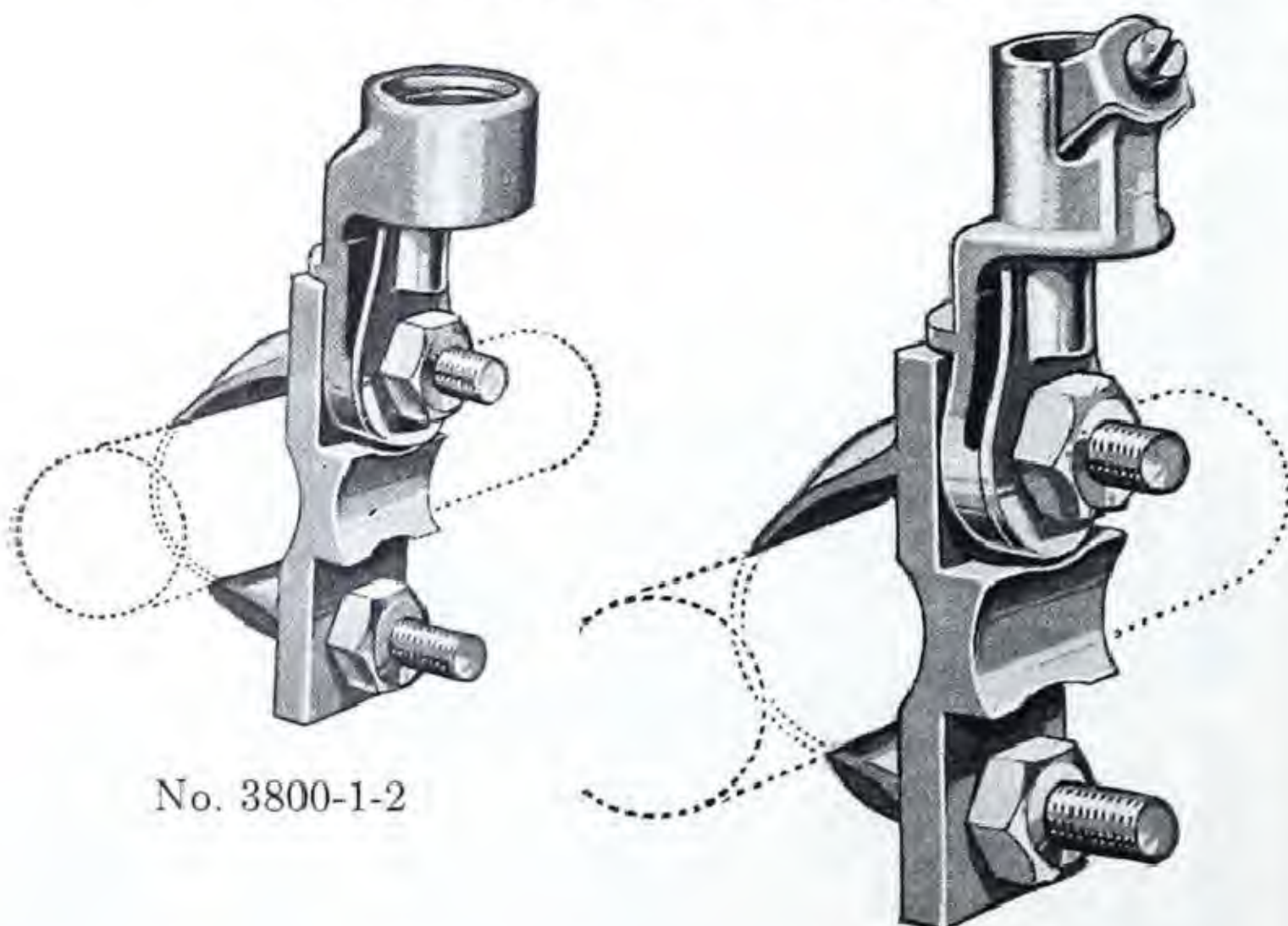
List No.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3650	1/2" Grounding Wedge	100	100	2 1/2	\$12.00
3651	3/4" Grounding Wedge	100	100	5 1/2	14.00
3652	1" Grounding Wedge	20	50	6 1/2	17.00
3653	1 1/4" Grounding Wedge	10	50	8	19.00

T. & B. Grounding Bushings

Heavy malleable castings with smooth, well rounded shoulders, non-breakable, and protected from corrosion with Tabolite Superior Galvanizing. Furnished assembled with two brass screws for attaching jumper wires.

List No.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3850	1/2"	100	100	8	\$ 7.50
3851	3/4"	100	100	9	9.00
3852	1"	50	50	12	15.00
3853	1 1/4"	20	50	15	18.00
3854	1 1/2"	50	50	30	24.00
3855	2"	25	25	35	35.00

T. & B. Ground Fittings



No. 3800-1-2

No. 3810

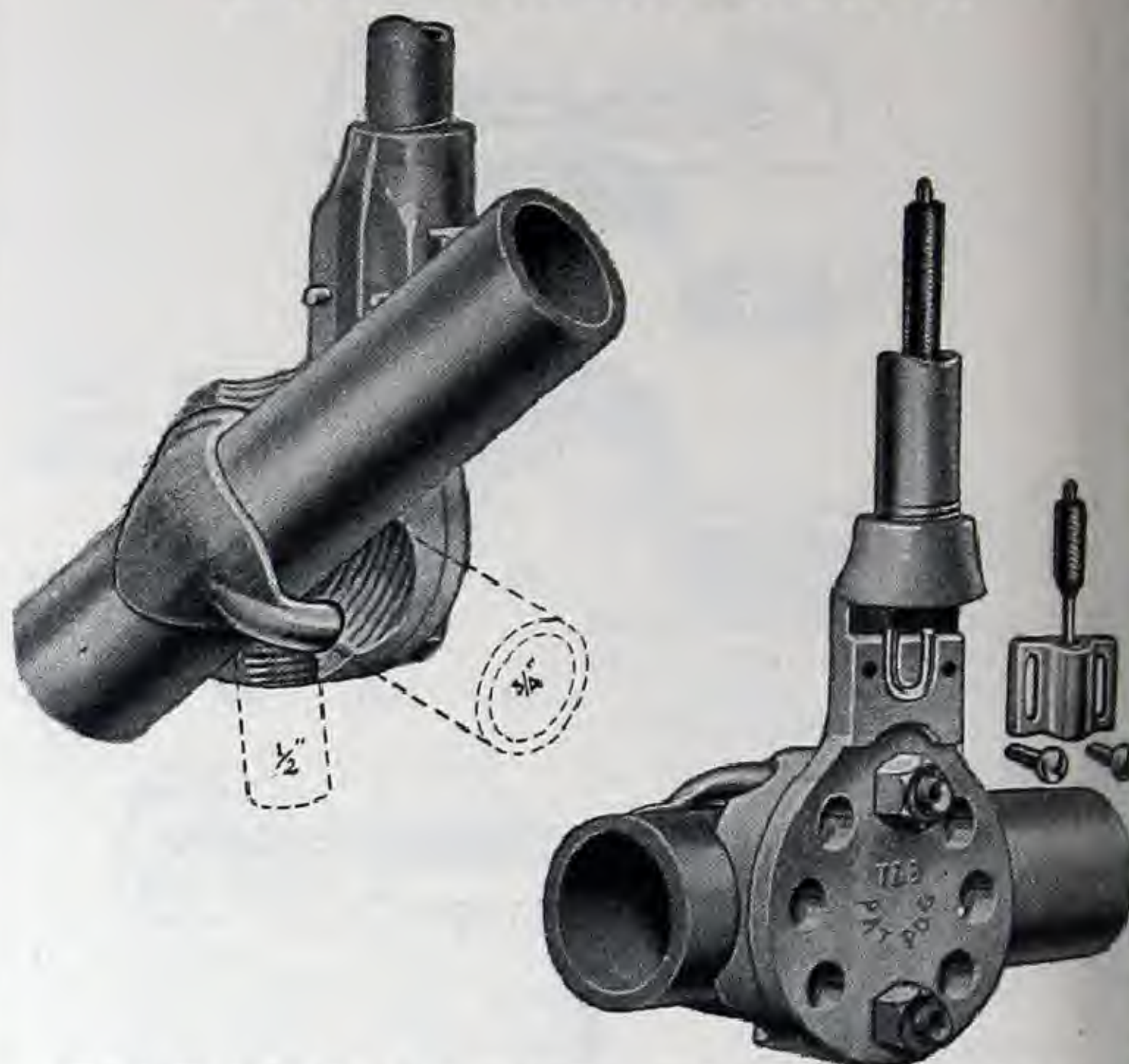
FOR RIGID CONDUIT

List No.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3800	1/2" conduit to 1/2", 3/4" and 1" water pipe.....	25	100	50	\$.70
3801	3/4" conduit to 1/2", 3/4" and 1" water pipe.....	25	25	57	1.25
3802	1" conduit to 1/2", 3/4" and 1" water pipe.....	10	10	65	1.75

FOR ARMORED CABLE

List No.		Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
3810	For No. 8 single armored cable to 1/2", 3/4" and 1" water pipe.....	25	100	48	.70

T. & B. GROUND FITTINGS



Each T. & B. No. 3670 style Protective Type Ground Fitting is designed to take any of three sizes of water pipe, and to meet the water pipe at various angles. The heavy "U" bolt is designed with a flat shoe which clamps tightly onto, but cannot damage the water pipe.

It is made of tough malleable iron, protected against rust with Tabolite superior galvanizing. The ground wire connection may be soldered to the brass lug, or looped through the groove provided and clamped tight with the lug to form a solderless bond.

List No.	Size	For Water Pipe	Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price each
3670	1/2"	1/2", 3/4", 1"	10	50	110	\$.90
3671	3/4"	1/2", 3/4", 1"	5	20	112	1.60
3672	1"	1/2", 3/4", 1"	2	10	115	2.50
3680	1/2"	1 1/4", 1 1/2", 2"	10	50	170	.90
3681	3/4"	1 1/4", 1 1/2", 2"	5	20	172	1.60
3682	1"	1 1/4", 1 1/2", 2"	2	10	175	2.50
3692	1/2"	2 1/2", 3", 3 1/2"	2	10	350	3.50
3693	3/4"	2 1/2", 3", 3 1/2"	2	10	356	3.50
3694	1"	2 1/2", 3", 3 1/2"	2	10	362	3.50
3695	1/2"	4", 4 1/2", 5"	2	10	400	4.00
3696	3/4"	4", 4 1/2", 5"	2	10	412	4.00
3697	1"	4", 4 1/2", 5"	2	10	419	4.00

Assembled U-Bolt, Bar, Adapter, only



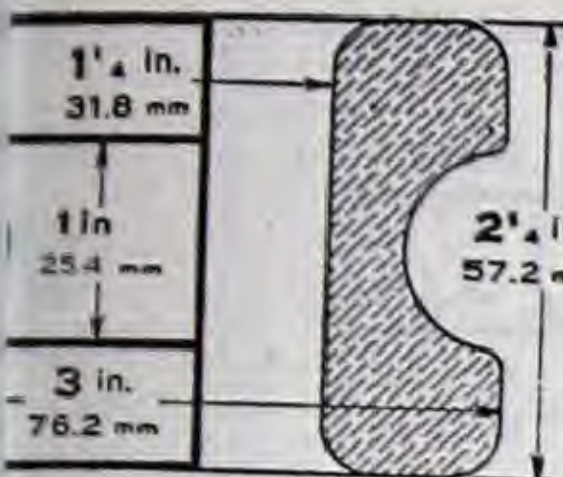
No. 3830

List No.	For Water Pipe	Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price each
3820	2 1/2", 3", 3 1/2"....	1	10	300	\$3.25
3821	4", 4 1/2", 5"....	1	10	350	3.75

If a conduit connection is not required, it is economical to use the T. & B. No. 3830 Ground Fitting, which consists of the U-Bolt, adapter bar and soldering lug assembly of the T. & B. No. 3800 Ground Fitting, without the conduit hub. Solder lug takes No. 4 wire.

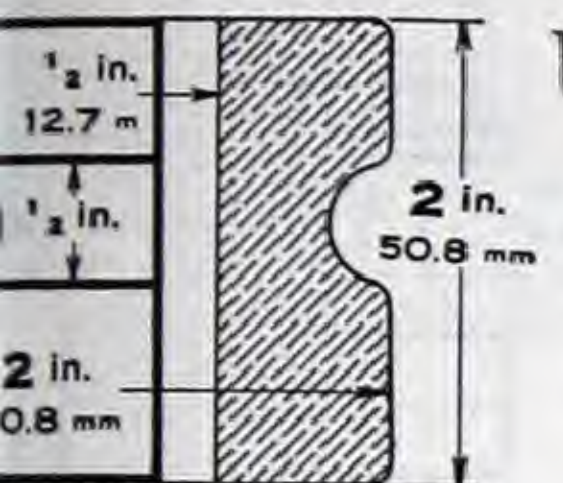
List No.	For Water Pipe	Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price each
3830	1/2", 3/4", 1"....	25	25	40	\$.50

THOMAS PORCELAIN INSULATORS

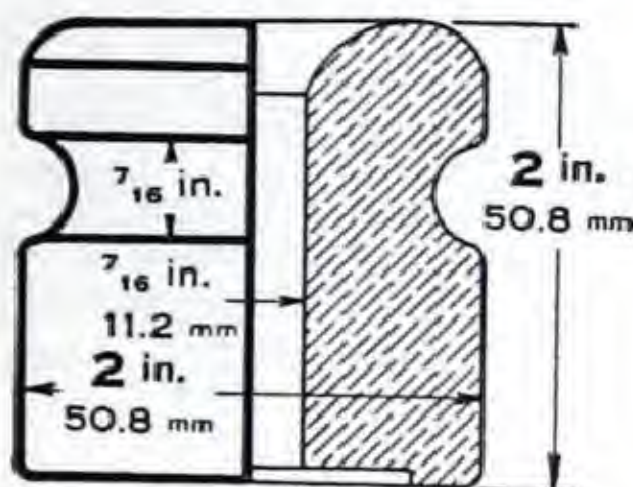


No. 0
List No. 0
No. in Bbl. 350
Ship. Wgt. per Bbl. lbs. 310
Price, per 1000 \$340.00

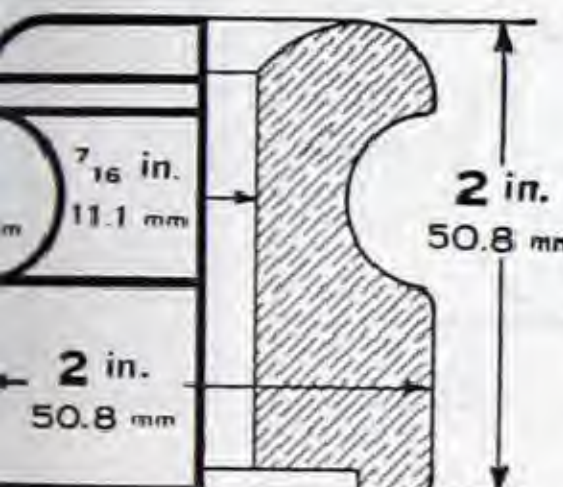
No. 1
List No. 1
No. in Bbl. 600
Ship. Wgt. per Bbl. lbs. 420
Price, per 1000 \$177.15



No. 2
List No. 2
No. in Bbl. 850
Ship. Wgt. per Bbl. lbs. 420
List Price, per 1000 \$120.00

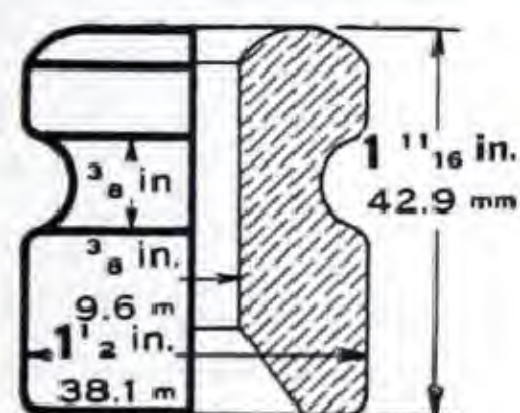
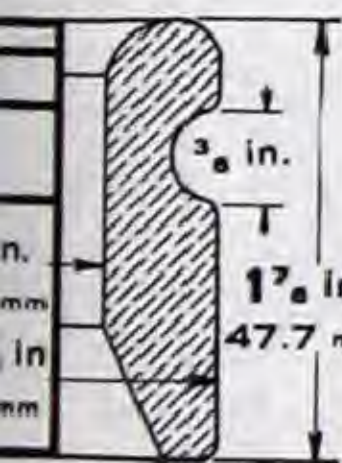


No. 3
List No. 3
No. in Bbl. 900
Ship. Wgt. per Bbl. lbs. 435
Price, per 1000 \$123.40



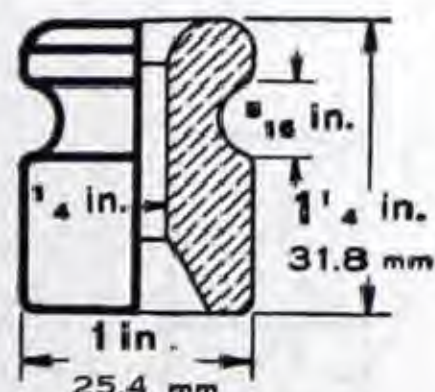
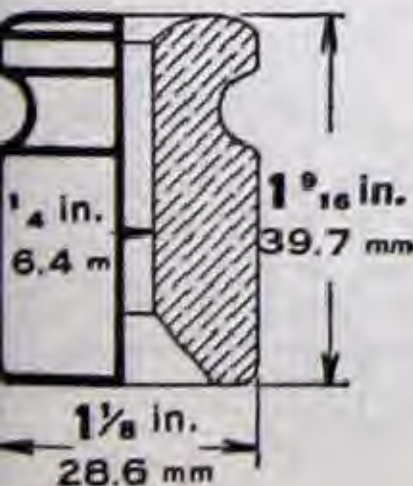
No. 3 1/2
List No. 3 1/2
No. in Bbl. 1000
Ship. Wgt. per Bbl. lbs. 400
List Price, per 1000 \$116.40

No. 4
List No. 4
No. in Bbl. 2000
Ship. Wgt. per Bbl. lbs. 415
Price, per 1000 \$55.00



No. 4 1/2
List No. 4 1/2
No. in Bbl. 2000
Ship. Wgt. per Bbl. lbs. 400
List Price, per 1000 \$55.00

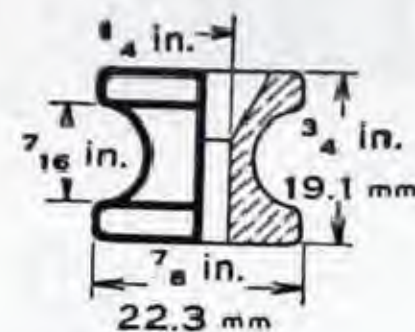
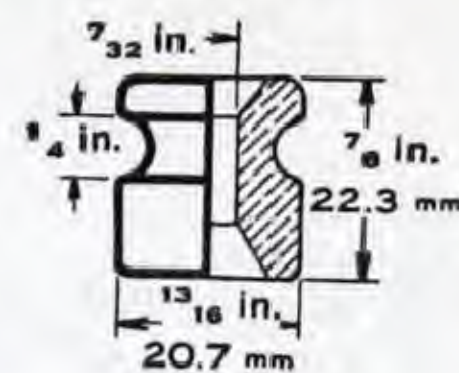
No. 5
List No. 5
No. in Bbl. 6000
Ship. Wgt. per Bbl. lbs. 430
Price, per 1000 \$28.30



No. 5 1/2
List No. 5 1/2
No. in Bbl. 3500
Ship. Wgt. per Bbl. lbs. 410
List Price, per 1000 \$38.00

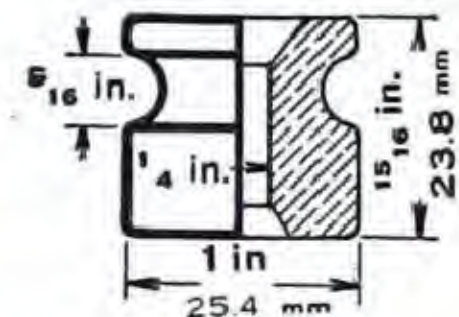
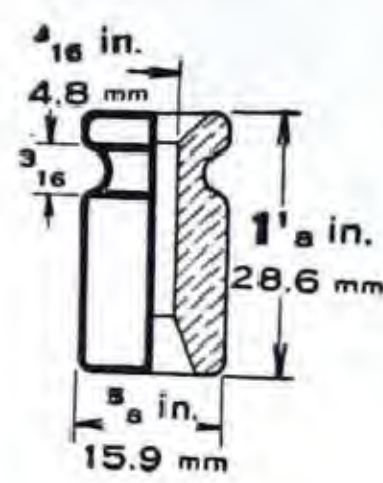
THOMAS PORCELAIN INSULATORS

No. 6
List No. 6
No. in Bbl. 13500
Ship. Wgt. per Bbl. lbs. 465
List Price, per 1000 \$21.90



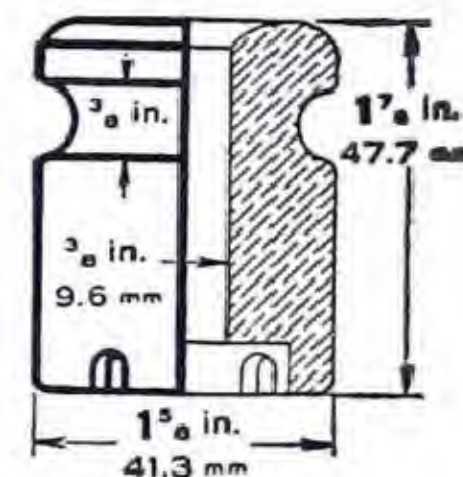
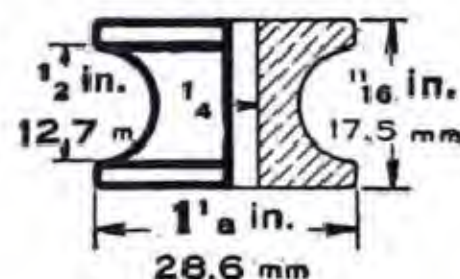
No. 7
List No. 7
No. in Bbl. 15000
Ship. Wgt. per Bbl. lbs. 370
List Price, per 1000 \$21.30

No. 8
List No. 8
No. in Bbl. 8000
Ship. Wgt. per Bbl. lbs. 375
List Price, per 1000 \$27.00



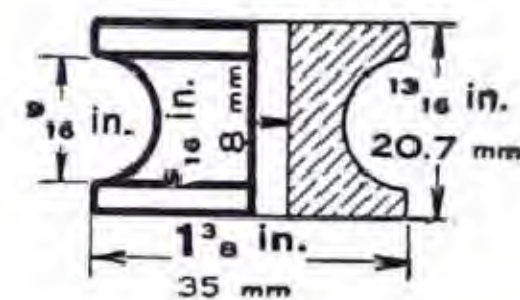
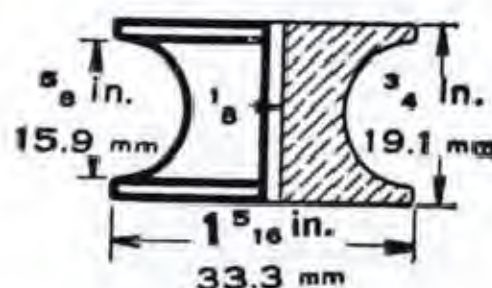
No. 9
List No. 9
No. in Bbl. 20000
Ship. Wgt. per Bbl. lbs. 400
List Price, per 1000 \$34.90

No. 10
List No. 10
No. in Bbl. 1500
Ship. Wgt. per Bbl. lbs. 415
List Price, per 1000 \$81.40



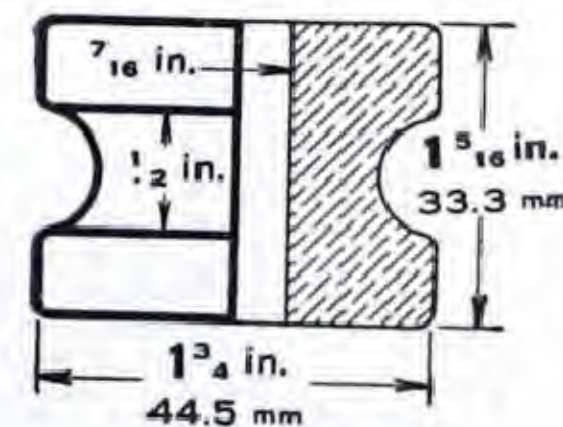
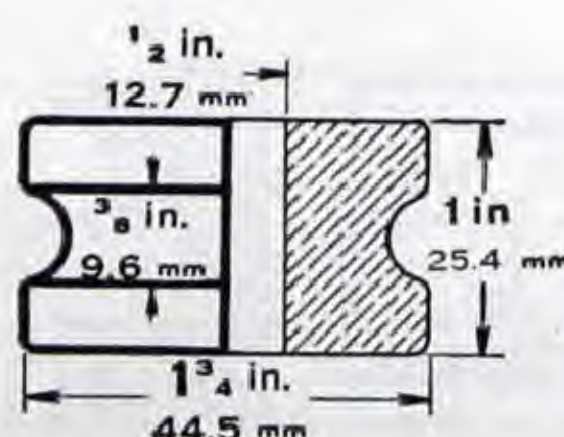
No. 11
List No. 11
No. in Bbl. 9000
Ship. Wgt. per Bbl. lbs. 330
List Price, per 1000 \$31.95

No. 12
List No. 12
No. in Bbl. 5000
Ship. Wgt. per Bbl. lbs. 275
List Price, per 1000 \$45.10



No. 13
List No. 13
No. in Bbl. 4500
Ship. Wgt. per Bbl. lbs. 300
List Price, per 1000 \$54.25

No. 15
List No. 15
No. in Bbl. 2000
Ship. Wgt. per Bbl. lbs. 415
List Price, per 1000 \$81.75

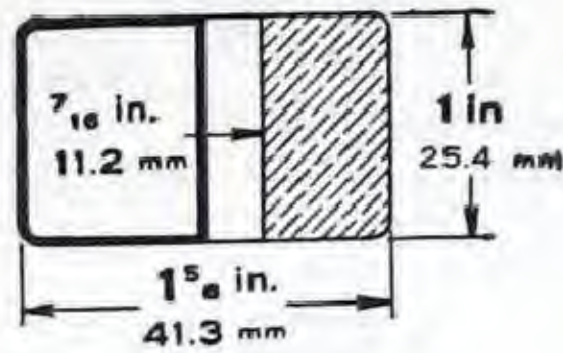
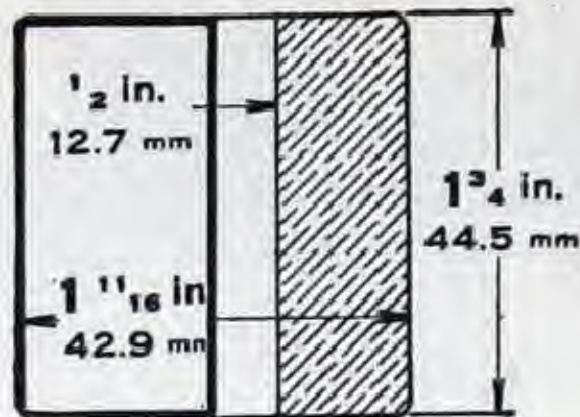


No. 16
List No. 16
No. in Bbl. 2200
Ship. Wgt. per Bbl. lbs. 420
List Price, per 1000 \$79.95

THOMAS PORCELAIN INSULATORS

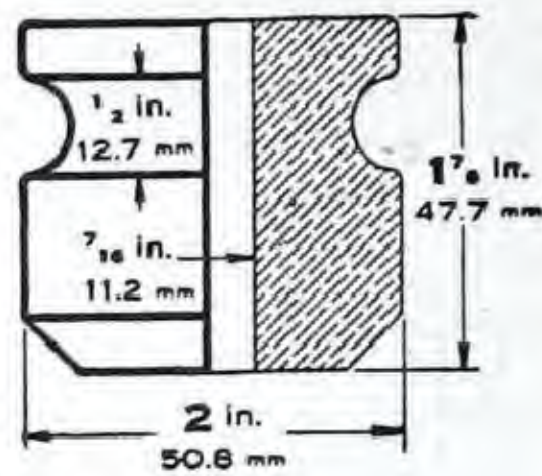
No. 17

List No. 17
 No. in Bbl. 1200
 Ship. Wt. per Bbl. lbs. 400
 List Price. per 1000 \$97.20



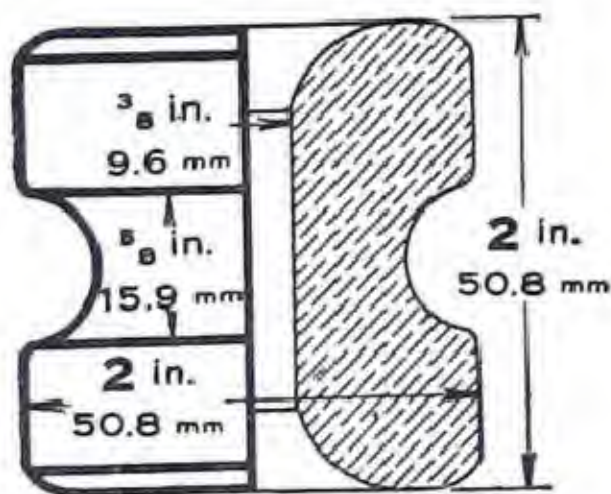
No. 18

List No. 18
 No. in Bbl. 3000
 Ship. Wt. per Bbl. lbs. 350
 List Price. per 1000 \$65.75



No. 19

List No. 19
 No. in Bbl. 1000
 Ship. Wt. per Bbl. lbs. 450
 List Price. per 1000 \$134.20

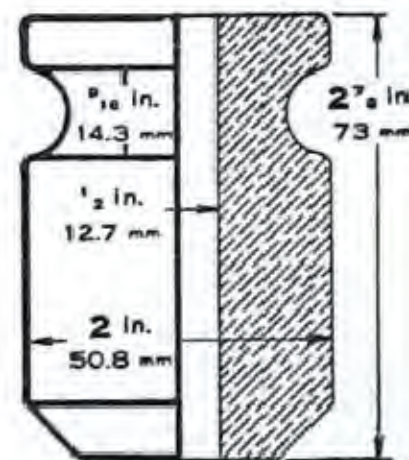


No. 20

List No. 20
 No. in Bbl. 1000
 Ship. Wt. per Bbl. lbs. 440
 List Price. per 1000 \$113.25

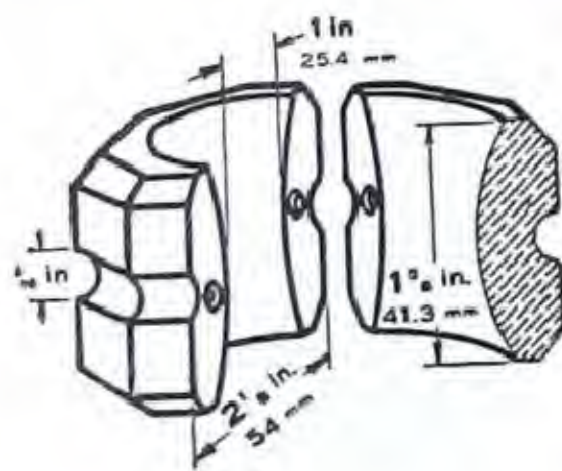
No. 21 (B.X.)

List No. 21
 No. in Bbl. 600
 Ship. Wt. per Bbl. lbs. 440
 List Price. per 1000 \$202.85



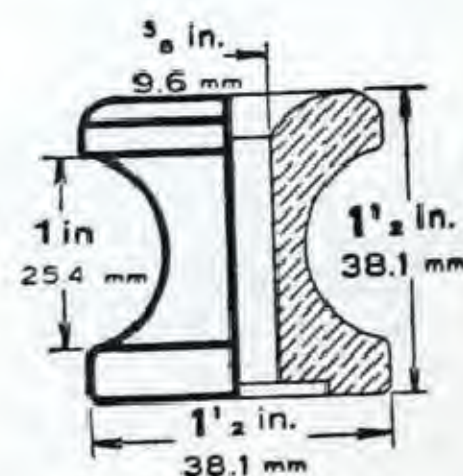
No. 22 (Victor)

List No. 22
 No. in Bbl. 1000
 Ship. Wt. per Bbl. lbs. 400
 List Price. per 1000 \$115.60



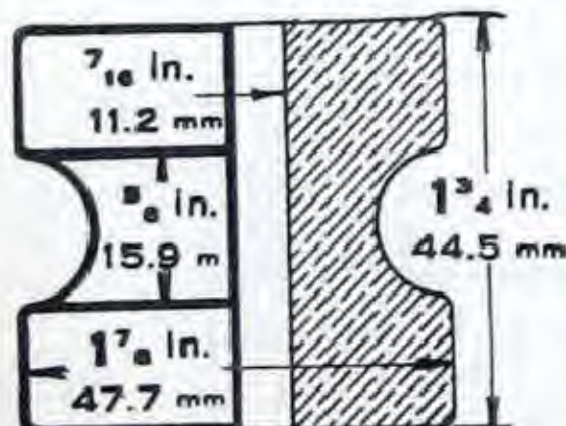
No. 23

List No. 23
 No. in Bbl. 2000
 Ship. Wt. per Bbl. lbs. 250
 List Price. per 1000 \$66.20



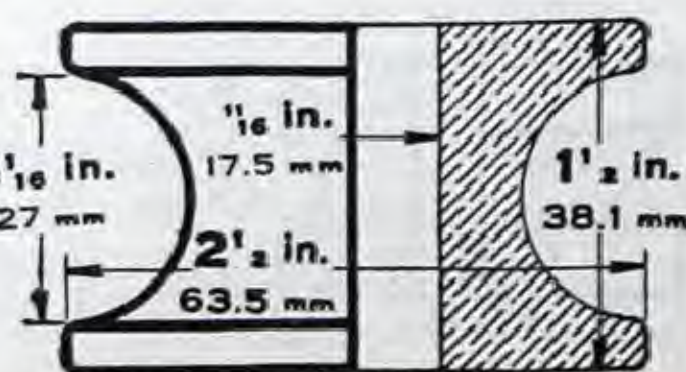
No. 24

List No. 24
 No. in Bbl. 1200
 Ship. Wt. per Bbl. lbs. 425
 List Price. per 1000 \$56.40



No. 25

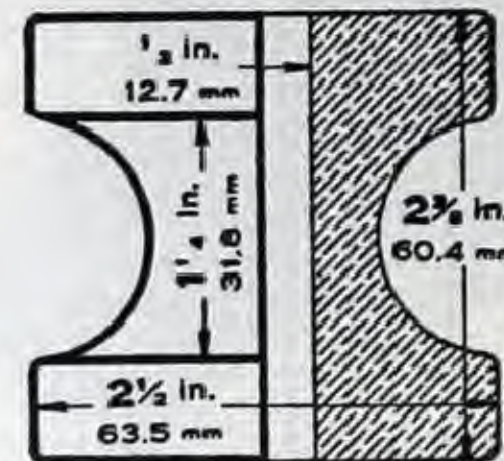
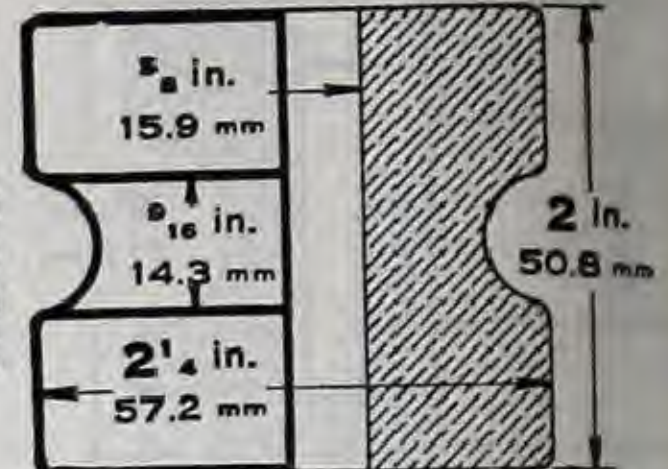
List No. 25
 No. in Bbl. 750
 Ship. Wt. per Bbl. lbs. 330
 List Price. per 1000 \$150.25



THOMAS PORCELAIN INSULATORS

No. 26

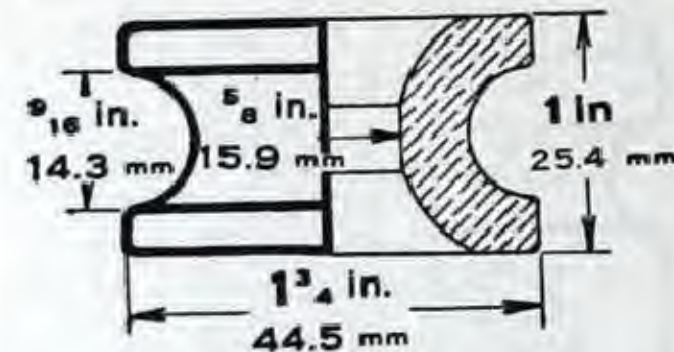
List No. 26
 No. in Bbl. 700
 Ship. Wt. per Bbl. lbs. 420
 List Price. per 1000 \$159.35



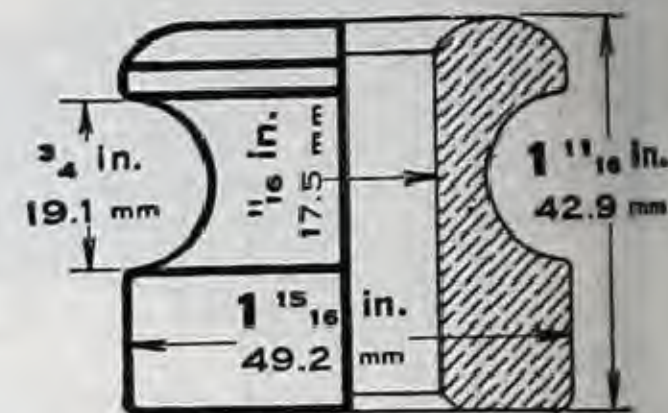
No. 29

List No. 29
 No. in Bbl. 500
 Ship. Wt. per Bbl. lbs. 400
 List Price. per 1000 \$207.90

List No. 30
 No. in Bbl. 1250
 Ship. Wt. per Bbl. lbs. 415
 List Price. per 1000 \$120.95



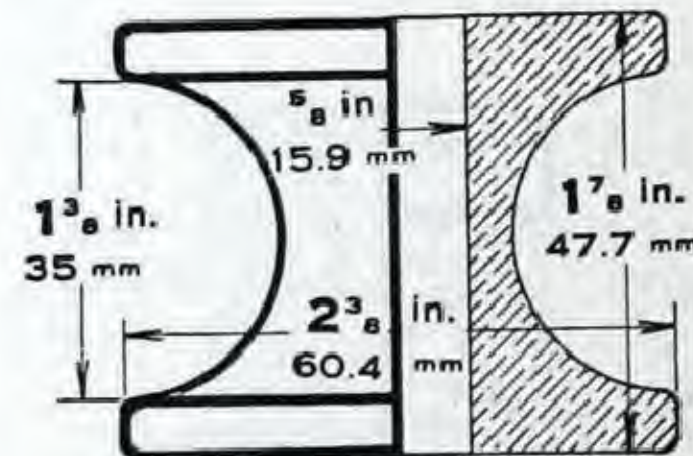
No. 30



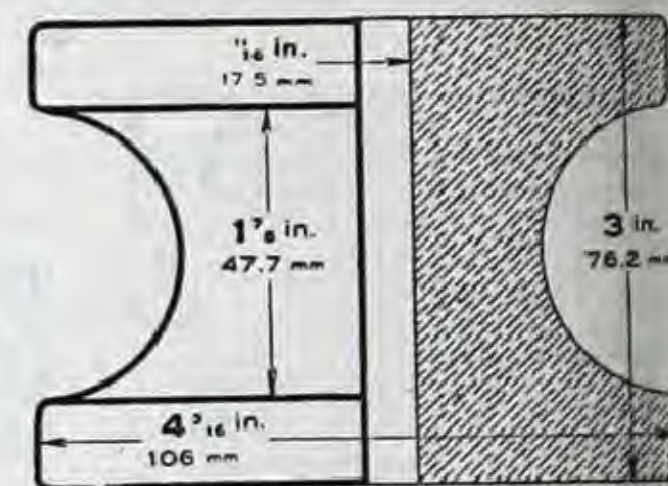
No. 31

List No. 31
 No. in Bbl. 2500
 Ship. Wt. per Bbl. lbs. 250
 List Price. per 1000 \$77.70

List No. 32
 No. in Bbl. 140
 Ship. Wt. per Bbl. lbs. 325
 List Price. per 1000 \$817.15



No. 32

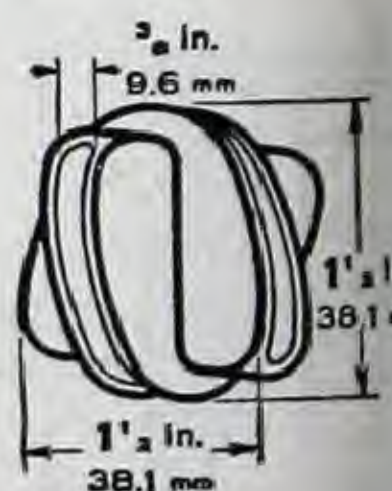
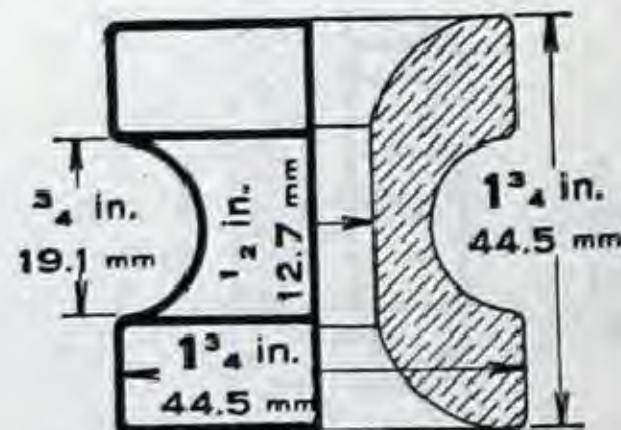


No. 34

List No. 34
 No. in Bbl. 600
 Ship. Wt. per Bbl. lbs. 395
 List Price. per 1000 \$191.90

No. 35

List No. 35
 No. in Bbl. 1500
 Ship. Wt. per Bbl. lbs. 415
 List Price. per 1000 \$275.00

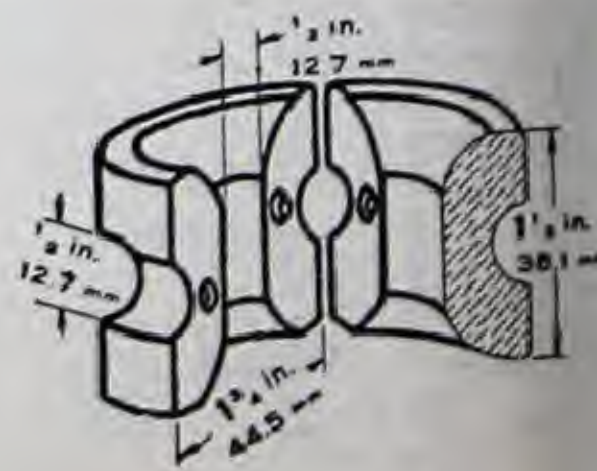


No. 36

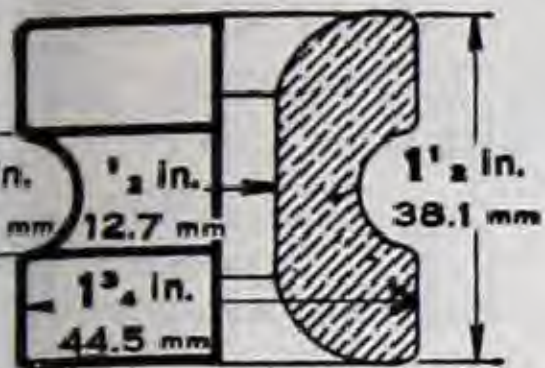
List No. 36
 No. in Bbl. 1500
 Ship. Wt. per Bbl. lbs. 415
 List Price. per 1000 \$82.95

No. 37 Split Knob

List No. 37 split
 No. in Bbl. 1500
 Ship. Wt. per Bbl. lbs. 370
 List Price. per 1000 \$109.70

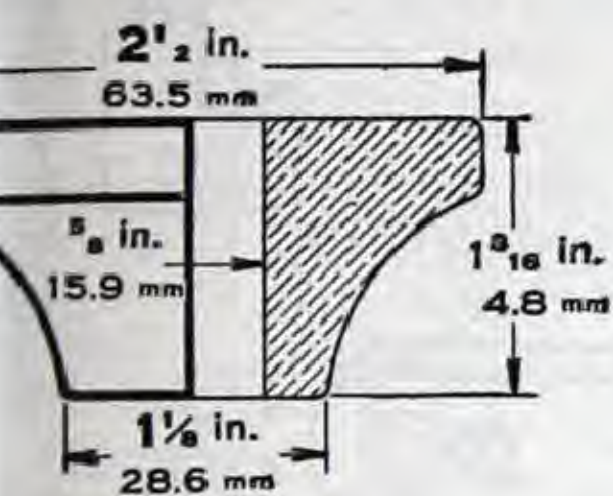


THOMAS PORCELAIN INSULATORS

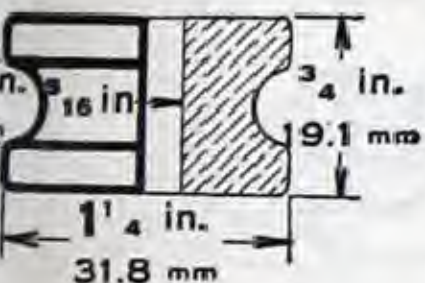


No. 37 SOLID KNOB
List No. 37 solid
No. in Bbl. 1750
Ship. Wgt. per Bbl. lbs. 370
List Price, per 1000. \$81.35

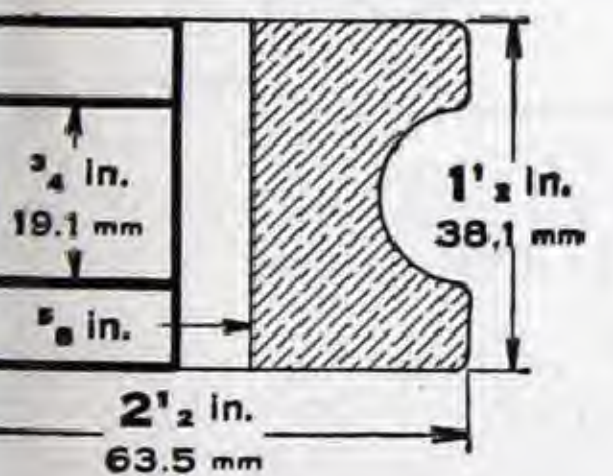
No. 39
No. 39
in Bbl. 700
Ship. Wgt. per Bbl. 95
List Price, per 1000. \$178.30



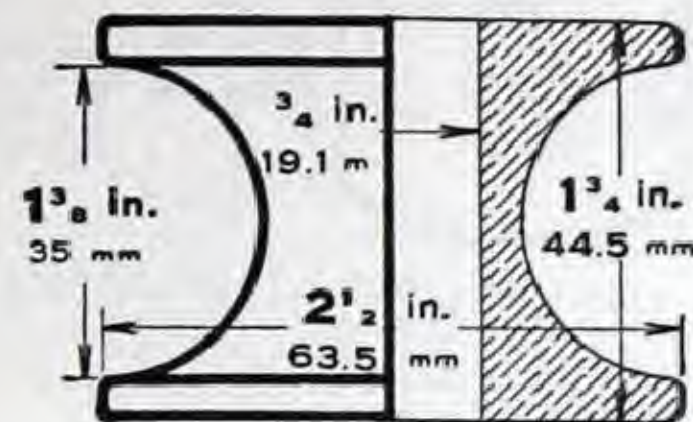
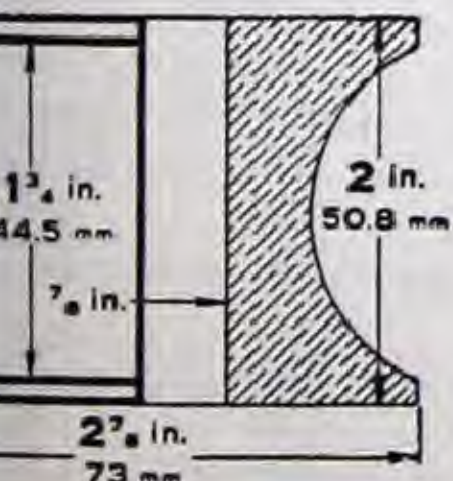
No. 41
No. 41
in Bbl. 1300
Ship. Wgt. per Bbl. 400
List Price, per 1000. \$84.30



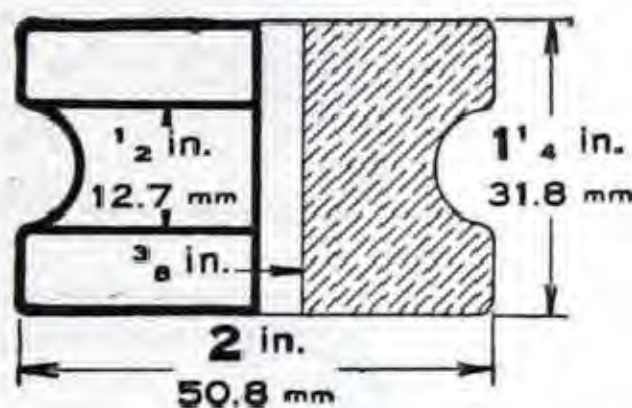
No. 46
No. 46
in Bbl. 4500
Ship. Wgt. per Bbl. lbs. 350
List Price, per 1000. \$39.05



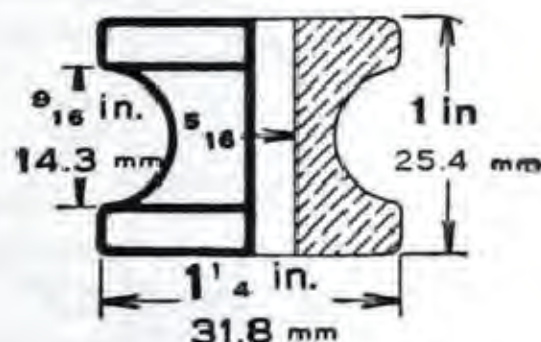
No. 49
No. 49
in Bbl. 700
Ship. Wgt. per Bbl. 425
List Price, per 1000. \$204.40



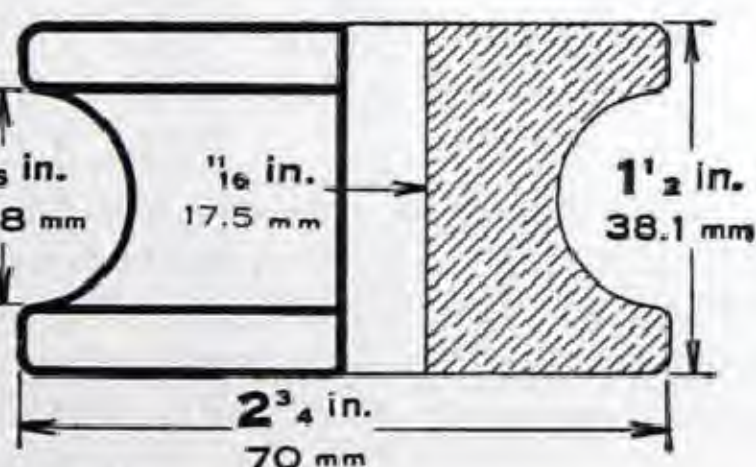
No. 40
List No. 40
No. in Bbl. 2000
Ship. Wgt. per Bbl. 400
List Price, per 1000. \$77.00



No. 45
List No. 45
No. in Bbl. 5000
Ship. Wgt. per Bbl. lbs. 300
List Price, per 1000. \$41.35

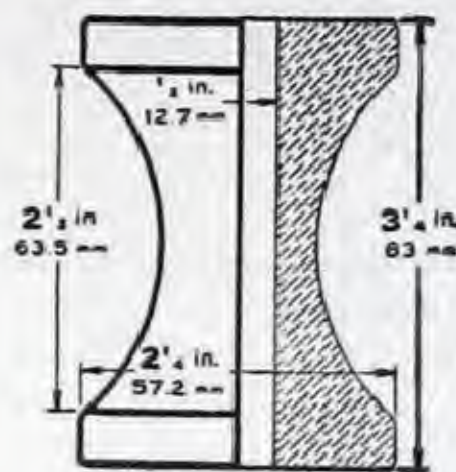


No. 48
List No. 48
No. in Bbl. 850
Ship. Wgt. per Bbl. 450
List Price, per 1000. \$168.70



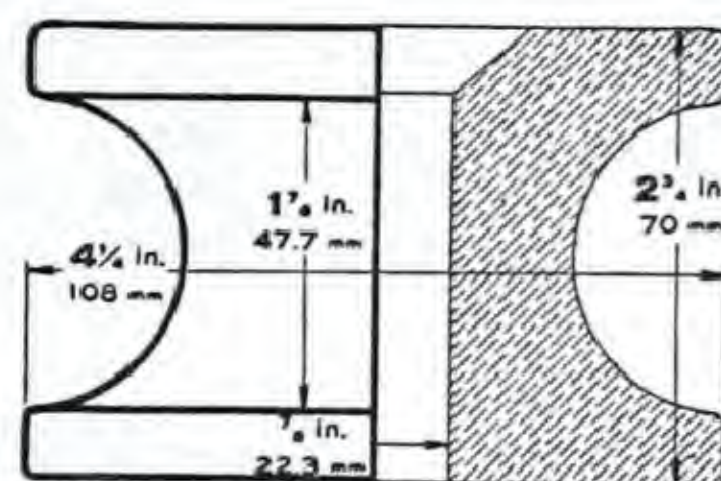
No. 50
List No. 50
No. in Bbl. 450
Ship. Wgt. per Bbl. 400
List Price, per 1000. \$355.70

THOMAS PORCELAIN INSULATORS

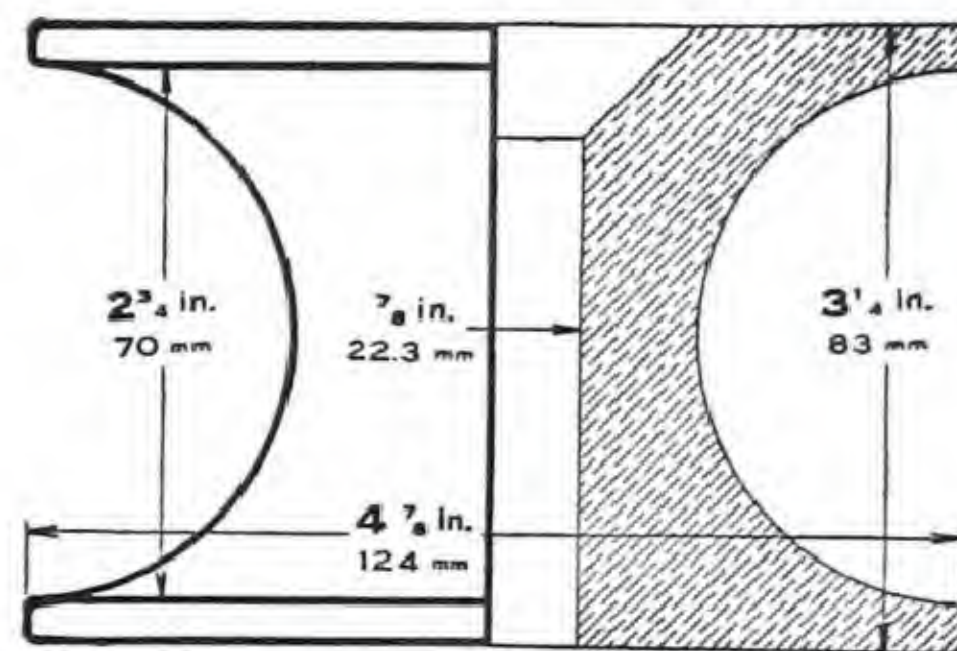


No. 51
List No. 51
No. in Bbl. 450
Ship. Wgt. per Bbl. lbs. 300
List Price, per 1000. \$230.80

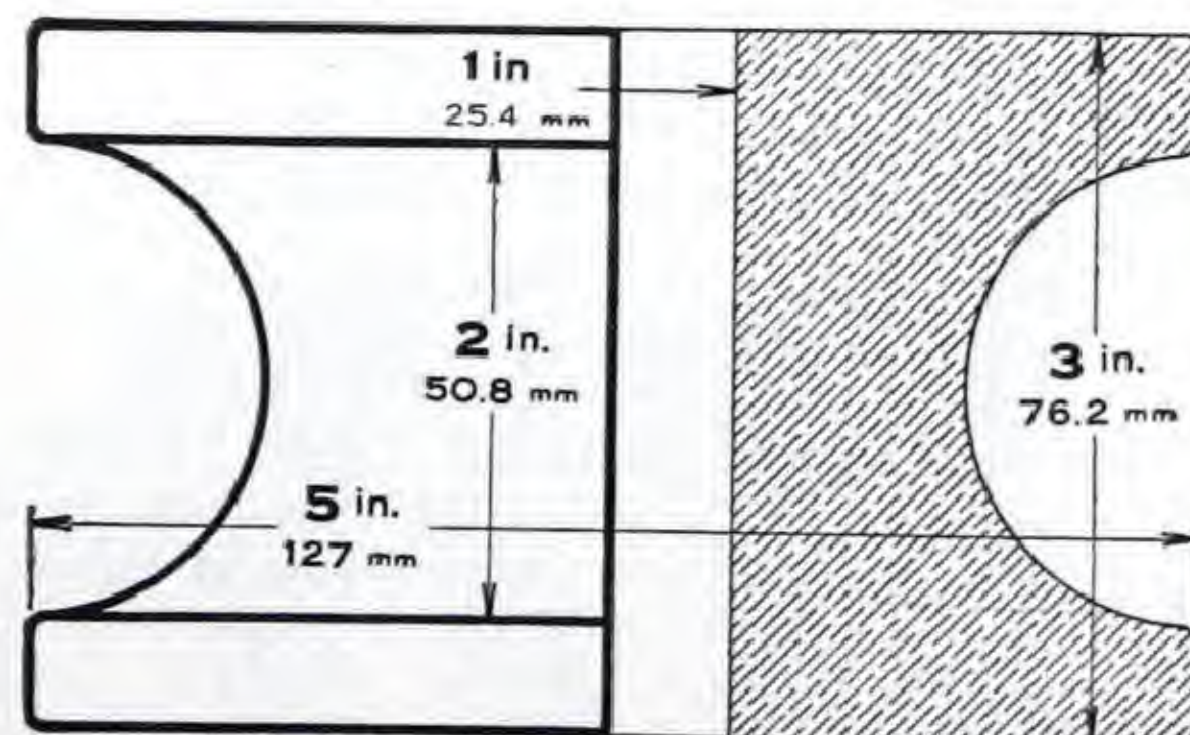
No. 52
List No. 52
No. in Bbl. 180
Ship. Wgt. per Bbl. lbs. 400
List Price, per 1000. \$756.45



No. 53
List No. 53
Number in Barrel 150
Shipping Weight per Barrel, pounds 280
List Price, per 1000. \$817.45

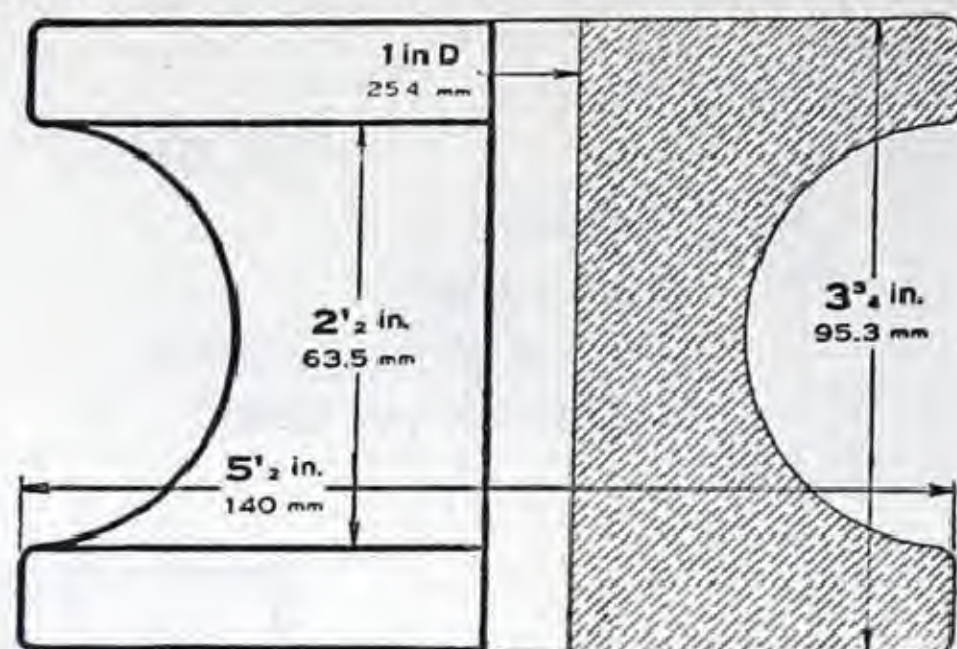


No. 54
List No. 54
Number in Barrel 90
Shipping Weight per Barrel, pounds 300
List Price, per 1000. \$1063.35



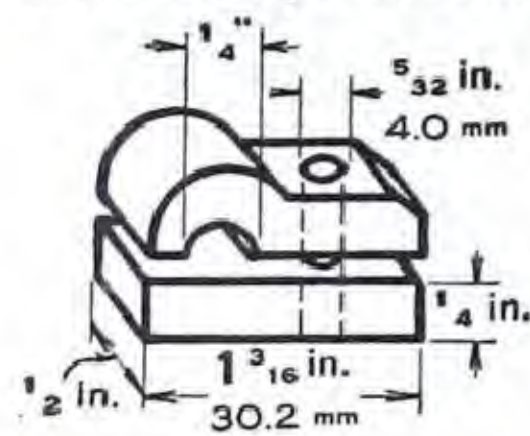
No. 55
List No. 55
Number in Barrel 80
Shipping Weight per Barrel, pounds 325
List Price, per 1000. \$1129.00

THOMAS PORCELAIN INSULATORS



No. 56

List No.	56
Number in Barrel	65
Shipping Weight per Barrel, pounds	325
List Price, per 1000	\$1611.60

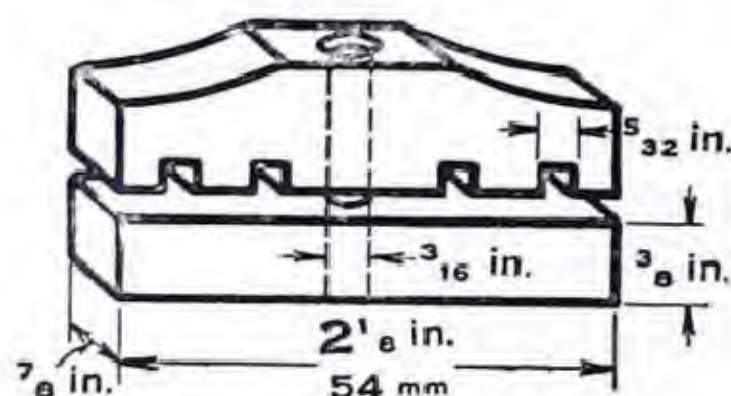
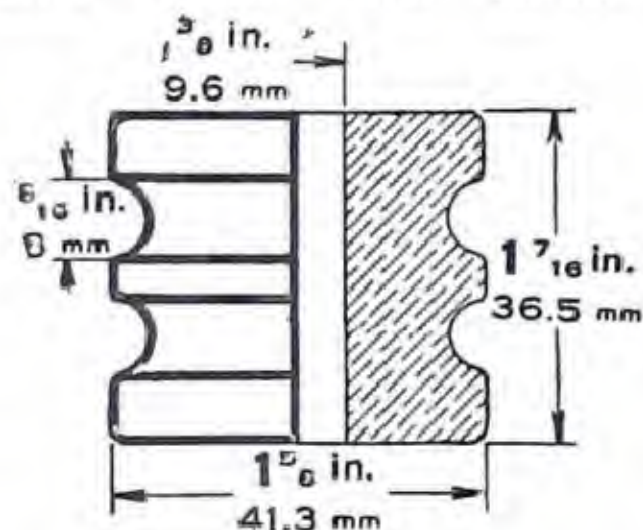
No. 333 Top
No. 333 1/2 Base

TELEPHONE CLEATS

List No.	No. in Bbl.	Wgt. per Bbl. Lbs.	List Price per 1000
333	21500	465	\$25.00
333 1/2	22000	475	25.00

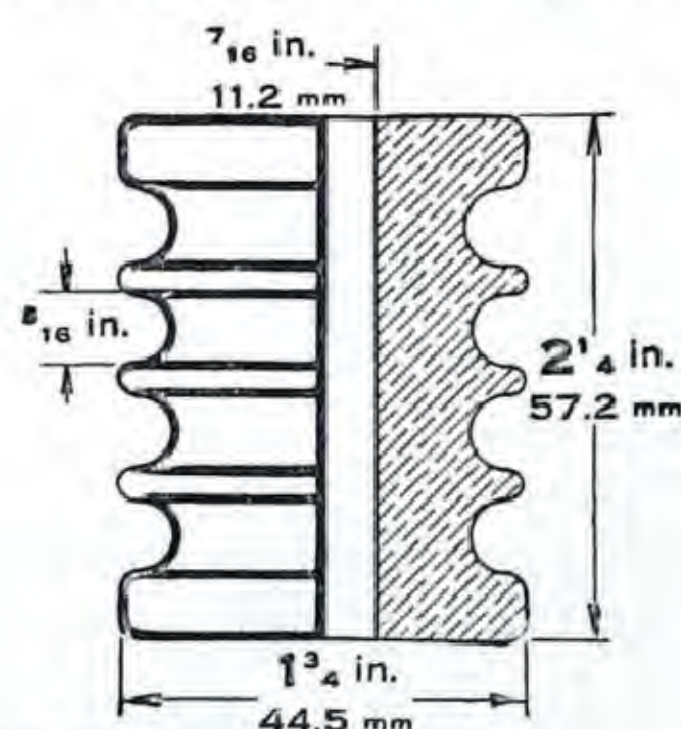
TELEPHONE CLEATS

List No.	No. in Bbl.	Ship. Wgt. per bbl. Lbs.	List Price per 1000
314	3000	350	\$54.00
315	3000	375	49.00

No. 314 Top
No. 315 Base

TELEPHONE KNOBS

List No.	6061
No. in Bbl.	2000
Ship. Wt. per Bbl. lbs.	455
List Price, per 1000	\$88.00



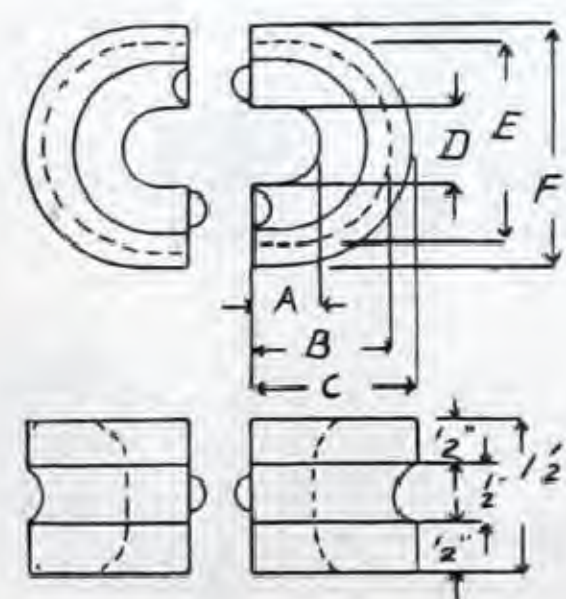
TELEPHONE KNOBS

List No.	6062
No. in Bbl.	1000
Ship. Wgt. per Bbl. lbs.	375
List Price per 1000	\$150.00

NAIL ASSEMBLED KNOBS

Consists of cap, base, 10d nail and nail head assembled. Has two grooves and will take wire sizes 12 to 14.

List No.	Dia. Inches	Height Inches	Std. Pkg.	Wt. per 1000 Lbs.	Price per 1000
5 1/2 Split	1 3/16	1 3/4	2600	160	\$70.00



THOMAS FOREST SERVICE INSULATORS

No. 6147 No. 6539 No. 6651

Dimensions in inches

A	9/32	1 1/2	5/8
B	3/4	7/8	1 1/4
C-1	1 1/8	1 1/2	
D	9/16	3/4	
E-1 1/2	1 3/4	1 3/4	
F-2	2 1/4	2 1/4	

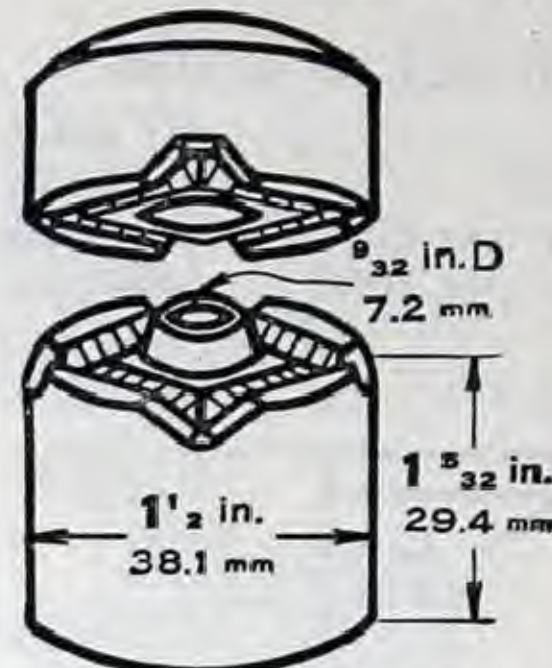
No. in barrel

1250	1000	750
Ship. Wt. per M. lbs.		
340	440	565

THOMAS PORCELAIN INSULATORS

SPLIT KNOBS

Has four grooves and will take wire sizes 8 to 10.



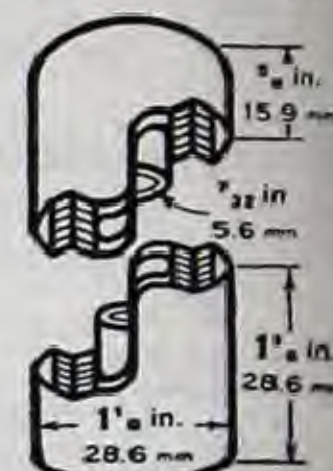
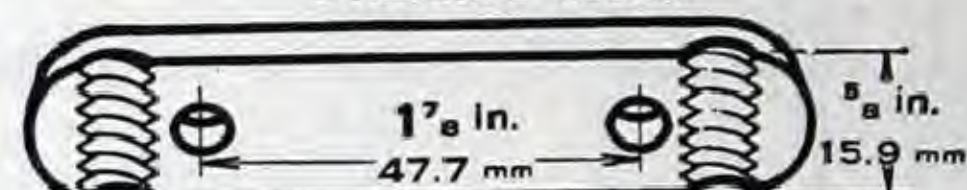
List No.	Dia. in.	No. in Bbl.	Wgt. per Bbl. Lbs.	List Price per 1000
9419	1 1/2	1500	415	\$53.20

Four grooves; will take wire sizes 4 to 6.

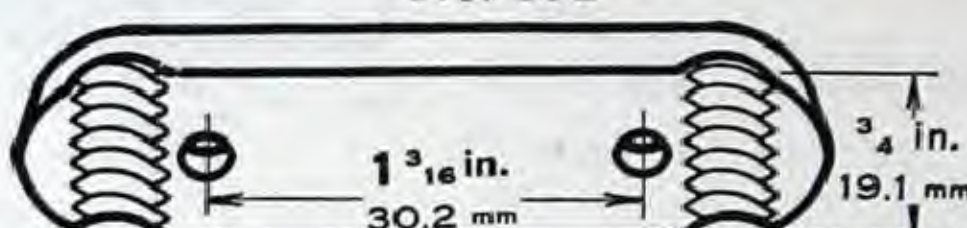
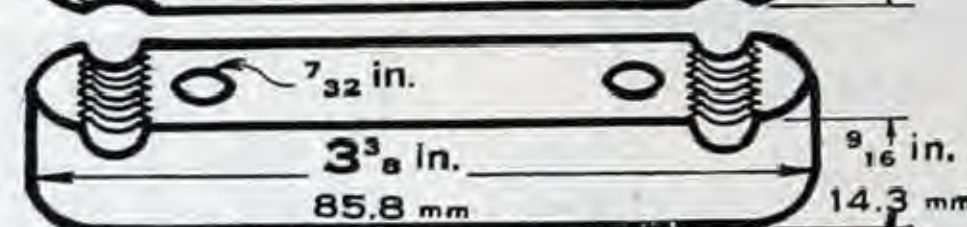
9420	1 15/16	875	430	\$82.20
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No. 101 SPLIT WIRING KNOBS

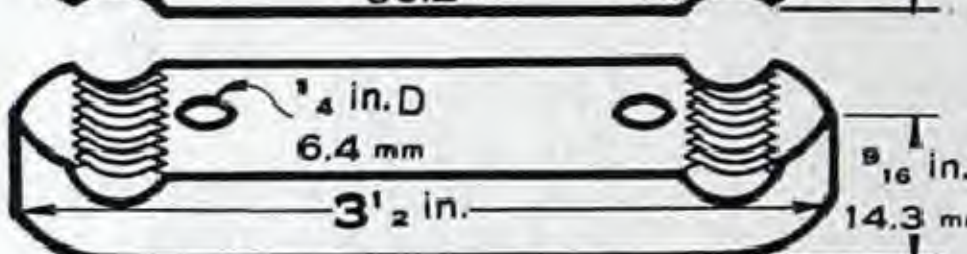
List No.	101
Wire Nos.	12 to 14
Number in Bbl.	3000
Ship. Wgt. per Bbl., lbs.	425
List Price, per 1000	\$36.75

TWO AND THREE-WIRE CLEATS
Standard Cleats

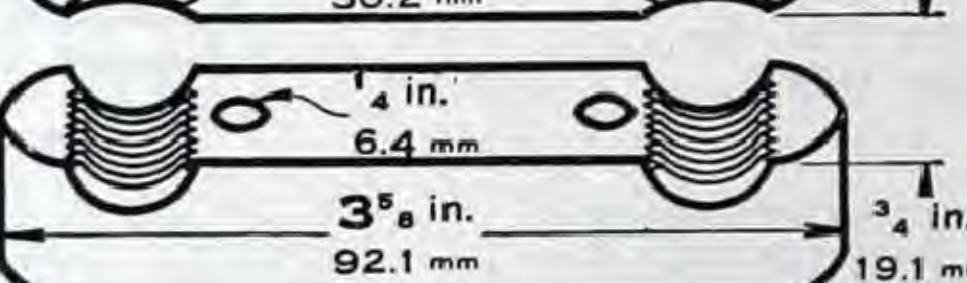
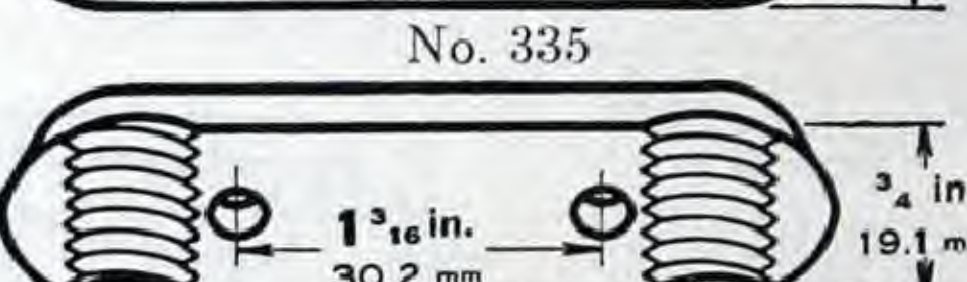
No. 334



No. 335



No. 350



Unless three-wire cleats are specified, orders will be filled with two-wire cleats as shown in illustrations.

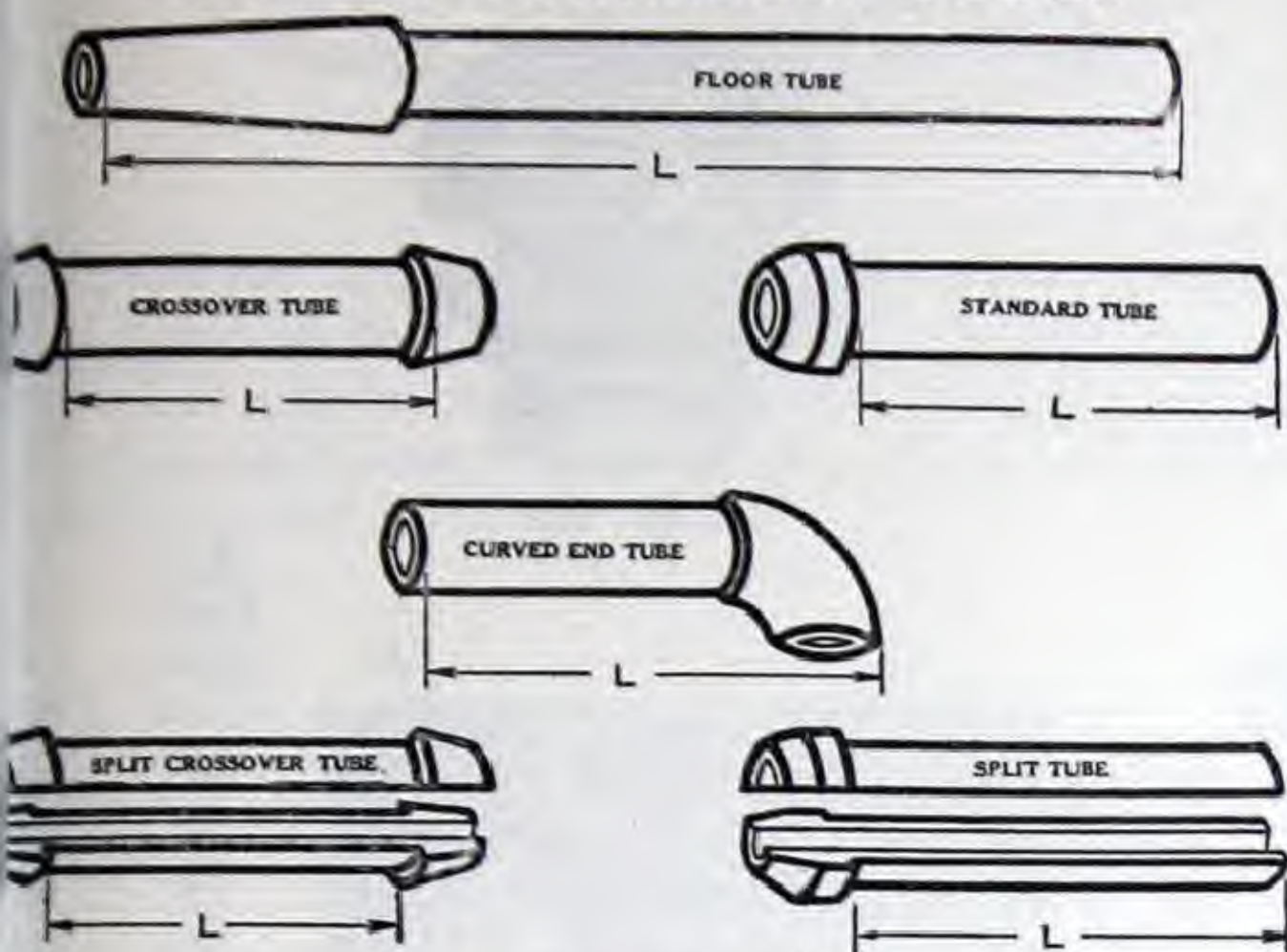
Wire Size	No. in Bbl.	Ship. Wgt. per Bbl. Lbs.	Glazed List Price per 1000	Un glazed List Price per 1000
12 to 14	1850	395	334-G \$90.00	334-UG \$52.00
8 to 10	1500	425	335-G 100.00	335-UG 60.00
2 to 6	1250	395	350-G 150.00	350-UG 88.00

MILL CLEATS

The following designs are exactly the same as those listed and illustrated above, excepting that cleats with a heavy on inch base are furnished. These are extremely valuable for construction in damp places or where cleats are attached to metal supports as in mills, foundries, etc.

List No.	Wire Size	No. in Bbl.	Shipping Weight per Bbl. Pounds	List Price per 1000
334 1/2-G	12 to 14	1400	400	\$135.00
335 1/2-G	8 to 10	1100	420	150.00
350 1/2-G	2 to 6	850	390	225.00
334 1/2-UG	12 to 14	1400	400	78.00
335 1/2-UG	8 to 10	1100	420	90.00
350 1/2-UG	2 to 6	850	390	120.00

THOMAS PORCELAIN TUBES



Tube size as referred to in list							
Diameters	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Outside (in.)	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{15}{16}$	$1\frac{1}{16}$	$1\frac{7}{16}$	$1\frac{13}{16}$
Outside (mm.)	14.3	17.5	20.6	23.8	30.2	36.5	46.1
Diameters	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Outside (in.)	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{15}{16}$	$1\frac{1}{16}$	$1\frac{7}{16}$	$1\frac{13}{16}$
Outside (mm.)	14.3	17.5	20.6	23.8	30.2	36.5	46.1
Diameters	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
Outside (in.)	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{15}{16}$	$1\frac{1}{16}$	$1\frac{7}{16}$	$1\frac{13}{16}$
Outside (mm.)	14.3	17.5	20.6	23.8	30.2	36.5	46.1

STANDARD UNGLAZED TUBES

Tube Size							
L	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1	$1\frac{1}{4}$
2	\$ 16	\$ 20	\$ 26				
2	17	21	27	\$ 40	\$ 60	\$100	
2	18	22	28	46	70	112	\$150
2	19	24	30	52	80	125	170
2	21	27	33	58	90	138	190
2	23	30	37	65	100	150	210
2	30	40	48	80	116	168	240
2	39	50	60	95	132	186	272
2	50	60	72	110	148	204	306
2	90	105	130	140	180	240	376
2	167	186	215	250	290	375	450
2	244	267	300	340	390	500	700
2	321	348	385	430	492	625	870
2	398	429	470	520	594	750	1040
2	475	510	555	610	696	875	1210
2	552	591	640	700	798	1000	1380
2	629	672	725	790	900	1125	1550
2	706	753	810	880	1000	1250	1720
L	$1\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3
2	\$210						
2	230	\$310	\$420				
2	255	340	460	\$590	\$740	\$920	\$1150
2	280	370	500	640	800	1000	1250
2	320	445	630	835	1090	1450	1750
2	360	520	760	1030	1380	1900	2250
2	405	600	900	1225	1670	2350	2750
2	490	750	1160	1615	2250	3250	3750
2	580	900	1430	2005	2830	4150	4750
2	1025	1600	1700	2400	3420	5050	5750
2	1235	1900	2800	4000	5600	5950	6800
2	1445	2200	3200	4520	6240	8200	10200
2	1660	2500	3600	5040	6880	8900	11150
2	1875	2800	4000	5560	7520	9600	12100
2	2090	3100	4400	6080	8160	10300	13050
2	2300	3400	4800	6600	8800	11000	14000

or solid floor tube prices multiply above list by 3.
 or split floor tube prices multiply above list by 6.
 or split standard tube prices multiply above list by 10.
 or solid cross-over tube prices multiply above list by 6.
 or split cross-over tube prices multiply above list by 12.
 or curved and curved end tube prices multiply above list by 3.
 or headless tube prices (above 8" long) multiply above list by 4.
 or headless tube prices (8" or under in length) use regular
 or glazed tube prices add 50% to net prices.

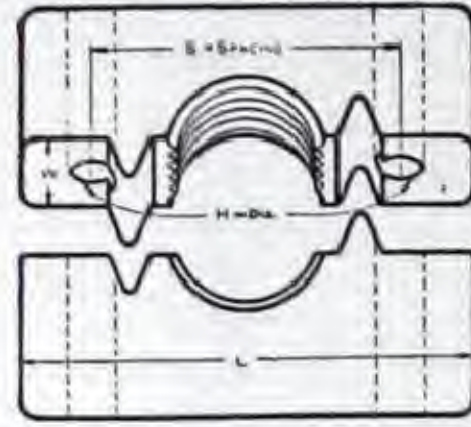
THOMAS PORCELAIN TUBES

Tubes—Continued

NUMBER OF STANDARD TUBES PACKED PER BARREL

Tube Size					
L	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	
$1\frac{1}{2}$	15000	12500	10000		
1	11000	7500	6000	4500	
$1\frac{1}{2}$	9000	6000	4200	3200	
2	6500	5000	3400	2500	
$2\frac{1}{2}$	5500	3750	2800	2000	
3	4500	3000	2000	1500	
4	3000	2200	1600	1200	
5	2500	1700	1250	1000	
6	2350	1600	1050	1000	
8	2000	1400	1000	850	
10	1850	1300	900	800	
12	1500	1000	750	650	
14	1100	850	600	500	
16	1000	650	500	450	
18	900	500	350	200	
20	750	500	300	200	
22	600	500	300	200	
24	600	450	300	200	
L	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{1}{2}$					
1	3700	2000			
$1\frac{1}{2}$	2500	1500	725	450	
2	1800	1100	625	400	280
$2\frac{1}{2}$	1500	900	525	350	250
3	1100	750	425	300	225
4	900	600	300	250	200
5	800	500	285	240	200
6	650	400	275	225	175
8	675	400	225	190	150
10	550	300	180	150	140
12	500	275	150	125	120
14	300	225	120	100	90
16	275	175	90	75	60
18	190	100	75	60	50
20	150	100	75	60	50
22	150	100	75	60	50
24	150	100	75	60	50
GROSS WEIGHT PER BARREL STANDARD TUBES					
L	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	
$1\frac{1}{2}$	360	370	370		
1	370	380	375	380	
$1\frac{1}{2}$	350	300	345	375	
2	310	355	315	355	
$2\frac{1}{2}$	310	310	315	325	
3	280	315	235	265	
4	240	265	245	350	
5	235	255	245	340	
6	285	285	250	240	
8	355	345	390	350	
10	350	355	360	355	
12	335	315	345	340	
14	310	395	320	335	
16	315	300	335	275	
18	320	305	300	285	
20	315	320	325	300	
22	325	330	320	300	
24	340	330	305	325	
L	$\frac{3}{4}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$
$1\frac{1}{2}$					
1	300	350			
$1\frac{1}{2}$	320	360	420	420	
2	310	345	350	350	400
$2\frac{1}{2}$	295	330	320	325	380
3	280	315	310	315	370
4	255	240	230	225	240
5	265	265	250	235	255
6	235	235	260	245	270
8	370	395	275	290	295
10	385	400	290	280	255
12	335	330	265	285	280
14	305	315	270	295	290
16	385	315	245	250	250
18	240	250	235	225	290
20	255	285	260	255	310
22	305	315	295	290	335
24	335	380	310	305	360

THOMAS PORCELAIN INSULATORS



B. & D. Single Wire Cleats

List No.	Dimensions in Inches				No. in Barrel	Gross Wgt. per Barrel	List Price per 1000
	L	S	W	H			
110	1 7/8	1 1/8	7/8	1/4	2000	430	\$ 74.00
111	2 1/4	1 3/8	1	5/16	1600	465	96.00
112	2 5/8	1 11/16	1 1/8	5/16	1250	455	101.00
113	3	1 15/16	1 1/4	3/8	700	440	140.00
114	3 3/8	2 1/4	1 3/8	3/8	500	430	180.00
115	1 7/8	1 1/8	7/8	1/4	1600	410	78.45
116	2 1/4	1 3/8	1	5/16	1250	455	99.25
117	2 5/8	1 11/16	1 1/8	5/16	1000	450	132.60
118	3	1 15/16	1 1/4	3/8	650	450	179.05
119	3 3/8	2 1/4	1 3/8	3/8	450	445	249.05
120	1 7/8	1 1/8	7/8	1/4	1400	435	86.00
121	2 1/4	1 3/8	1	5/16	1050	420	120.00
122	2 5/8	1 11/16	1 1/8	5/16	800	430	140.00
123	3	1 15/16	1 1/4	3/8	600	445	172.00
124	3 3/8	2 1/4	1 3/8	3/8	400	425	212.00
125	3 3/8	2 1/4	1 3/8	3/8	400	435	260.00
126	4 1/4	2 15/16	1 5/8	7/16	250	475	260.00
127	4 3/4	3 1/4	1 13/16	9/16	200	515	330.00
128	5 3/8	3 13/16	2	9/16	140	525	500.00
129	6	4 3/8	2 1/4	9/16	100	505	620.00

Size of Wire Received		Size of Wire Received	
List No.	B. & S. Gauge	List No.	B. & S. Gauge
110 No.	14 to No. 6	121 No.	6 to No. 2
111 No.	6 to No. 2	122 No.	2 to No. 0
112 No.	2 to No. 0	123 No.	0 to No. 000
113 No.	0 to No. 000	124 No.	000 to 200000 C.M.
114 No.	000 to 200000 C.M.	125 No.	10 Duplex Parallel Conduit Cable 5/8 by 7/8 inches.
115 No.	14 to No. 6		
116 No.	6 to No. 2		
117 No.	2 to No. 0		
118 No.	0 to No. 000	126	200000 to 500000 C.M.
119 No.	000 to 200000 C.M.	127	500000 to 1000000 C.M.
120 No.	14 to No. 6	128	800000 to 1250000 C.M.
		129	1000000 to 2000000 C.M.

Small Bushings

List No.	Dimensions in Inches			Number per Barrel	Gross Wgt. per Barrel	List Price per Barrel
	A	B	C			
400	1/4	1/2	9/16	15000	250	\$50.00
401	5/16	3/4	5/8	6000	200	57.00
402	3/8	11/16	1 1/8	5000	225	80.00
403	3/16	3/4	1	4000	275	70.00

PORCELAIN BUSHINGS



No. 10

List No.	Type	Std. Pkg.	Std. Wgt. Lbs.	List Price Per 10
10	3/8" Knockout, 3/8" wire hole...	1000	35	\$28.4
20	1/2-3/4" Knockout, 1/2" wire hole	1000	50	28.5
30	3/4" Knockout, 9/16" wire hole...	500	75	40.6
40	1" Knockout, 3/4" wire hole...	250	50	95.3
50	1 1/4-1 1/2" Knockout 1 1/8" wire hole.....	100	25	142.6
60	2" Knockout, 1 5/8" wire hole...	50	40	286.8

PORCELAIN CONDUIT FITTING COVERS



List No.	Size Inches	Type	Std. Pkg.	List Price Each
110.....	1/2	1 Hole	200	\$0.1
120.....	1/2	2 "	200	.1
130.....	1/2	3 "	200	.1
140.....	1/2	4 "	200	.1
210.....	3/4	1 "	100	.1
220.....	3/4	2 "	100	.1
230.....	3/4	3 "	100	.1
240.....	3/4	4 "	100	.1
260.....	3/4	6 "	100	.1
310.....	1	1 "	50	.2
320.....	1	2 "	50	.2
330.....	1	3 "	50	.2
340.....	1	4 "	50	.2
360.....	1	6 "	50	.2
420.....	1 1/4	2 "	20	.3
430.....	1 1/4	3 "	20	.3
440.....	1 1/4	4 "	20	.3
460.....	1 1/4	6 "	20	.3
520.....	1 1/2	2 "	10	.4
530.....	1 1/2	3 "	10	.4
540.....	1 1/2	4 "	10	.4
560.....	1 1/2	6 "	10	.4
620.....	2	2 "	5	.6
630.....	2	3 "	5	.6
640.....	2	4 "	5	.6
660.....	2	6 "	5	.6
720.....	2 1/2 and 3	2 "	5	.8
730.....	2 1/2 and 3	3 "	5	.8
740.....	2 1/2 and 3	4 "	5	.8
760.....	2 1/2 and 3	6 "	5	.8
820.....	3 1/2 and 4	2 "	5	.9
830.....	3 1/2 and 4	3 "	5	.9
840.....	3 1/2 and 4	4 "	5	.9

SLATER GROUND CLAMPS
Wedge Type for Water Pipes
Hot Galvanized

The Slater ground Clamp for water pipes consists of a steel band formed to span the water pipe — a wedgehead bolt and a wedge washer to draw the band firmly into position and to grip the ground wire or wires into positive contact with the pipe.



The drawing-in action of the wedgehead bolt and wedge washer tightens the ground wire firmly in place.

This clamp is a distinct improvement in grounding house services and electrical appliances. The well-known older method of using a perforated copper band to which the ground wires are fastened has shown that in time the oxidization of the band has increased the resistance of the ground circuit to the danger point.

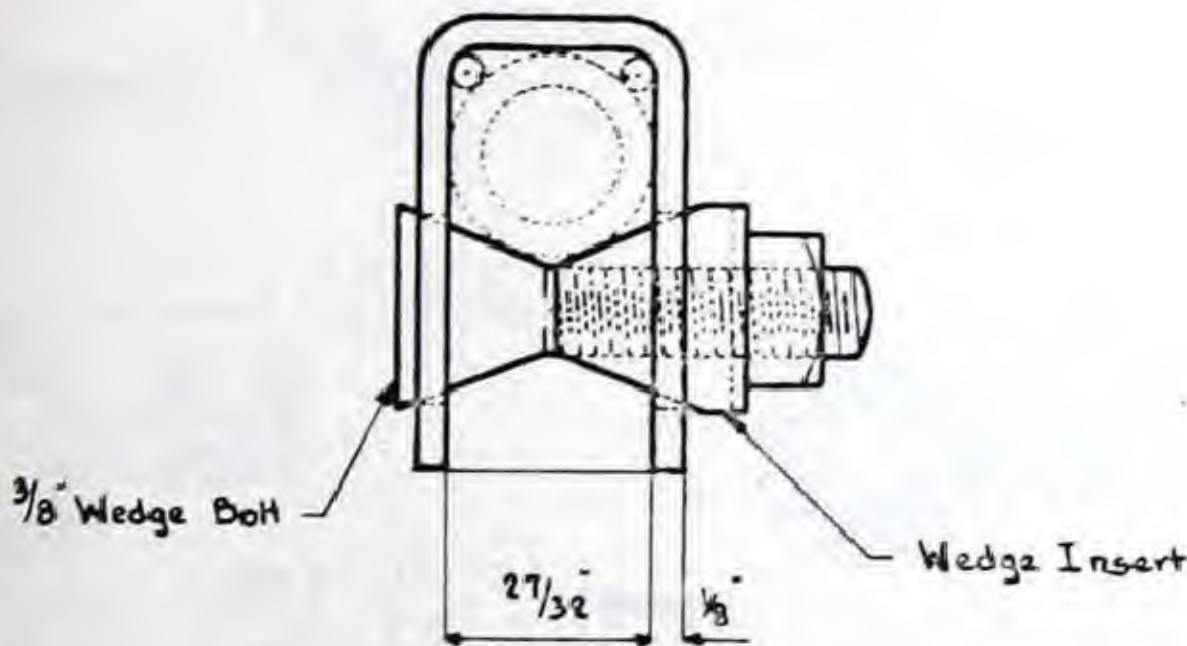


Diagram showing the wedging action of the bolt and wedge washer. The bearing points of bolthead and washer are exactly opposite to the ground wire positions.

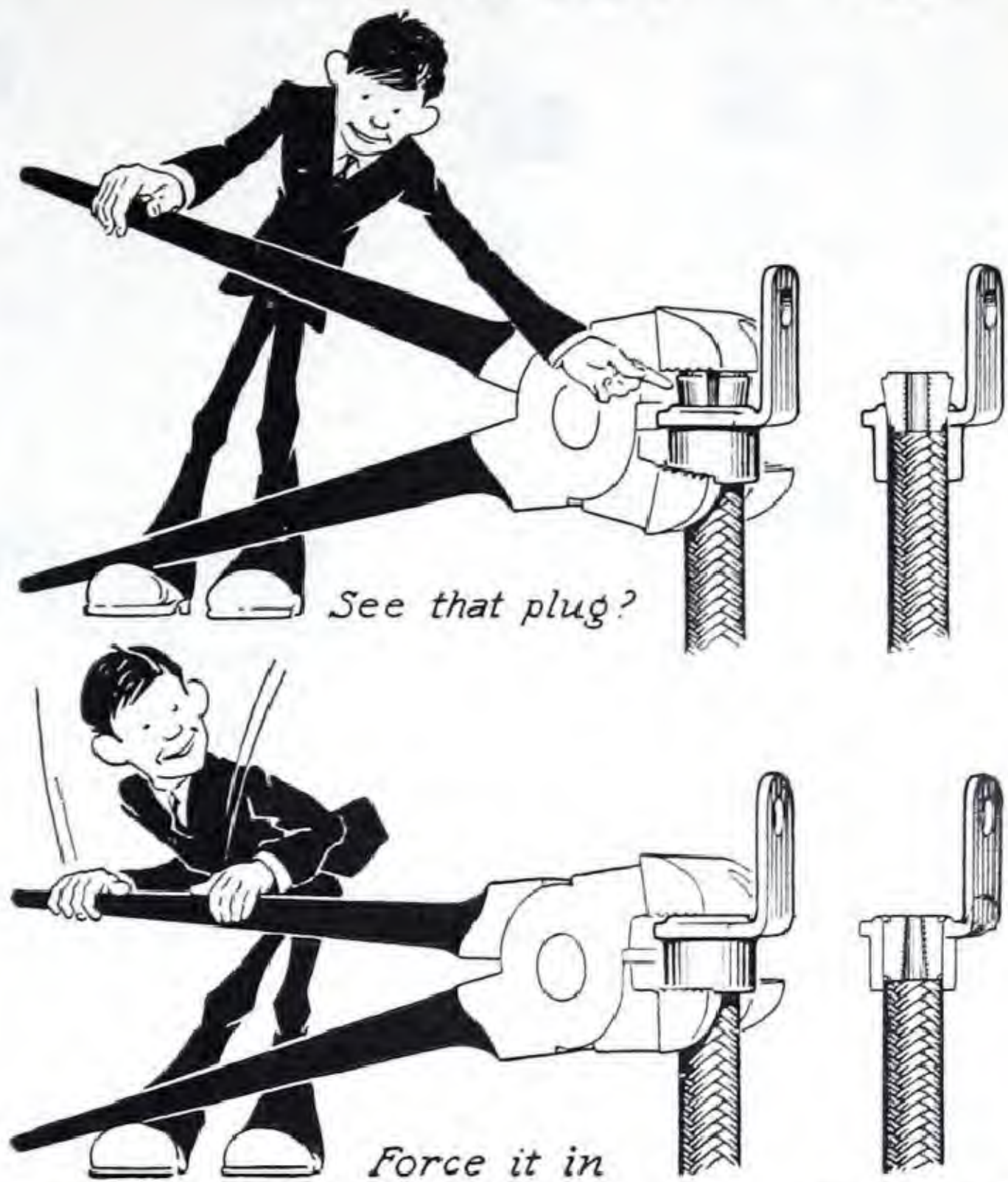
The Slater Wedge Type Ground Clamp will admit of grounding one or two circuits at the one point. If the original ground is a single circuit, it is only necessary to loosen the clamp, insert the extra ground wire and tighten the clamp again. No soldering in inconvenient or dangerous positions. A wrench is the only tool required.

The Slater Ground Clamp has been passed by the H.E.P.C. Approvals Laboratories, Number LA 3944.

List No.	Description	Wt. lbs. Per 100
18L100	Ground Clamp for 1/2" water pipe	.....
Price on application		

T. & B. WEDGE-ON CONDUCTOR
TERMINALS

Approved by Underwriter's Laboratories



List No.	Wire Size	Unit Quan.	Std. Pkg.	Wgt. per M in lbs.	List Price per 100
18L100	Nos. 22 to 18 Sol. and Str.....	25	100	4 1/2	\$5.00
16L100	No. 16 Sol. and Str.....	25	100	6 1/2	5.00
14L100	No. 14 Sol. and Str.....	25	100	8	5.00
12L100	No. 12 Sol. and Str.....	25	100	10	6.00
10L100	No. 10 Sol. and Str.....	25	100	11	7.00
8L100	No. 8 Sol. and Str.....	25	100	21	8.00
6L100	No. 6 Stranded.....	25	100	28	9.00
6SL100	No. 6 Solid.....	25	100	28	9.00
4L100	No. 4 Stranded.....	25	100	32	10.00
4SL100	No. 4 Solid.....	25	100	32	10.00

TOOLS

Especially Designed For Use With T & B Wedge-On Conductor Terminals

List No.	For Terminal Sizes	Unit Quan.	Std. Pkg.	Wgt. Each in lbs.	List Price Each
21000	No. 8 to 16, incl.....	1	10	1 1/2	\$3.50
21001	No. 8, 6, and 4.....	1	10	1 1/2	3.50
21002	No. 16 and 14 only..	1	10	3/4	2.50
21003	No. 22 to 18 only....	1	10	3/4	2.50

Terminals of special sizes and shapes can be furnished. No. 9L100 is of same dimensions as No. 10L100, but takes 19 strands of No. 22 Control Wire.

Above terminals also accommodate shipboard and control wires as follows: No. 18L100 takes 1 str. .025" 642 CM & 7 str. .0126" (.038") 1120 CM; No. 16L100 takes 7 str. .020" (.061") I.C. Wire & 19 str. .0126" (.065") 3,000 CM; No. 14L100 takes 7 str. .025" (.076") 4,000 CM & 7 str. .020" (.061") I.C. wire & 19 str. .0126" (.065") 3,000 CM; No. 12L100 takes 7 str. .025" (.076") 4,000 CM & 19 str. of No. 25 Control Wire; No. 10L100 takes 7 str. .036" (.108") 9,000 CM; No. 8L100 takes 7 str. .045" (.136") 14,000 CM; No. 6L100 takes 7 str. .057" (.171") 23,000 CM; No. 4SL100 takes 19 str. .040" (.202") 30,000 CM; No. 4L100 takes 19 str. .045" (.226") 40,000 CM.

T. & B. TITE-BIND SOLDERLESS CONNECTORS

A complete line of Mechanical Lugs and Connectors for Wires, Cables and Tubing

Approved by the Underwriters Laboratories

T. & B. Tite-Bind Solderless Lugs and Connectors are designed to give the best electrical contact and mechanical connection, utilizing a principle unique in this field. They are manufactured from high copper content alloy which insures great mechanical strength and electrical conductivity.

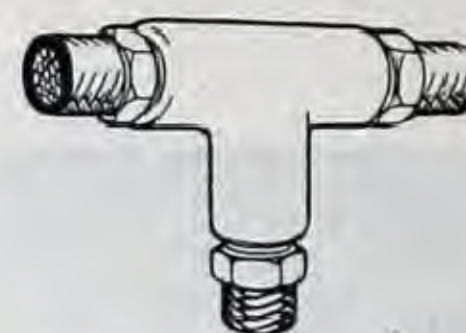
Nine popular types of Tite-Bind Solderless Connectors illustrated below.



Lug



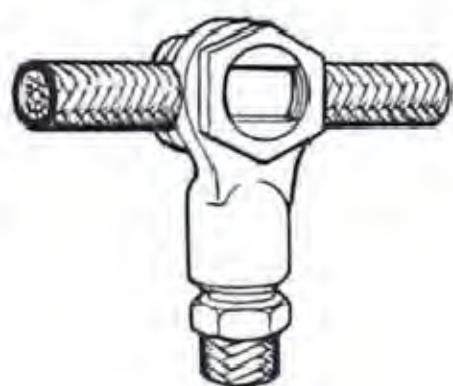
2-Way Connector

90°
Angle
Connector

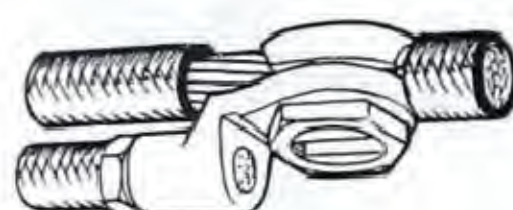
3-Way Connector



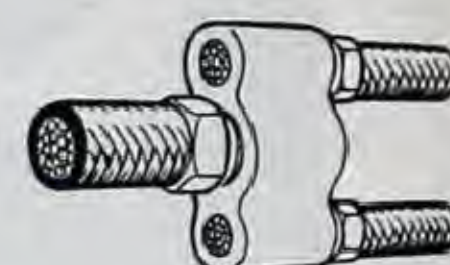
3-Way Connector



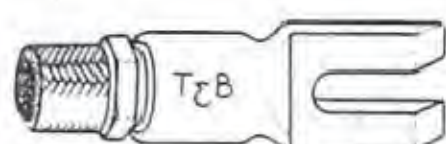
Cable Tap



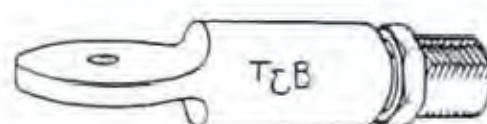
Parallel Tap

2-Way Connecting
Block3-Way Connecting
Block

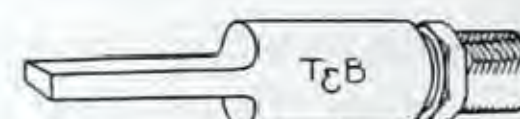
We are prepared to furnish Tite-Bind Solderless Connectors of any special design for all types of conductors, flexible and extra flexible cables, bars, tubing, etc. Some of the additional designs we are ready to supply are illustrated below.



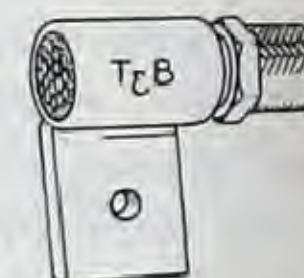
Service Box Lug



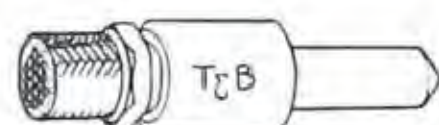
Back Connected Lug



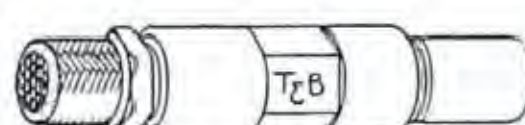
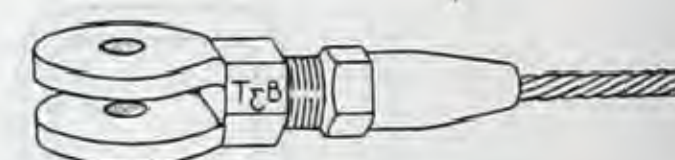
Back Connected Lug



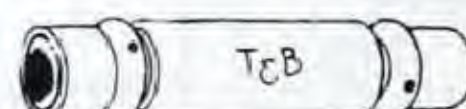
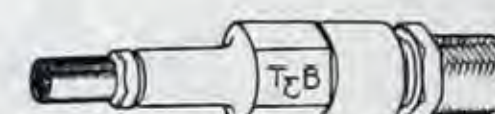
90° Left Angle Lug



Service Box Plug

Stud Connector
FemaleStud Connector
Male

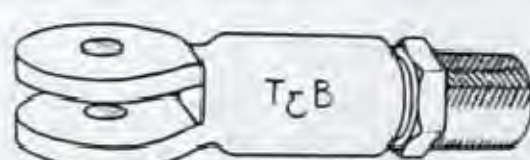
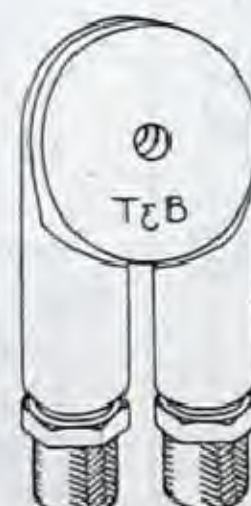
Messenger Wire Connector

3-Way Flexible
Cable Tap2-Way Lead Cable
Connector

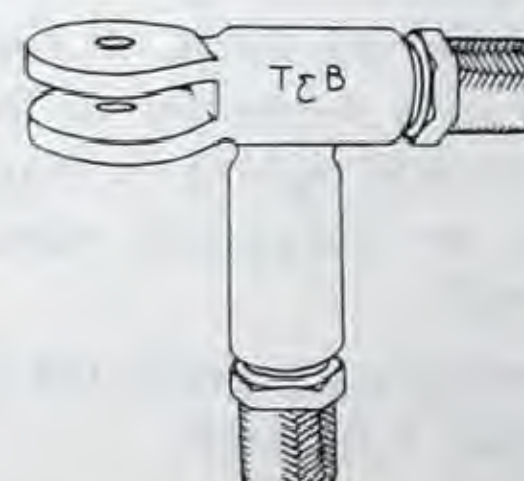
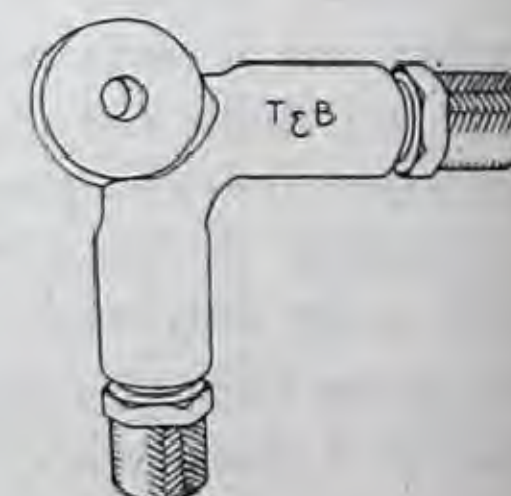
2-Way Reducer



Angle Lug

Cable Anchor
Style S

Swivel Lugs

Cable Anchor
Style RCable Anchor
Style E

Prices on application.

SHERMAN TERMINALS

Sheet Metal Terminals

Copper (except as noted)
May Be Used With or Without Soldering

WITH BRIDGE



No. 0



No. 1



No. 1A



No. 13



No. 13A



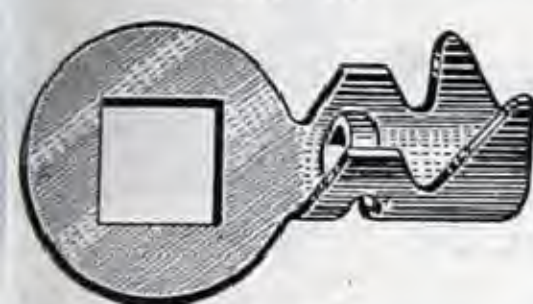
No. 14



No. 15



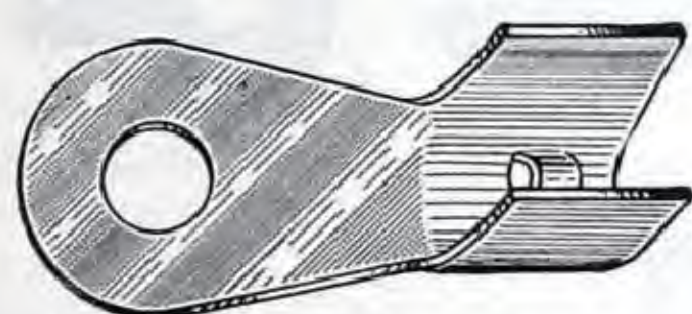
No. 17



No. 83



No. 78



No. 55 (Brass)

WITHOUT BRIDGE



No. 2



No. 3



No. 4



No. 5



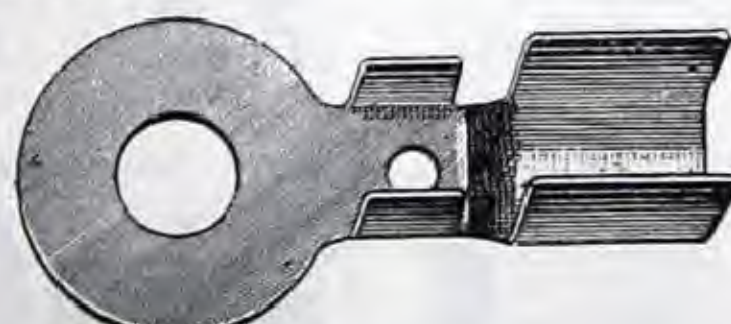
No. 6



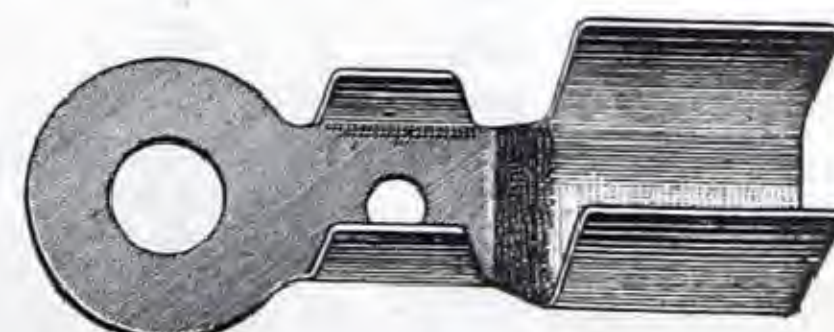
No. 11



No. 7



No. 8



No. 9

Part No.	Thickness	Diam. Stud Hole	Weight per 1000	Carton Quantity
0	.022	$\frac{3}{16}$	2½	1000
1	.025	$\frac{3}{16}$	3	1000
*1	.030	$\frac{13}{64}$	3¾	1000
1A	.030	$\frac{3}{16}$	4¾	1000
2	.030	$\frac{1}{4}$	3½	1000
*3	.022	$\frac{3}{16}$	2¾	1000
3	.030	$\frac{3}{16}$	3¾	1000
3	.040	$\frac{3}{16}$	4¾	500
4	.022	$\frac{13}{64}$	2¼	1000
*4	.030	$\frac{13}{64}$	3	1000
4	.040	$\frac{13}{64}$	4	1000
*5	.022	$\frac{3}{16}$	3½	1000
5	.030	$\frac{13}{64}$	4¾	1000
5	.040	$\frac{3}{16}$	6	500
*6	.030	$\frac{7}{32}$	4½	500
6	.040	$\frac{7}{32}$	5½	500
*7	.022	$\frac{1}{4}$	5¾	500
7	.030	$\frac{1}{4}$	7¾	500
7	.040	$\frac{1}{4}$	10¼	500
*8	.022	$\frac{1}{4}$	6¼	500
8	.030	$\frac{1}{4}$	9	500
8	.040	$\frac{1}{4}$	12	500
9	.022	$\frac{1}{4}$	11¾	250
*10	.030	$\frac{9}{32}$	4½	500
10	.040	$\frac{9}{32}$	5½	500
11	.030	$\frac{13}{64}$	3¾	500
12	.030	$\frac{13}{64}$	3½	1000
13	.025	$\frac{13}{64}$	3	1000
13A	.025	$\frac{3}{16}$	3¼	1000
14	.025	$\frac{9}{32}$	3¼	1000
15	.025	$\frac{13}{32}$	4½	500
16	.030	$\frac{7}{32}$	5¼	500
17	.030	$\frac{7}{32}$	5¼	500
18	.030	$\frac{3}{16}$	3½	1000
55	.025	$\frac{1}{4}$	6	500
70	.022	$\frac{13}{64}$	2½	1000
*70	.030	$\frac{13}{64}$	3	1000
70	.040	$\frac{13}{64}$	3½	500
*71	.030	$\frac{13}{32}$	5½	500
71	.040	$\frac{13}{32}$	7	1000
72	.025	$\frac{3}{16}$	4¾	1000
73	.030	$\frac{11}{64}$	3	500
74	.040	$\frac{13}{64}$	6½	500
75	.030	$\frac{11}{64}$	6	500
76	.030	$\frac{1}{4}$	5	500
77	.030	$\frac{3}{16}$	5¼	500
78	.030	$\frac{3}{16}$	5¼	1000
79	.030	$\frac{3}{16}$	2½	250
80	.094	$\frac{13}{32}$	34¼	250
81	.094	$\frac{13}{32}$	34¼	250
83	.025	$\frac{1}{4}$ sq.	3¼	1000
84	.100	$\frac{7}{16}$	75	250
85	.075	$\frac{7}{16}$	68	200

Unless otherwise specified, terminals will be furnished in the weights marked ().

Prices on application.

SHERMAN TERMINALS

Sheet Metal Terminals

Copper (except as noted)

WITHOUT BRIDGE



No. 10



No. 12



No. 18 (Brass)



No. 16



No. 70



No. 71



No. 73



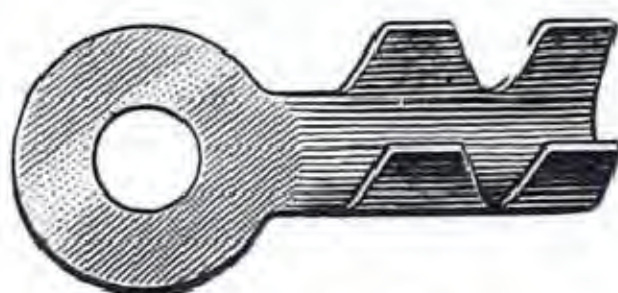
No. 74



No. 75 (Brass)



No. 72



No. 76



No. 77



No. 79 (Brass)

Part No.	Thickness	Diam. Stud Hole	Weight per 1000	Carton Quantity
*19	.016	$\frac{5}{32}$	1	1000
19	.030	$\frac{5}{32}$	1½	1000
20	.016	$\frac{5}{32}$	1	1000
21	.022	$\frac{5}{32}$	1	1000
22	.016	$\frac{13}{64}$	1¼	500
23	.016	$\frac{3}{16}$	1¼	500
*24	.030	$\frac{3}{16}$	1⅞	1000
24	.040	$\frac{3}{16}$	2⅜	1000
25	.022	$\frac{3}{16}$	2	1000
26	.030	$\frac{7}{32}$	2½	1000
*27	.022	$\frac{3}{16}$	2½	1000
27	.040	$\frac{3}{16}$	4¼	1000
29	.022	$\frac{13}{32}$	3½	500
*29	.040	$\frac{13}{32}$	6⅜	500

Unless otherwise specified, terminals will be furnished in the weights marked ().

SINGLE EAR TYPE
Copper (except as noted)

No. 19



No. 20



No. 21



No. 22



No. 23



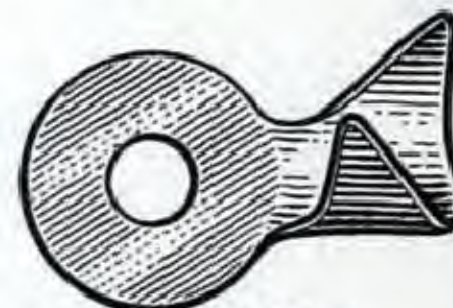
No. 24



No. 25



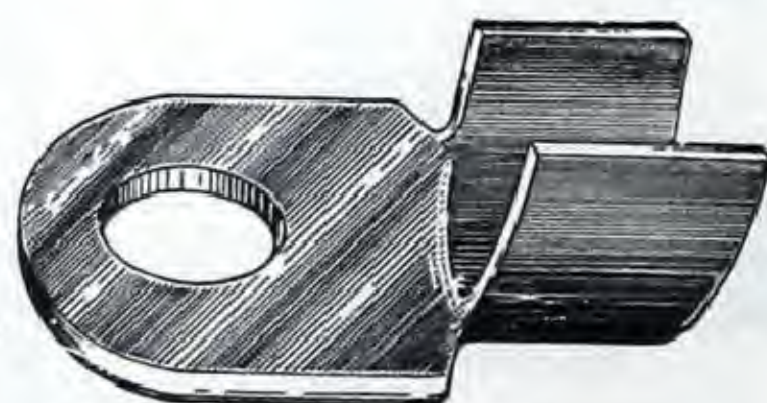
No. 26

Half Size
No. 85

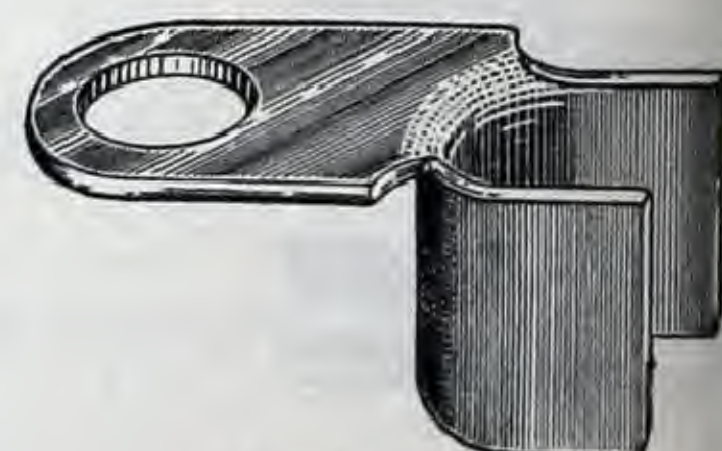
No. 27



No. 29



No. 80 (Brass)



No. 81 (Brass)

FLAT TYPE

Part No.	Thickness	Diam. Stud Hole	Weight per 1000	Carton Quantity
31	.022	$\frac{13}{32}$	3	1000
32	.022	$\frac{17}{64}$	1½	2000
33	.022	$\frac{11}{32}$	1¾	1000
34	.016	$\frac{5}{32}$	½	2000
35	.016	$\frac{3}{16}$	½	2000
36	.016	$\frac{5}{32}$	½	2000
38	.016	$\frac{3}{16}$	½	2000

Prices on application.

No. 34
(Tinned)No. 35
(Tinned)No. 36
(Tinned)No. 38
(Tinned)

No. 32



No. 33











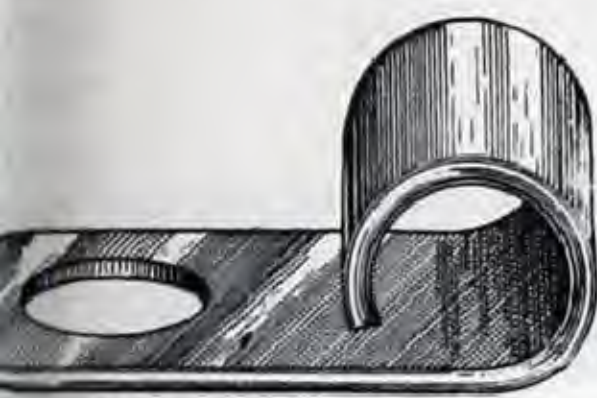
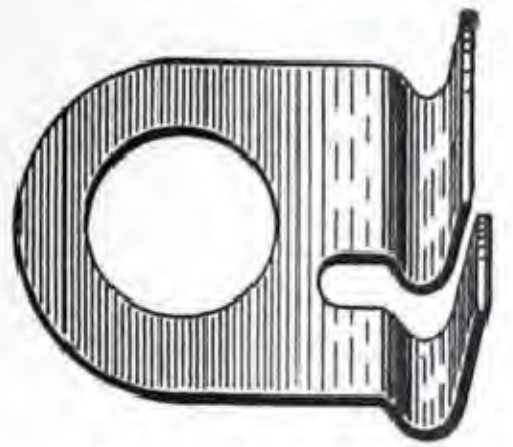


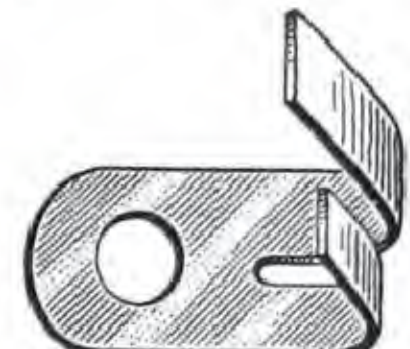


No. 31

SHERMAN TERMINALS

Sheet Metal Terminals

Copper (except as noted)

ROLL TYPE

				Part No.	Thick-ness	Diam. Stud Hole	Weight per 1000	Carton Quantity
				40	.075	$\frac{13}{32}$	40	250
No. 41	No. 42	No. 43 (Brass)	No. 44	41	.030	$\frac{13}{64}$	3	1000
				42	.045	$\frac{13}{64}$	9½	500
				43	.030	$\frac{13}{64}$	1¾	1000
				44	.050	$\frac{7}{32}$	8¼	500
				45	.025	$\frac{9}{64}$	1½	500
No. 45	No. 47 (Brass)	No. 47a (Brass)	No. 49 (Brass)	46	.030	$\frac{25}{64}$	7½	500
				47	.025	$\frac{13}{64}$	2½	1000
				47-A	.025	$\frac{13}{64}$	2½	1000
				48	.050	$\frac{13}{64}$	8	500
				49	.030	$\frac{13}{64}$	2¾	1000
No. 40			No. 46 (Brass)	62	.030	$\frac{13}{64}$	2	1000
				63	.025	$\frac{13}{64}$	3	1000
				64	.022		1½	1000
				65	.040		3	1000
								
No. 48 (Brass)	No. 62 (Brass)	No. 63 (Brass)	No. 64 (Brass)					
								
			No. 65 (Brass)					

Sherman Plain Battery Connectors

FLEXIBLE WIRE








(Cut Half Size)

Terminals: Copper and corrugated, making nut hold tight.
Wire: Soft, cotton covered, flexible, No. 16/30 wire, 3¾
Inches center to center of stud holes.

Part No.	Weight per 1000	Carton Quantity
Bat. Ctr.	7	100

Brass Ring Terminals

The best type for use where a little neater job than ordinary is required.

		Part No.	Sleeve I. D.	Diam. Stud Hole	Weight per 1000	Carton Quantity
		50	$\frac{3}{16}$	$\frac{13}{64}$	3½	500
No. 50	No. 54	51	$\frac{1}{4}$	$\frac{13}{64}$	5	500
		52	$\frac{1}{4}$	$\frac{9}{32}$	6	500
No. 51		53	$\frac{1}{4}$	$\frac{13}{32}$	6	500
		54	$\frac{1}{4}$	$\frac{23}{32}$	8	500
No. 52-53	No. 56	*56	$\frac{9}{32} \times \frac{9}{16}$	$\frac{13}{64}$	7½	500

*Same as No. 51, but takes two wires, each smaller than ¾ inches.

Examples. Cuts being actual size, proper selection can easily be made without samples. If uncertain, advise us of the seemingly best suited and get free samples. Special Stud Holes. For special stud hole, add \$1.25 per net. Minimum charge each item repunched, hole larger than regular, \$5.00. Minimum charge each item punched, hole smaller than regular, \$10.00.

Envelope Packing. Terminals may be packed 100 in envelope at extra charge of 25c per 1000.

Tinned, Cadmium Plated or Nickel Terminals (unless so furnished regularly) add 20%. Minimum additional charge, \$3.00 net.










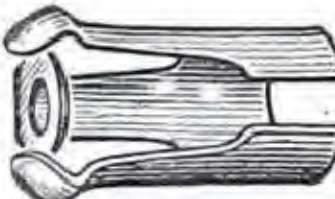


Prices on application.

SHERMAN TERMINALS

In selecting this line, we have endeavored to include terminals exactly suited for every purpose and at the lowest cost consistent with electrical efficiency. New styles are being constantly added as demand requires. When customers

are uncertain what should be used, we are glad to advise, and our Engineering Department is thoroughly competent to give expert opinion. All cuts are actual size except where otherwise specified.

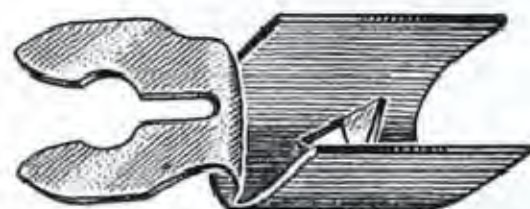
High Tension and Solderless Spark Plug Terminals (Brass)

			Part No.	Diam. Cable Mm.	Weight per 1000	Carton Quantity
			P-100	7	1½	1000
P-100	P-101	P-102	P-101	7	1	1000
			P-102	7	1½	1000
			P-103	7	1	1000
P-103	P-105	P-106 (Copper)	P-105	7	1	1000
			P-106		1	1000
			P-107	7	1½	1000
P-107	P-108	P-109 (Nickel Plated)	P-108	9	1½	1000
			P-109	7	1½	1000
			P-110	7	1½	1000
P-110	P-111	P-116 (Nickel Plated)	P-111		1	1000
			P-116	9	7½	500
			P-117	7	6¼	500
			*P-118 (.030)	7	5	1000
			P-118 (.040)	7	7	1000
			P-119	7	8	500
			P-120	7	6	500
			P-121	7	4½	500
			P-122	7	11	500
			P-126	7	5	500
			P-127	7	6	500

*Standard.



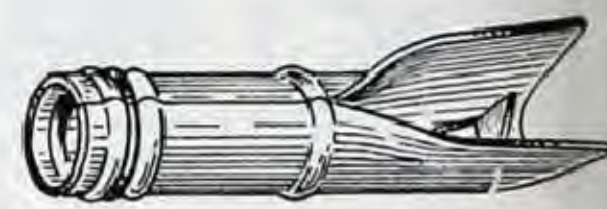
P-117
(Nickel Plated)



P-118
(Nickel Plated)

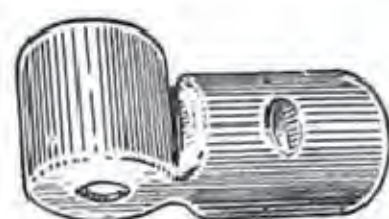


P-119
(Nickel Plated)

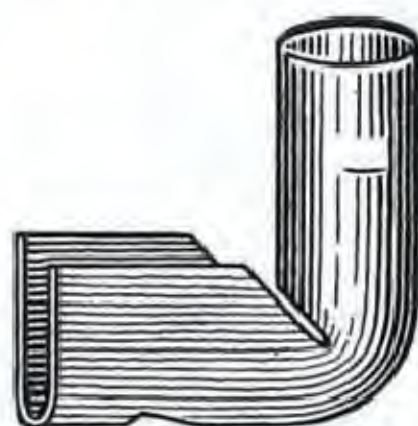


P-120
(Nickel Plated)

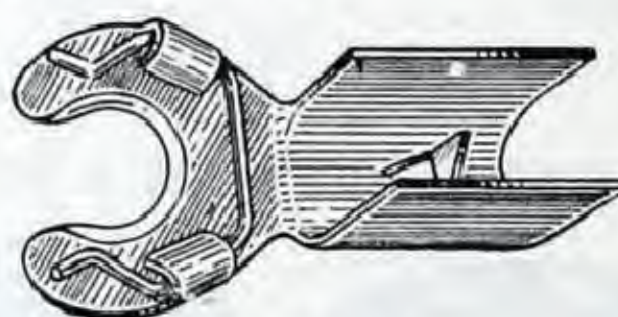
Note—P-119 will fit inside of P-120, thus making a thrust type assembly.



P-121



P-127
(Nickel Plated)



P-122



P-126

Brass Spark Plug Terminals

(Be sure to specify whether Clip or Ring Style)

The lowest priced spark plug terminal procurable of really dependable quality. Very carefully and accurately made, and represents the best quality of this type.



Clip



Ring

Part No.	Diam. Cable Mm.	Diam. Cable In.	Weight per 1000	Carton Quantity
*.200		6/32	8	500
.215	5		8½	500
.235		7/32	9	500
.281	7		10	500
.300		9/32	10½	500
.325		10/32	11	500
.360	9	11/32	12	500
.475		15/32	16½	500

*Size indicates inside diameter of wire sleeve in decimals of an inch.

Prices on application.

SHERMAN SOLDERING LUGS

Listed as Approved by Underwriters' Laboratories.

All round end Sherman Lugs smaller than $\frac{15}{16}$ " O.D. are made under the Sherman Patent and are the type which has secured its prominence. In appearance they are superior to any others. They are absolutely seamless all around. They cannot leak out at closed end, making messy job and saving solder. Better conductivity is also secured. The round end lugs are much more satisfactory than old style lugs from tubing. We strongly recommend use of round end lugs in small sizes whenever possible. However, square end lugs can be furnished if necessary.

For sizes $\frac{15}{16}$ " O. D. and up, Sherman Soldering Lugs are made only of seamless copper tubing of exactly correct gauge—selected for the purpose.

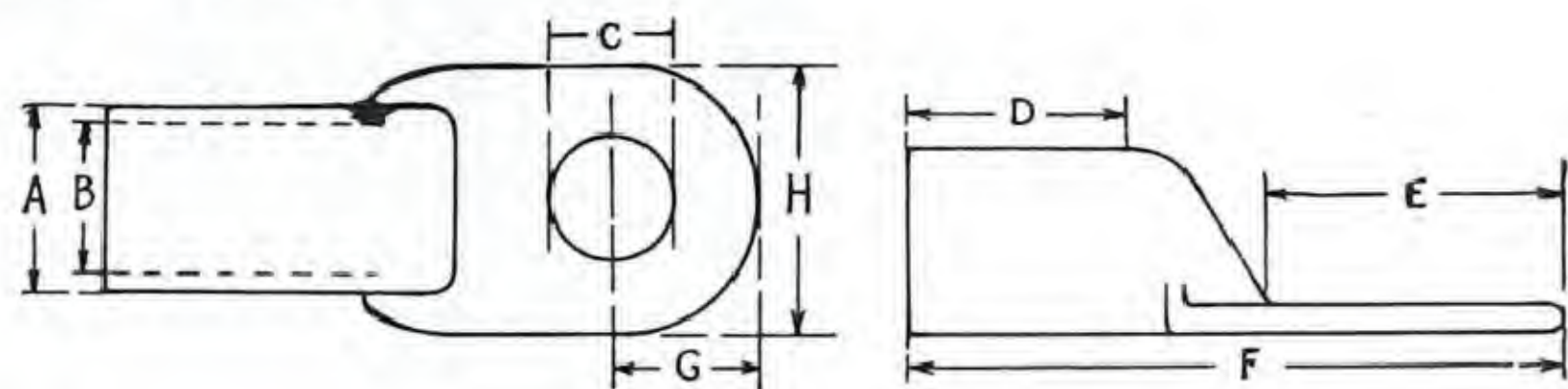
Dimensions in tables following represent standards required and approved by Underwriters. All lugs which come

up to these standards, whether special or regular, are stamped for identification with letter "S" and N. E. C. rating in amperes across flat portion at wire end (as shown in cut). Look for the marking, as without it lugs are not approved fittings.

To select Terminals according to N. E. C. Rating governing knife switches, use the following equivalents:

30 amperes.....	use $\frac{1}{4}$ " size
60 amperes.....	use $\frac{3}{8}$ " size
100 amperes.....	use $\frac{1}{2}$ " size
200 amperes.....	use $\frac{11}{16}$ " size
400 amperes.....	use $1\frac{1}{16}$ " size
600 amperes.....	use $1\frac{7}{16}$ " size
800 amperes.....	use $1\frac{3}{4}$ " size
1,000 amperes.....	use $2\frac{1}{16}$ " size

Side Formed Lugs



Part Number	Amp. Cap. N. E. C.	Max. B & S (A.W.G.) Stranded Wire	Approximate Dimensions in Inches					Weight per 1000	Carton Quantity
			B	C	E	F	G		
$\frac{3}{16}$	25	10	.1368	$\frac{11}{64}$	$\frac{15}{32}$	$\frac{15}{16}$	$\frac{7}{32}$	4	250
$\frac{1}{4}$	35	8	.186	$\frac{13}{64}$	$\frac{1}{2}$	$1\frac{1}{32}$	$\frac{7}{32}$	6	200
$\frac{5}{16}$	50	6	.232	$\frac{13}{64}$	$\frac{19}{32}$	$1\frac{7}{32}$	$\frac{1}{4}$	11	200
$\frac{3}{8}$	70	4	.285	$\frac{9}{32}$	$\frac{11}{16}$	$1\frac{11}{32}$	$\frac{9}{32}$	17	125
$\frac{7}{16}$	90	2	.336	$\frac{9}{32}$	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{11}{32}$	24	100
$\frac{1}{2}$	125	0	.398	$\frac{11}{32}$	$\frac{13}{16}$	$1\frac{3}{4}$	$\frac{13}{32}$	35	100
$\frac{9}{16}$	150	00	.461	$\frac{13}{32}$	$\frac{15}{16}$	2	$\frac{7}{16}$	46	100
$\frac{5}{8}$	175	000	.511	$\frac{13}{32}$	1	$2\frac{1}{8}$	$\frac{1}{2}$	60	100
$\frac{11}{16}$	225	0000	.559	$\frac{13}{32}$	$1\frac{5}{32}$	$2\frac{9}{32}$	$\frac{17}{32}$	80	100
$\frac{13}{16}$	250	250,000CM	.651	$\frac{13}{32}$	$1\frac{1}{4}$	$2\frac{5}{8}$	$\frac{5}{8}$	140	50
$\frac{15}{16}$	325	400,000	.776	$\frac{13}{32}$	$1\frac{5}{8}$	$3\frac{3}{8}$	$\frac{3}{4}$	225	Bulk
$\frac{1}{16}$	362	450,000	.82	$\frac{13}{32}$	$1\frac{3}{4}$	$3\frac{7}{16}$	$\frac{13}{16}$	285	"
$\frac{1}{8}$	400	500,000	.88	$\frac{13}{32}$	$2\frac{1}{8}$	$4\frac{1}{16}$	$\frac{15}{16}$	370	"
$\frac{3}{16}$	450	600,000	.943	$\frac{13}{32}$	$2\frac{1}{4}$	$4\frac{7}{16}$	1	410	"
$\frac{1}{4}$	550	800,000	1.084	$\frac{17}{32}$	$2\frac{1}{2}$	5	$1\frac{1}{8}$	715	"
$\frac{3}{8}$	650	1,000,000	1.21	$\frac{29}{32}$	$2\frac{1}{2}$	$5\frac{3}{8}$	$1\frac{3}{16}$	790	"
$\frac{1}{2}$	850	1,500,000	1.46	$1\frac{1}{32}$	$3\frac{1}{8}$	$6\frac{5}{8}$	$1\frac{7}{16}$	1,470	"
$\frac{3}{4}$	1,050	2,000,000	1.66	$1\frac{1}{32}$	$3\frac{5}{8}$	$7\frac{1}{2}$	$1\frac{5}{8}$	2,760	"

" to $\frac{13}{16}$ " furnished Round End (Sherman Patent) unless specified Square.

" to $2\frac{1}{16}$ " furnished Square End unless specified Round. Not made seamless.

These sizes can be furnished in Square End drawn seamless style.

These lugs can be furnished with $\frac{9}{32}$ " stud hole as a standard alternate size at no additional cost. The $\frac{1}{2}$ " lug with a $\frac{13}{32}$ " stud is considered standard for automotive work and will be furnished at no additional cost.

NOTES (Please Read Carefully)

Stud Holes: Lugs furnished with special size or location of holes at same prices as for regular lugs, plus Special Net Charge for each size. Special Length Lugs: Lugs shorter than regular will be billed at regular lug prices, plus "Special Charge" for each size. Lugs longer than regular will be billed at a price increase in proportion to the increased length, plus "Special Net Charge" for each size. Bending (to permit bending), add 10%. For Cadmium Plating, Rosin Dipping or Tinning all over, add 10% to regular lug prices, plus Special Net Charge for each size. Rosin Dipped or Tinned inside only, add 20% to regular prices, plus Special Net Charge for each size. Unless otherwise specified, lugs will be furnished side formed and regular stud holes. Orders for special material will be manufactured with an allowable variation of 10% over or under the quantity specified.

SPECIAL NET CHARGES

- $\frac{3}{16}$ " to $\frac{9}{16}$ ", inclusive.
- $\frac{5}{8}$ " to $\frac{13}{16}$ ", inclusive.
- $\frac{13}{16}$ " to $1\frac{1}{8}$ ", inclusive.
- $1\frac{5}{16}$ " and $1\frac{7}{16}$ ".
- $1\frac{3}{4}$ " and $2\frac{1}{16}$ ".

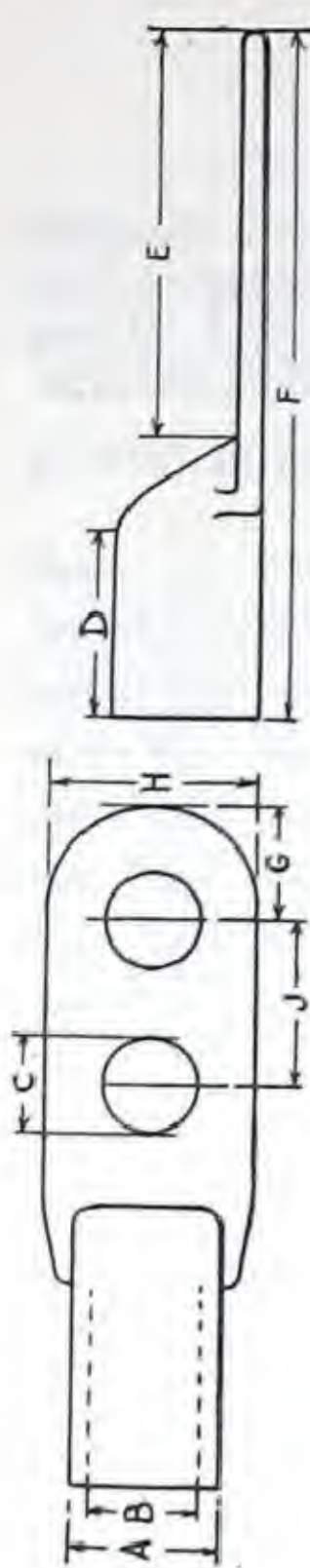
Above special net charges cover special machine set-up expense on orders for less than 5,000 single-hole lugs $\frac{13}{16}$ " and smaller, and less than 500 of all other sizes and types.

Note: Only one Special Net Charge will be added covering special operations for each size and type of lug ordered. Prices on application.

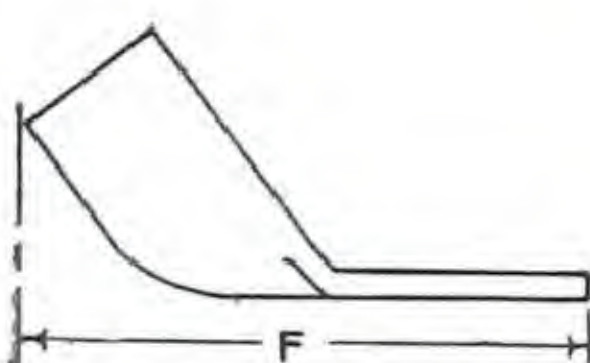
SHERMAN SOLDERING LUGS

Two Hole Lugs

Two Hole Lugs are made of seamless tubing and furnished Square End unless otherwise specified. Flat portion (E) may be made to order, either longer or shorter, but tubular portion (D) cannot be readily changed. Dimensions, except as noted below, are the same as standard side formed Lugs.



Part No.	Amp. Cap. N.E.C.	APPROXIMATE DIMENSIONS IN INCHES						Weight per 1000	Carton Qty.
A		C	E	F	G	J			Bulk
$\frac{3}{16}$	25	$\frac{5}{32}$	$\frac{3}{4}$	$1\frac{7}{32}$	$\frac{5}{32}$	$\frac{3}{8}$	5		
$\frac{1}{4}$	35	$\frac{3}{16}$	$\frac{7}{8}$	$1\frac{13}{32}$	$\frac{3}{16}$	$\frac{7}{16}$	8		
$\frac{5}{16}$	50	$\frac{7}{32}$	$1\frac{1}{16}$	$1\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	14		
$\frac{3}{8}$	70	$\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{29}{32}$	$\frac{5}{16}$	$\frac{5}{8}$	23		
$\frac{7}{16}$	90	$\frac{9}{32}$	$1\frac{3}{8}$	$2\frac{1}{8}$	$\frac{5}{16}$	$\frac{11}{16}$	34		
$\frac{1}{2}$	125	$\frac{11}{32}$	$1\frac{11}{16}$	$2\frac{5}{8}$	$\frac{3}{8}$	$\frac{7}{8}$	46		
$\frac{9}{16}$	150	$\frac{13}{32}$	2	$3\frac{1}{16}$	$\frac{7}{16}$	1	68		
$\frac{5}{8}$	175	$\frac{13}{32}$	2	$3\frac{1}{8}$	$\frac{7}{16}$	1	90		
$\frac{11}{16}$	225	$\frac{13}{32}$	$2\frac{1}{8}$	$3\frac{1}{4}$	$\frac{1}{2}$	1	115		
$\frac{13}{16}$	250	$\frac{17}{32}$	$2\frac{5}{8}$	4	$\frac{5}{8}$	$1\frac{1}{4}$	218		
$\frac{15}{16}$	325	$\frac{17}{32}$	$2\frac{3}{4}$	$4\frac{1}{2}$	$\frac{11}{16}$	$1\frac{1}{4}$	270		
1	362	$\frac{17}{32}$	3	$4\frac{27}{32}$	$\frac{3}{4}$	$1\frac{1}{2}$	355		
$1\frac{1}{16}$	400	$\frac{21}{32}$	$3\frac{1}{4}$	$5\frac{3}{16}$	$\frac{13}{16}$	$1\frac{1}{2}$	420		
$1\frac{1}{8}$	450	$\frac{21}{32}$	$3\frac{3}{8}$	$5\frac{5}{16}$	$\frac{7}{8}$	$1\frac{1}{2}$	475		
$1\frac{5}{16}$	550	$\frac{25}{32}$	$3\frac{15}{16}$	$6\frac{7}{16}$	1	$1\frac{13}{16}$	845		
$1\frac{7}{16}$	650	$\frac{29}{32}$	$4\frac{3}{8}$	$7\frac{1}{4}$	$1\frac{1}{8}$	2	1030		
$1\frac{3}{4}$	850	$1\frac{1}{32}$	$5\frac{1}{8}$	$8\frac{5}{8}$	$1\frac{3}{8}$	$2\frac{1}{4}$	1850		
$2\frac{1}{16}$	1050	$1\frac{1}{32}$	$5\frac{3}{8}$	$9\frac{1}{4}$	$1\frac{1}{2}$	$2\frac{1}{4}$	3200		

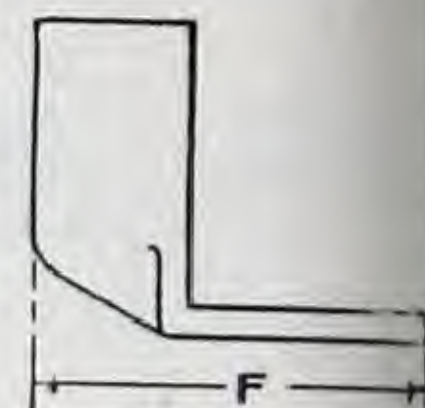


45°

Center Formed and Angle Lugs



90°



Center Formed Lugs. Dimensions the same as for Regular Side Formed Lugs. $\frac{13}{16}$ " and smaller seamless, round end—larger sizes of tubing regularly square end.

Angle Lugs. Dimensions and specifications the same as for Regular Side Formed Lugs, except "F," as shown below.

	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{9}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{15}{16}$	1	$1\frac{1}{16}$	$1\frac{1}{8}$	$1\frac{5}{16}$	$1\frac{7}{16}$	$1\frac{3}{4}$	$2\frac{1}{16}$
45°	$\frac{13}{16}$	$1\frac{1}{8}$	$1\frac{3}{16}$	$1\frac{7}{16}$	$1\frac{9}{16}$	$1\frac{3}{4}$	$1\frac{15}{16}$	$2\frac{3}{16}$	$2\frac{7}{16}$	$2\frac{7}{8}$	$3\frac{5}{8}$	$3\frac{3}{4}$	$4\frac{3}{8}$	$4\frac{3}{4}$	$5\frac{5}{16}$	$5\frac{11}{16}$	$6\frac{15}{16}$	$7\frac{15}{16}$
90°	$\frac{11}{16}$	$\frac{13}{16}$	$\frac{15}{16}$	$1\frac{1}{8}$	$1\frac{7}{16}$	$1\frac{3}{8}$	$1\frac{9}{16}$	$1\frac{11}{16}$	$1\frac{7}{8}$	$2\frac{1}{8}$	$2\frac{5}{8}$	$2\frac{13}{16}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$3\frac{15}{16}$	$4\frac{1}{16}$	5	$5\frac{13}{16}$

Prices for these Lugs are the same as for Two-Hole Lugs above plus net additional charge for each size ordered as noted under "Special Net Charges."

While these types are standard, they are not regularly carried in stock. Will be made up promptly to order.

Sherman Automotive Lugs

Light Weight — Not Approved



Part No.	Thickness	Size	Stud Hole	Cable Size	Wt. per 1,000	Carton Qty.
(Plain End)						
A	.030	$\frac{7}{16}$	$\frac{13}{32}$	1	17	250
B	.030	$\frac{15}{32}$	$\frac{13}{32}$	1-0	20	250
C	.030	$\frac{1}{2}$	$\frac{13}{32}$	0	20	250
AH	.040	$\frac{7}{16}$	$\frac{13}{32}$	1	26	250
BH	.040	$\frac{15}{32}$	$\frac{13}{32}$	1-0	26	250
CH	.040	$\frac{1}{2}$	$\frac{13}{32}$	0	26	250
DH	.040	$\frac{9}{16}$	$\frac{13}{32}$	00	35	250
(Bell End)						
AX	.030	$\frac{7}{16}$	$\frac{13}{32}$	1	20	250
BX	.030	$\frac{15}{32}$	$\frac{13}{32}$	1-0	20	250
CX	.030	$\frac{1}{2}$	$\frac{13}{32}$	0	20	250
AHX	.040	$\frac{7}{16}$	$\frac{13}{32}$	1	26	250
BHX	.040	$\frac{15}{32}$	$\frac{13}{32}$	1-0	26	250
CHX	.040	$\frac{1}{2}$	$\frac{13}{32}$	0	26	250

Angle Lugs: Any of the above lugs can be furnished with 45° or 90° angle in lots of not less than 5,000 at an addition of 15% For Special Stud Holes, Annealing, Cadmium Plating, Rosin Dipping, or Tinning all over or inside only, add same additional prices as for Side Formed Lugs.

Prices on Application.

SHERMAN (NEMA-NELA) STANDARD AND HEAVY DUTY SOLDERING LUGS

NEMA Publication No. 101—NELA Publication No. 232

Made only of Annealed Seamless Copper Tubing



Two-Hole Standard Duty



4-Hole and 2-Hole Heavy Duty

These soldering lugs are designed to meet the insistent demands of Light and Power Company engineers for a standardized line of properly made lugs for standard and heavy duty. A line was desired that would be interchangeable with the cast lugs used on power apparatus now in operation.

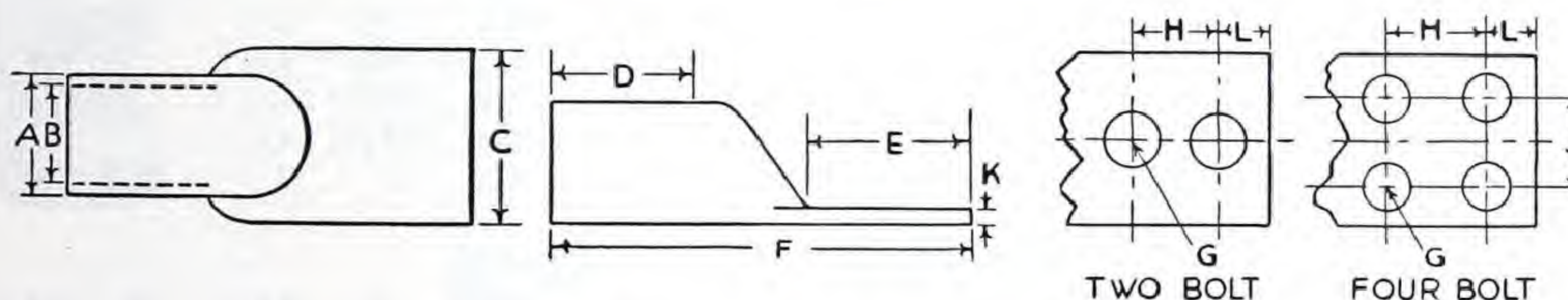
The careful and thorough research work of the joint NEMA-NELA Committee produced these standards reflecting consensus of opinion and experience of leading member companies and apparatus manufacturers.

Standard Duty Lugs. These lugs are of substantial construction, providing two bolts each, and are adequate for general purposes although they will not permit the cable to fuse in case of sustained short circuits. The tongue drilling of these lugs is the same as that for the HEAVY DUTY types of the corresponding sizes. This allows the lugs to be used widely as standards in station and apparatus design with various copper bus sizes. For ordinary use where the Heavy Duty additional copper is not needed nor economically warranted, the Standard Duty lugs should suffice. Standard

Duty Lugs are furnished only in the long tongue 2-hole style. For one hole, shorter length tongue see Trade Bulletin No. 6 which describes the approved line of regular Sherman Soldering Lugs.

Heavy Duty Lugs. These HEAVY DUTY Lugs are interchangeable with standard cast lugs and are more economical. Heretofore, tubing lugs were not available, because the greater width of the tongue in the tubing lugs formerly manufactured was too wide for dimension width allowable in some installations. Now the tubing type of lug can be held to the same width as the cast, making the more efficient and more economical tubing lug available for such installation. These lugs with the narrow tongue can be used in replacement on old apparatus without any mounting changes. They also allow closer mounting in new apparatus, thus saving space and weight in equipment design. These Heavy Duty Lugs should be adequately successful to withstand heavy short circuit currents.

Marking. Each lug is plainly marked on the barrel with the maximum cable size and the Sherman part number.



Standard Duty Multiple Bolt Copper Soldering Lugs (NEMA-NELA STANDARD)

Part Number	Max. Cable Size	Approximate Dimensions in Inches									Weight per 1,000	Amps.
		A	B	C	E	F	G	H	J	L		
2S3	No. 2 AWG	.437	.336	$\frac{5}{8}$	$1\frac{3}{4}$	$2\frac{1}{2}$	$\frac{5}{16}$	1		$\frac{11}{32}$	50	90
2S4	No. 2/0AWG	.562	.461	$\frac{13}{16}$	2	$3\frac{1}{8}$	$\frac{7}{16}$	1		$1\frac{1}{2}$	80	150
2S5	250,000CM	.812	.669	$1\frac{13}{64}$	3	$4\frac{1}{2}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	270	250
2S6	350,000CM	1.000	.822	$1\frac{1}{2}$	3	$4\frac{7}{8}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	420	300
2S7	500,000CM	1.062	.881	$1\frac{37}{64}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	500	400
2S8	750,000CM	1.312	1.084	$1\frac{31}{32}$	$3\frac{1}{2}$	6	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	850	525
2S9	*1,000,000CM	1.437	1.209	$2\frac{13}{64}$	$3\frac{1}{2}$	$6\frac{3}{8}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	1000	650

Heavy Duty Multiple Bolt Copper Soldering Lugs (NEMA-NELA STANDARD)

2H5	250,000CM	.840	.625	$1\frac{1}{4}$	3	5	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	400	250
2H6	350,000CM	1.050	.822	$1\frac{1}{2}$	3	$5\frac{3}{4}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	625	300
2H7	500,000CM	1.315	.951	$1\frac{1}{2}$	$3\frac{1}{2}$	$6\frac{3}{8}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	1360	400
2H8	*750,000CM	1.660	1.272	$1\frac{3}{4}$	$3\frac{1}{2}$	$7\frac{1}{8}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	2100	525
2H9	*1,000,000CM	1.900	1.490	$2\frac{1}{4}$	$3\frac{1}{2}$	$7\frac{3}{4}$	$\frac{9}{16}$	$1\frac{3}{4}$		$\frac{5}{8}$	2800	650
4H10	*1,500,000CM	2.370	1.930	3	$4\frac{1}{4}$	$9\frac{5}{8}$	$\frac{9}{16}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{5}{8}$	4800	850
4H11	*2,000,000CM	2.870	2.315	$3\frac{1}{2}$	$4\frac{1}{4}$	$10\frac{1}{2}$	$\frac{9}{16}$	$1\frac{3}{4}$	$1\frac{3}{4}$	$\frac{5}{8}$	7800	1050

*Rope core or annular conductor.

Prices on application.

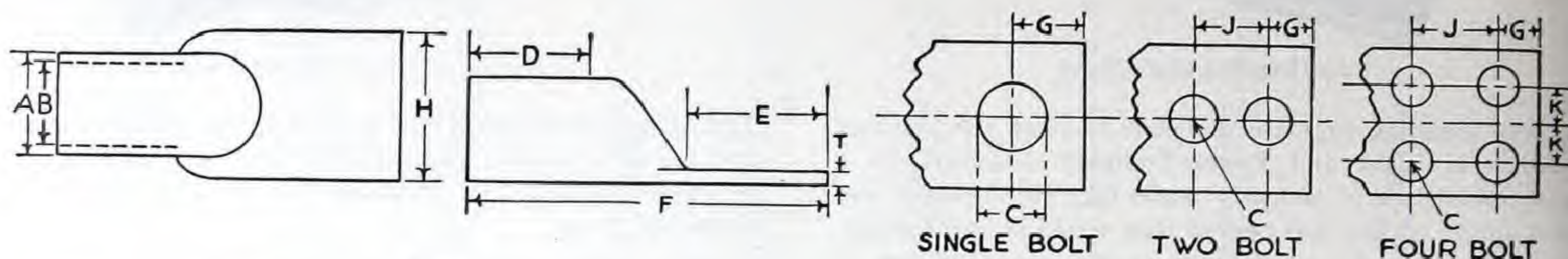
SHERMAN (NELA STANDARD) HEAVY DUTY SOLDERING LUGS

These Lugs are made exactly to the specifications prepared by the original NELA Committee to meet the insistent demand of Light and Power Company engineers for a standardized line of lugs for heavy duty.

Sherman Heavy Duty Lugs are made of the best quality of seamless copper tubing. Dimensions are held as accurate as is consistently possible through the use of the latest type of

machinery, tools and fixtures. Special care is used to get flat contact surfaces and to keep Lugs free from burrs, corrosion and other faults which would impair electrical or mechanical service.

Markings. Each Lug is plainly marked on the barrel with the word "Sherman" and the number. This provides both identification and guarantee of the highest standard of workmanship.



Part No.	Max. Cable Size	Amp. Cap. N.C.E.	APPROXIMATE DIMENSIONS IN INCHES									Wgt. per 1000
			A	B	H	E	F	G	J	K	C	
Single Bolt Tongue												
1	19/22	35	.25	.187	.39	.50	1	$\frac{3}{16}$	...	...	$\frac{7}{32}$	8
2	6, B. & S.	50	.313	.232	.47	.75	1½	$\frac{3}{8}$	...	...	$\frac{7}{32}$	18
3	2	90	.540	.375	.74	.87	2	$\frac{3}{8}$	...	...	$\frac{9}{32}$	80
4	00	150	.675	.494	.97	1.25	2¾	$\frac{1}{2}$	...	...	$\frac{13}{32}$	155
5	250,000CM	250	.840	.625	1.22	1.50	3¼	$\frac{3}{4}$	...	...	$\frac{17}{32}$	275
6	350,000CM	300	1.050	.822	1.50	2.25	4¾	1	...	...	$\frac{17}{32}$	540
Two-Bolt Tongue												
1-A	19/22	35	.25	.187	.38	1.00	1½	$\frac{3}{16}$	$\frac{1}{2}$	...	$\frac{7}{32}$	12
2-A	6, B. & S.	50	.313	.232	.47	1.25	2	$\frac{1}{4}$	$\frac{5}{8}$	...	$\frac{7}{32}$	25
3-A	2	90	.540	.375	.74	1.50	2½	$\frac{3}{8}$	$\frac{5}{8}$	...	$\frac{9}{32}$	105
4-A	00	150	.675	.494	.97	2.25	3¾	$\frac{1}{2}$	1	...	$\frac{13}{32}$	210
5-A	250,000CM	250	.840	.625	1.22	2.25	4	$\frac{1}{2}$	1	...	$\frac{13}{32}$	330
6-A	350,000CM	300	1.050	.822	1.50	3.25	5¾	$\frac{3}{4}$	1½	...	$\frac{17}{32}$	650
7	500,000	400	1.315	.951	1.87	3.25	6¼	$\frac{3}{4}$	1½	...	$\frac{17}{32}$	1350
8	750,000*	525	1.66	1.272	2.41	3.25	6⅞	$\frac{3}{4}$	1½	...	$\frac{17}{32}$	2000
9	1,000,000*	650	1.90	1.49	2.74	4.25	8⅞	1	2	...	$\frac{17}{32}$	3200
Four-Bolt Tongue												
8-A	750,000*	525	1.66	1.272	2.41	3.25	6⅞	$\frac{3}{4}$	1¼	$\frac{5}{8}$	$\frac{13}{32}$	2000
9-A	1,000,000*	650	1.90	1.49	2.74	3.25	7⅞	$\frac{3}{4}$	1½	$\frac{3}{4}$	$\frac{13}{32}$	2800
10	1,500,000*	850	2.37	1.93	3.50	4.25	10	1	2	1	$\frac{17}{32}$	5000
11	2,000,000*	1050	2.87	2.315	4.25	4.25	11	1	2	1	$\frac{17}{32}$	8300

*Designates rope core cable sizes. Core can be drilled out and space filled with copper plug or solder.

Dimension "E" in larger sizes will be found slightly larger than specified to allow for bending in the field.

NOTES (Please Read Carefully)

Special Net Charges

1 to 4-A, inclusive, 2S3 and 2S4.

5 and 5-A, 2S5 and 2H5.

6 to 7, inclusive, 2S6 and 2S7, 2H6 and 2H7.

8 to 9-A, inclusive, 2S8 and 2S9, 2H8 and 2H9.

10 and 11, 4H10 and 4H11.

These net charges cover special machine set-up expense regardless of quantity of lugs ordered.

Blank Lugs furnished only when specified; otherwise regular bolt holes as listed. Stud Holes: Lugs furnished with special size or location of stud holes at same prices as for regular lugs, plus Special Net Charge for each size. Special Length Lugs: Lugs shorter than regular will be billed at

regular lug prices, plus Special Net Charge for each size. Lugs longer than regular will be billed at a price increase in proportion to the increased overall length, plus Special Net Charge for each size. Straight Lugs regularly furnished. Angle Lugs 45° or 90° only when specified and at an additional charge of 50% to regular prices plus Special Net Charge for each size. Straight Lugs may be bent in the field, but this should be done only after annealing in large sizes. Annealing (to permit bending), add 10%. For Cadmium Plating, Rosin Dipping or Tinning all over, add 10% to regular lug prices, plus Special Net Charge for each size. For Rosin Dipping or Tinning inside only, add 20% to regular lug prices, plus Special Net Charge for each size.

Prices on application.

FAHNESTOCK CONNECTORS

No. 3

Will take No. 10 B & S Wire

Length over all..... $1\frac{1}{16}$ inches
Width..... $\frac{3}{8}$ inch

Screw hole for No. 8 screw

List Prices

	Brass	Bronze
Each.....	\$0.05	\$0.06
Per doz.....	.50	.60
Per 100.....	2.15	2.50



No. 5

Will take No. 10 B & S Wire

Has projecting lug to which can be soldered a wire.

Length over all not including soldering lug. $1\frac{1}{16}$ inches
Width..... $\frac{3}{8}$ inch

Screw hole for No. 8 screw

List Prices

	Brass	Bronze
Each.....	\$0.07	\$0.08
Per doz.....	.70	.80
Per 100.....	2.40	2.70



No. 9

Will take No. 10 B & S wire

Length over all..... $2\frac{1}{16}$ inches
Width..... $\frac{3}{8}$ inch

Screw hole for No. 8 screw.

List Prices

	Brass	Bronze
Each....	\$0.08	\$0.10
Per doz..	.75	.85
Per 100..	3.50	4.00



No. 24

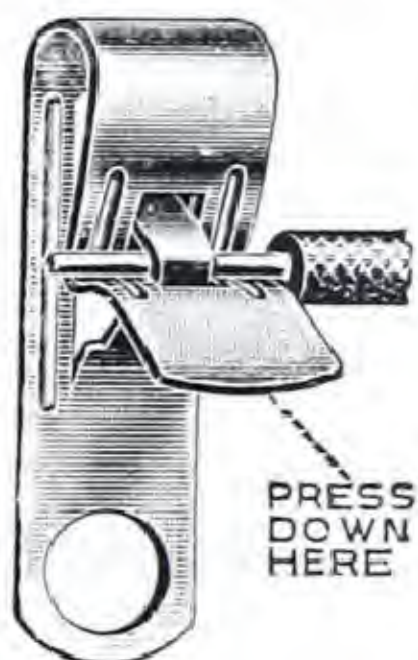
Will take No. 10 B & S wire

Length over all..... $1\frac{7}{16}$ inches
Width..... $\frac{3}{8}$ inch
Made with either $\frac{1}{4}$ or $\frac{5}{16}$ -inch screw hole

List Prices

	Brass	Bronze
Each.....	\$0.08	\$0.10
Per doz.....	.75	.85
Per 100.....	3.50	4.00

Made in various lengths up to $3\frac{1}{8}$ inch all.



No. 30

Two large clips riveted together. Both snap over the line. Made for different size wire. Used for test poles or for party line work.

Length over all..... $1\frac{5}{16}$ inches
Width..... $\frac{5}{8}$ inch

Made only in bronze

List Price

Each.....	\$0.15
Per doz.....	1.20
Per 100.....	10.00

In ordering, please specify size wire connectors are to be used on. Also whether to be used on iron or copper wire.



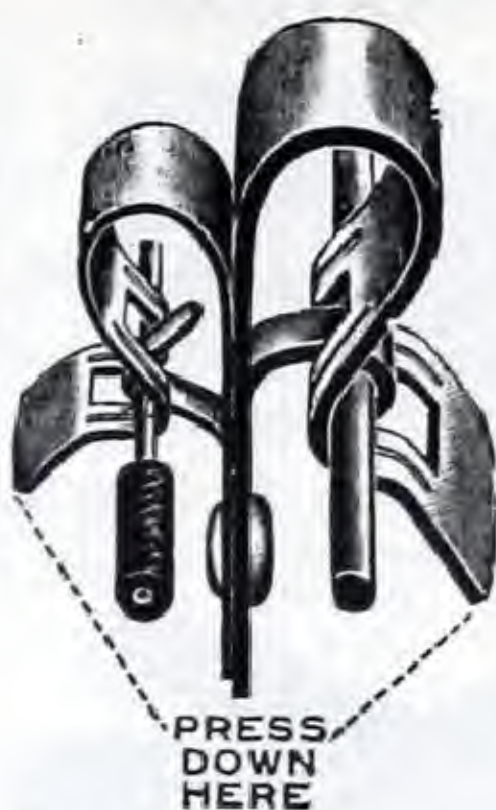
FAHNESTOCK

No. 31 CONNECTORS

One large and small clip riveted together.

Large clip snaps over the line wire and we make same for different sizes of line wire. The small clip does not snap over and will take up to and including a No. 10 B & S wire. Used for attaching drop or jumper wires to line on junction poles or on party lines.

Made only in bronze



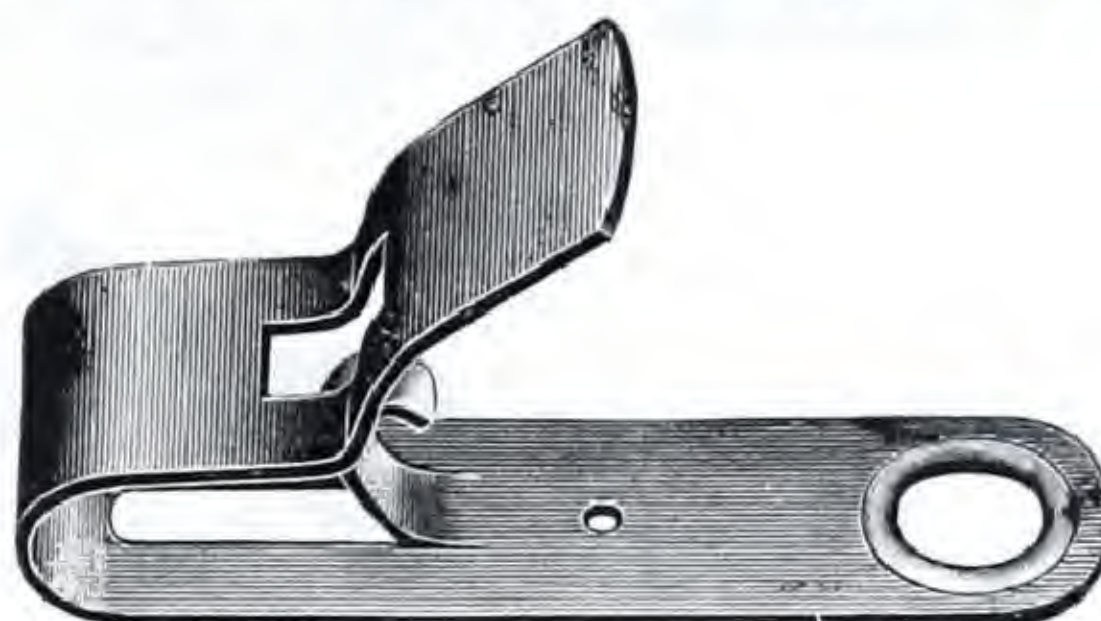
Length over all Width

	Each	Per doz.	Per 100
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$1\frac{5}{16}$ " $\frac{5}{8}$ "	\$0.10	\$1.10	\$9.00
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In ordering please specify size wire connectors are to be used on.

Also whether to be used on iron or copper wire.

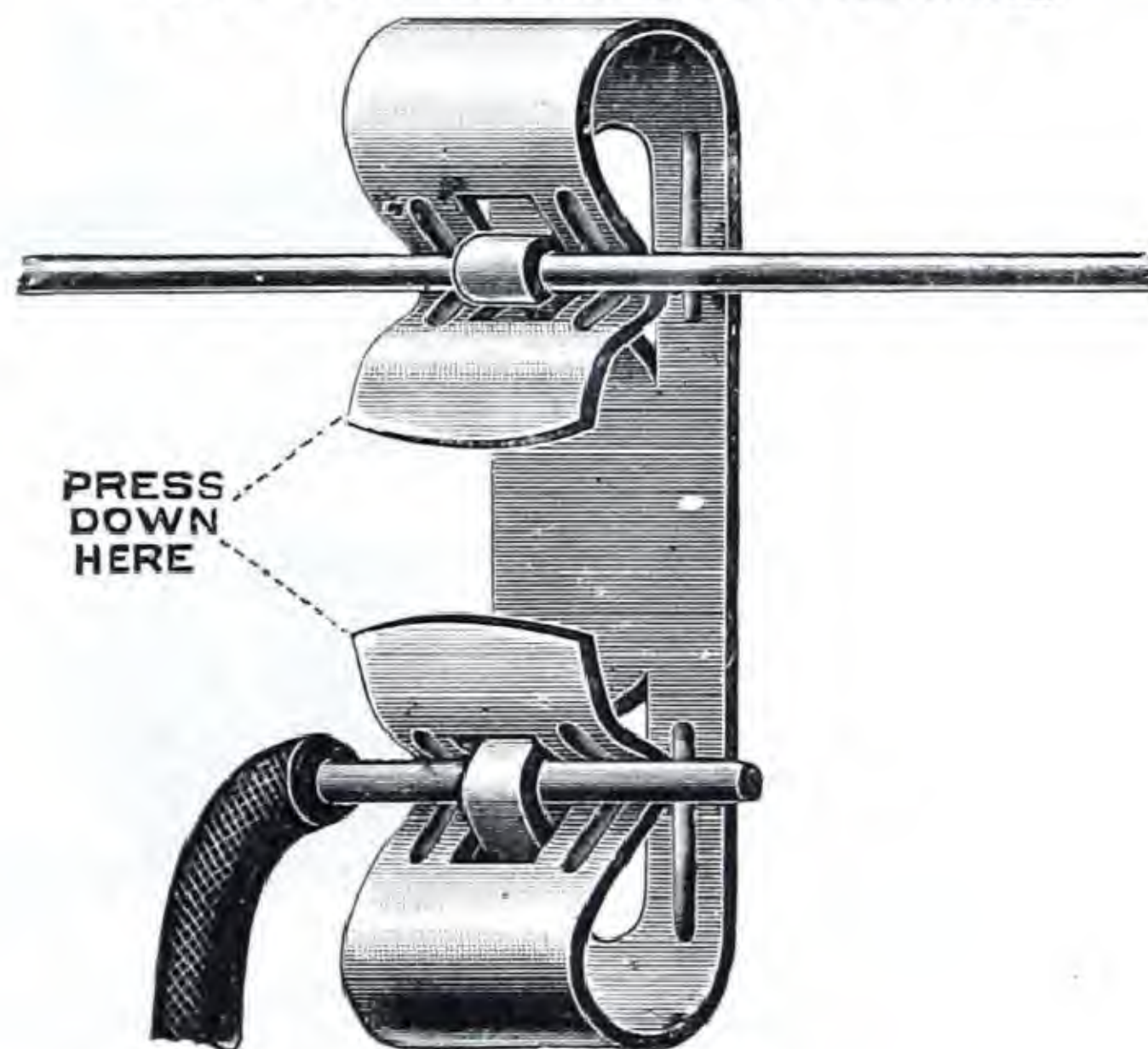


No. 33

Temporary connectors for emergency work and test sets. Will snap over a No. 8 B. W. G. wire.

Price, bronze finish only, each.....\$0.15

THIS END SNAPS OVER THE WIRE



No. 34

TELEPHONE "SNAP OVER" CONNECTOR

One end snaps over the line. Made in only one size. Snaps over a No. 12 B. W. G. wire. Other end does not snap over wire but will take any size wire up to 9 B. W. G.

Length over all..... $2\frac{3}{4}$ inches
Width..... $\frac{5}{8}$ inch

Made only in bronze

	List Price
Each.....	\$0.10
Per doz.....	.90
Per 100.....	7.50

FRANKEL ELECTRICAL TESTING CLIPS



No. 2535

Made of brass, nickel-plated.
Flattened back with bolt and nuts to attach connector.

List No. 2535.....List Price, Each \$0.60

No. 2533

Made of brass, nickel-plated.
Tapped for set screw.
Drilled to slip $\frac{1}{16}$ -inch.



List No. 2533.....List Price, Each \$0.48



No. 2530

Brass, nickel-plated.
Especially adapted for fine wire or charging light batteries.

List No. 2530.....List Price, Each \$0.20

No. 2534

Brass, nickel-plated.
Drilled with $\frac{1}{16}$ -inch hole.
Has screw back.



List No. 2534.....List Price, Each \$0.48



No. 2539

Made of brass, nickel-plated.
This is a radio clip, especially designed for finest work.

List No. 2539.....List Price, Each \$0.14

No. 2521 and 2538

The pin pierces the insulation and makes a positive test connection. Use teeth for fine wires.

For electrical tests or temporary connections, requiring no skinning, no taping of wires.

List No. 2521 Brass, nickel-plated.....List Price, Each \$0.40

List No. 2538 Nickel silver.....List Price, Each \$0.50



Frankel Clip Extensions

Brass, nickel-plated.

Extension attached to clip, to reach obstructed and crowded corners that are out of reach of the clip.

List No. 2527 Extension only.....List Price, Each \$0.40



Frankel Battery Charging Clips

Heavy steel and heavily lead plated.

The jaws spread $1\frac{3}{8}$ ", the spring is removable and renewable.

List No. 2544.....List Price, Each \$0.50

Springs only.....List Price, Each \$0.10

MARR SOLDERLESS INSULATED WIRE CONNECTORS

A Permanent Positive Connection



No Tape

No Solder

No. 1

The No. 1 Marr Connector takes any fixture installation condition. In fixture wiring it will take from 2 to 8 No. 18 stranded fixture wires.

No. 1 Genuine Bakelite Connectors, List Price per 100 \$4.00

Cleaner
Neater



Quicker
Cheaper

No. 2

The No. 2 Marr Connector for conduit work takes up to 5 No. 12 B. & S. Gauge Wires.

List Price, per 100.....\$5.00

S. & S. PORCELAIN WIRE CONNECTORS



No. 4300-1

List No.	Type	Carton	Standard Package	Package Weight Pounds	List Price Per 1000
4300	Medium	100	1000	20	\$27.45
4301	Large	100	1000	25	27.45

SHERMAN FIXTURE CONNECTORS

Approved

THE PERFECT SOLDERLESS CONNECTOR

Only One Size Needed—Fits All Wires, No. 12 or Smaller



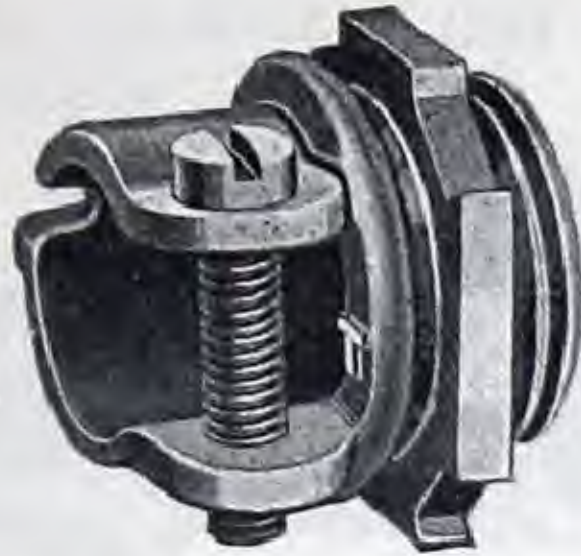
Side View

Cross Section
Showing Bridge

The use of the Sherman Fixture Connector is the most approved and efficient method of making small electrical connections. The day of the wasteful soldered joint is past. Soldered joints are efficient but it takes valuable time to make them—time is money, consequently soldered joints are expensive not alone from the viewpoint of time but on account of material necessary—acid, solder and blow torch.

Prices on application.

"SQUEEZE" CONNECTORS



Malleable Iron—Galvanized
For Flexible Steel Conduit
and Armoured Conductors

List No.	Dimensions				Std. Pkg.	Wgt. Lbs. Per 100	List Price Per 100
	Size Inches	Size K.O.	Approx. Open.	Approx. Closed			
250	1/4	3/8	15/32	11/32	100	4	\$11.00
252	5/16	3/8	17/32	11/16	100	4	11.00
250A	1/4	1/2	15/32	11/32	100	6	12.50
252A	5/16	1/2	17/32	11/16	100	6	12.50
253	3/8	1/2	19/32	1 1/8	1000	8	7.50
248	3/8	1/2	21/32	9/16	100	8	7.50
260	3/8A	1/2	11/16	11/16	100	12	9.00
254	1/2	1/2	13/16	13/16	100	13	9.00
278	3/4S	3/4	1	7/8	100	20	15.00
255	3/4	3/4	1 3/32	15/16	100	21	15.00
256	1	1	1 13/32	1 1/4	50	25	25.00
261	1	1	1 17/32	1 3/8	50	30	25.00
264	1	1	1 1/4	1 3/8	50	26	25.00
257	1 1/4	1 1/4	1 21/32	1 1/2	50	40	35.00
262	1 1/4	1 1/4	1 15/8	1 5/8	50	45	35.00
258	1 1/2	1 1/2	1 7/8	1 11/8	50	65	50.00
263	1 1/2	1 1/2	2 1/32	1 13/16	50	70	50.00
259	2	2	2 1/2	2 5/16	50	90	75.00
249	2 1/2	2 1/2	3	2 13/16	25	148	100.00
277	3	3	3 9/16	3 5/16	5	180	125.00

Locknuts are furnished with above connectors without charge except Nos. 250 and 252.

†The 1/4" and 5/16" sizes have 3/8" (pipe size) threaded ends to fit standard sockets.

MADE TO HOLD
Following and other sizes

250	Armored Conductors—S.S. 14D, 12D, 10D and 8D Solid; 16E and 18E; D.S. 14D and 8D Solid; 16E and 18E; Port. Rubber Cords, Senior, 18W2, 16W2, 18W3, 16W3; Junior 16W3.
250A	(Fitted with No. 400 Adapter to fit standard 1/2" K. O.) Same cable range as No. 250.
252	Flex. Cond. 5/16" S.S. and D.S.; Port. Rubber Cords; Senior 14W2, 12W2, 10W2, 8W2, 14W3, 12W3, 10W3, 8W3, 18W4, 16W4.
252A	Same cable range as No. 252.
253	Armored Conductors S.S. 14W2, 12W2, 14W3, 6D Solid, 14E and 18EM; D.S. 14W2, 12W2, 14W3, 16EM, 18EM and 14E; 14W2L; Port. Rubber Cords, Senior 14W2, 12W2, 10W2, 8W2, 14W3, 12W3, 10W3, 8W3, 16W4, 14W4, Flex. Cond. 3/8" S.S. and D.S.
253V	
48	Arm. Conductors S.S. 10W2, 12W3, and 10W3; D.S. 12W3; Port. Rubber Cords, Senior 12W2, 10W2, 14W3, 12W3, 14W4, 12W4.
60	Arm. Conductors S.S. 8W2 and 8W3; D.S. 10W2, 8W2 and 10W3; Port. Rubber Cords Senior 8W2, 10W3, 8W3, 12W4, 10W4.
64	Arm. Conductors D.S. 8W3; Port. Rubber Cords, Senior 8W3, 10W4, 8W4; Flex. Conduit 1/2" S.S. and D.S.
78	Armored Conductors S.S. 6W2, 6W3; D.S. 6W2.
55	Armored Conductors S.S. 4W2, D.S. 4W2, 6W3; Flex. Cond. 3/4" S.S. and D.S.
64	Armored Conductors S.S. 2W2, 4W3; D.S. 2W2, 4W3; L. 6W2, 6W3, 4W2, 4W3.
66	Flex. Cond. 1" S.S.
61	Flex. Cond. 1" D.S.
67	Flex. Cond. 1 1/4" S.S.
62	Flex. Cond. 1 1/4" D.S.
68	Flex. Cond. 1 1/2" S.S.
63	Flex. Cond. 1 1/2" D.S.
69	Flex. Cond. 2" S.S. and D.S.
69	Flex. Cond. 2 1/2" S.S.
7	Flex. Cond. 3" S.S.

45° AND 90° "SQUEEZE" CONNECTORS



The Removable Cap eliminates fishing wires and enables you to make a quick and sure connection.

List No.	Size Inches	Size K.O.	Approx. Open	Approx. Closed	Inside Bush Dia.	Std. Pkg.	Wgt. lbs. Per 100	List Price Per 100
265	3/8—45°	1/2	5/8	1/2	9/16	100	14	\$16.00
266	3/8—90°	1/2	5/8	1/2	9/16	100	16	16.00
272	3/8A—90°	1/2	13/16	11/16	9/16	100	15	20.00
280	3/8L—90°	1/2	11/16	17/32	9/16	100	14	16.00
No. 280 3/8"-L is large type.								
267	1/2—45°	1/2	13/16	13/16	9/16	100	22	20.00
268	1/2—90°	1/2	15/16	13/16	9/16	100	22	20.00
279	3/4S—90°	3/4	1	7/8	3/4	50	25	40.00
269	3/4—45°	3/4	1 1/8	1	25/32	50	22	40.00
270	3/4—90°	3/4	1 1/8	1	25/32	50	28	40.00
273	1—90°	1	1 13/32	1 3/8	1	25	50	60.00
274	1 1/4—90°	1 1/4	1 21/32	1 3/8	1 1/4	10	100	75.00
275	1 1/2—90°	1 1/2	1 7/8	1 5/8	1 1/2	10	165	100.00
276	2—90°	2	2 1/2	2 1/4	2	5	250	150.00

Locknuts are furnished with above connectors without charge.

MADE TO HOLD

Following and other sizes

265	Armored Conductors S.S. 14W2, 14W3, 12W2, 12W3, 6D Solid, 14E, 18EM; D.S. 14W2, 14W3, 12W2, 16EM, 18EM, 14E; L. 14W2; Port. Rubber Cords; Senior 14W2, 12W2, 10W2, 8W2, 14W3, 12W3, 10W3, 8W3, 16W4, 14W4. Flex. Cond. 3/8" S.S. and D.S.
266	Same as No. 265.
272	Armored Conductors S.S. 8W2, 8W3; D.S. 10W2, 8W2, 10W3; Port. Rubber Cord, Senior 8W2, 8W3, 10W3, 12W4, 10W4.
267	Armored Conductors D.S. 8W3; Port. Rubber Cords, Senior 8W3, 10W4, 8W4; Flex. Cond. 1/2" S.S. and D.S.
268	Same as No. 267.
279	Armored Conductors S.S. 6W2, 6W3; D.S. 6W2.
269	Armored Conductors S.S. 4W2, 4W3; D.S. 4W2, 6W3; Flex. Cond. 3/4" S.S. and D.S.
270	Same as No. 269.
273	Armored Conductors S.S. 2W2; D.S. 2W2, 4W3; Flex. Cond. 1" S.S.
274	Flex. Cond. 1 1/4" S.S.
275	Flex. Cond. 1 1/2" S.S.
276	Flex. Cond. 2" S.S. and D.S.

SQUEEZE TYPE CONNECTOR



For Non-Metallic Sheathed Cable and Flexible Tubing Connector made of malleable iron, insert of steel galvanized.

Connector with Insert.

List No.	Size K.O.	Std. Pkg.	Wgt. Lbs. per 100	List Price per 100
2005	1/2"	100	8	\$ 8.50
2006	1/2"	100	13	10.00
2007	3/4"	100	15	16.00
2008	3/4"	50	13	16.00
2009	1"	20	20	30.00
List No. Made to Hold				
2005	With insert 14W2, 12W2, insert removed 14W3, 12W3.			
2006	With insert 10W2, insert removed 10W3.			
2007	With insert 10W2, insert removed 10W3.			
2008	With insert 8W2, insert removed 8W3.			
2009	With insert 6W2, insert removed 6W3.			

T. & B. STRAIGHT "TITE-BITE" CONNECTORS

FOR ARMORED CONDUCTORS AND FLEXIBLE STEEL CONDUITS



No. 300V—Visible Type

List No.	Size Inches	Size K.O. Inches	Inside Bushed Diam. Inches	Unit pkg.	Std. pkg.	Weight per 100 in lbs.	List Price per 100
300	3/8	1/2	1/2	50	1000	8.5	\$ 7.50
300-V	3/8	1/2	1/2	50	1000	8.5	7.50
301	3/8A	1/2	17/32	25	100	16	9.00
302	1/2	1/2	19/32	50	100	16	9.00
304	3/4	3/4	49/64	25	100	26	15.00
306	1	1	1	25	25	36	25.00
308	1 1/4	1 1/4	1 1/4	10	10	60	35.00
310	1 1/2	1 1/2	1 1/2	10	10	90	50.00
312	2	2	2	10	10	130	75.00
305	3/4S	1	7/8	25	100	32	15.00

MADE TO HOLD

Sizes of conductors listed, and others:

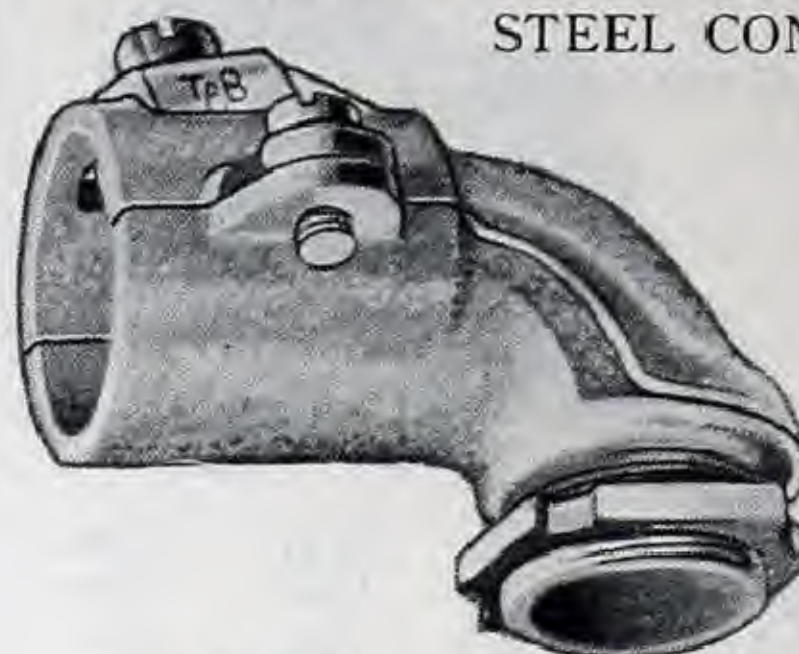
List No.	
300	S.S. 14-2, 14-3, 12-2, 12-3, 10-2, 4-1, 6-1; D.S. 4-1, 6-1, 12-2, 12-3, 14-2, 14-3; S.S. Lead 8-1, 14-2, 14-3; D.S. Lead 6-1; Flex. Cond. S.S. 3/8"; D.S. 3/8"; Lamp Cords 14-2, 16-2, 16-3, 18-3; Lamp Cords Reenf. S.S. 16-2, 18-2; D.S. 14-2, 16-2, 18-2, and other special sizes.
300-V	Takes same sizes of cables as No. 300. Visible type for bushed cable.
301	S.S. 10-3, 8-2, 8-3; D.S. 10-2, 10-3, 8-2; S.S. Lead 14-2, 14-3, 12-2, 12-3, 10-2, 10-3; D.S. Lead 14-2, 14-3, 12-2, 12-3, 10-2, 4-1, and others.
302	S.S. 10-4, 8-3; D.S. 10-4, 8-3; S.S. Lead 8-2, 8-3; D.S. Lead 10-3, 12-4, 12-3, 10-2, 4-1; Flex. Conduit 1/2" S.S. and 1/2" D.S.
304	S.S. 8-3, 6-2, 6-3, 4-2, 4-3; D.S. 6-2, 6-3, 4-2; S.S. Lead 6-2, 6-3; Flex. Conduit 3/4" S.S. and 3/4" D.S. 6-3 Service Ent. Cable.
306	S.S. 4-4, 2-2; D.S. 4-4, 4-3, 2-2; S.S. Lead 4-2, 4-3; Flex. Conduit 1" S.S. and 1" D.S.
308	Flex. Conduit 1 1/4" S.S. and 1 1/4" D.S.
310	Flex. Conduit 1 1/2" S.S. and 1 1/2" D.S.
312	Flex. Conduit 2" S.S. and D.S.

SPECIAL SIZE.

305	Special sizes.
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T. & B. ANGLE "TITE-BITE" CONNECTORS

FOR ARMORED CONDUCTORS AND FLEXIBLE STEEL CONDUITS



No. 321



No. 327 and all large sizes

T. & B. has designed a remarkable advanced type Tite-Bite Angle Connector with a screwless removable cap. Just tap the cover and it slides off. After cable is installed, tap the cover again and make up the Tite-Bite grip and the cover is on to stay—a neat, easy and more efficient job. The screwless feature is gradually being adapted to the entire line of T. & B. Tite-Bite Angle Connectors.

List No.	Size	Size K.O.	Inside Bushed Diam.	Unit pkg.	Std. pkg.	Wgt. per 100 in lbs.	List Price per 100
321	3/8"	1/2"	1/2"	50	100	18	\$ 16.00
322	3/8"A	1/2"	17/32"	50	100	27	20.00
323	1/2"	1/2"	19/32"	50	100	29	20.00
325	3/4"	3/4"	49/64"	50	50	34	40.00
326	1"	1"	1"	25	25	60	60.00
327	1 1/4"	1 1/4"	1 1/4"	10	10	110	75.00
330	2 1/2"	2 1/2"	2 1/2"	5	5	500	225.00
331	3"	3"	3"	5	5	650	262.50
326 1/2	3/4"S	1"	7/8"	50	50	60	40.00
327 1/2	1" S	1"	1 1/16"	25	25	74	60.00

MADE TO HOLD

List No.	Sizes of conductors listed, and others
321	S.S. 14-2, 14-3, 12-2, 12-3, 10-2, 4-1, 6-1; D.S. 4-1, 6-1, 12-2, 12-3, 14-2, 14-3; S.S. Lead 8-1, 14-2, 14-3; D.S. Lead 6-1; Flex. Cond. S.S. 3/8"; D.S. 3/8"; Lamp Cords 14-2, 16-2, 16-3, 18-3; Lamp Cords Reenf. S.S. 16-2, 18-2; D.S. 14-2, 16-2; 18-2, and other special sizes.
322	S.S. 10-3, 8-2, 8-3; D.S. 10-2, 10-3, 8-2; S.S. Lead 14-2, 14-3, 12-2, 12-3, 10-2, 10-3; D.S. Lead 14-2, 14-3, 12-2, 12-3, 10-2, 4-1; and others.
323	S.S. 10-4, 8-3; D.S. 10-4, 8-3; S.S. Lead 8-2, 8-3; D.S. Lead 10-3, 12-4, 12-3, 10-2, 4-1; Flex. Conduit 1/2" S.S. and 1/2" D.S.
325	S.S. 8-3, 6-2, 6-3, 4-2, 4-3; D.S. 6-2, 6-3, 4-2; S.S. Lead 6-2, 6-3; Flex. Conduit 3/4" S.S. and 3/4" D.S. 6-3 Service Ent. Cable.
326	S.S. 4-4, 2-2; D.S. 4-4, 4-3, 2-2; S.S. Lead 4-2, 4-3; Flex. Conduit 1" S.S. and 1" D.S.
327	Flex. Conduit 1 1/4" S.S. and 1 1/4" D.S.
330	Flex. Conduit 2 1/2" S.S. and 2 1/2" D.S.
331	Flex. Conduit 3" S.S. and 3" D.S.

Special Sizes:

326 1/2 Special sizes.

327 1/2 Special sizes.

T. & B. INSULETS

FOR NON-METALLIC SHEATHED CABLE

T. & B. Non-Metallic Sheathed Cable and Insulets are fitted with three-hole composition insulators, with one hole plugged. The insulator turns freely in its holder. They fasten securely to the cable with the T. & B. Tite-Bite Corrugated Grip.



No. 1655

Unit package: 25. Standard Package: 100.
Weight per 100: 16 lbs.

List No.	Size	Made to hold	List Price per 100
1655	3/8"	14W2, 14W3, 12W2, 12W3.....	\$20.00



No. 1610

T & B CONDUIT "INSULETS"

Base made for malleable iron galvanized; insulator has three wire holes, one-plugged.



No. 1660

List No.	Size	Std. Pkg.	Wt. Lbs. Per 100	List Price Per 100
1610	1/2"	100	15	\$20.00
1611	3/4"	100	19	30.00
1612	1"	50	38	40.00
1660	1/2" Rd.	100	11	20.00

T & B CONDUIT ANGLE "INSULETS"

Designed for use as a service entrance on horizontal conduit, also inside installations. Furnished complete with three wire hole insulator and screws (one-plugged). Malleable iron galvanized.



List No.	Size	Std. Pkg.	Wgt., Lbs. Per 100	List Price Per 100
1640	1/2"	50	44	\$30.00
1641	3/4"	50	52	45.00
1642	1"	30	108	60.00



No. 2000

T & B CABLE "INSULETS"

Designed to combine a motor outlet or pipe cap and a cable connector thereby saving the cost of assembling these fittings. Made of malleable iron galvanized; insulator has three wire holes, one-plugged.

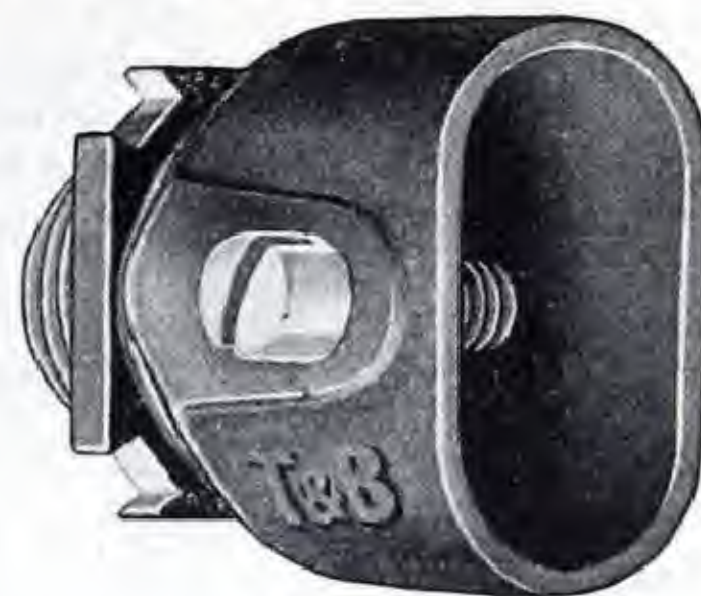


No. 1650

List No.	Size	Std. Pkg.	Wgt. Lbs. Per 1000	List Price Per 100 Pcs.
1650	3/8" Rd.	100	18	\$20.00
2000	3/8"	100	25	20.00
Made to Hold—14W2, 14W3, 12W2, 12W3, 10W2, 10W3, 3/8" S.S. and 3/8" D.S. Conduit.				

T. & B. DUPLEX CONNECTORS

Designed to accommodate two armored cables in the same knockout, saving labor, time and materials. The fitting has a single opening. Both cables are securely wedged in place by a single screw. Made of malleable iron, and plated with Tabolite Superior Galvanizing.



No. 239

Unit package: 25. Standard package: 100.

Weight per 100: 15 lbs.

List No.	Size	Size K.O.	Made to hold	List price per 100
239	3/8"	1/2"	14W2, 14W3, 12W2.....	\$10.00

T & B ENTRANCE CAP



No. 1525

Approved by the National Board. May be used either on vertical or horizontal service entrance and outside conduit installations. Screws burred so they cannot fall out. Heavy cast iron, galvanized; will not rust. All entrance caps will be furnished with insulators having four wire holes two-plugged unless otherwise specified.

List No.	Size	Std. Pkg.	Wgt., Lbs. Per 100	List Price Per 100
1525	1/2"	50	76	\$ 50.00
1526	3/4"	50	108	65.00
1527	1"	25	164	80.00
1528	1 1/4"	10	200	200.00
1529	1 1/2"	5	300	225.00
1530	2"	5	800	400.00
1531	2 1/2"	5	1500	900.00
1532	3"	5	2600	1100.00
1533	3 1/2"	2	2600	1900.00

T & B CAPPED ELBOWS

Designed for use as a service entrance fitting. Fittings are smooth on the interior, providing a smooth raceway for the wires. They are galvanized and provide a weatherproof entrance.



List No.	Size	Std. Pkg.	Wgt., Lbs. Per 100	List Price Per 100
1480	1/2"	50	50	\$ 60.00
1481	3/4"	50	64	70.00
1482	1"	25	132	90.00
1483	1 1/4"	10	250	250.00
1484	1 1/2"	5	320	300.00

"SQUEEZE" COMBINATION COUPLINGS

Malleable iron—galvanized. For connecting flexible and rigid metallic conduits, also for connecting flexible metallic conduit to outlet boxes by means of the well known T. & B. chase nipple. One piece malleable iron galvanized. Cannot pull apart.



No. 230

List No.	Size	Made to Hold	Unit Std. Pkg.	Std. Pkg.	Wgt. Lbs. Per 100	List Price Per 100
230	1/2"	1/2" S.S. Conduit, 1/2" D.S. Conduit, 6W2 S.S., 8W3 D.S., 6W2 D.S.	10	100	18	\$15.00
231	3/4"	3/4" S.S. Conduit, 3/4" D.S. Conduit, 4W2 S.S., 6W3 S.S., 4W3 S.S., 4W2 D.S., 6W3 D.S.	10	100	25	20.00
231	1"	1" S.S. Conduit, 1" D.S. Conduit, 2W2 S.S., 2W2 D.S.	10	50	35	25.00
233	1 1/4"	1 1/4" S.S. Conduit	10	50	40	35.00
234	1 1/2"	1 1/2" S.S. Conduit	50	50	76	50.00
235	2"	2" S.S. Conduit, 2" D.S. Conduit	50	50	92	75.00

**Inclined Set Screw Connectors**

Locknuts are furnished with connectors without charge.

List No.	Size	Size K.O.	Made to Hold	Unit Std. Pkg.	Std. Pkg.	Wgt. Lbs. Per 100	List Price Per 100
240	3/8"	1/2"	No. 14W2, 14W3, and 12W2	50	1000	8	\$7.50
241	1/2"	1/2"	No. 8W2, 8W3, 10W2L, 8W2L, 10W3L 1/2" S.S. Conduit, 1/2" D.S. Conduit	50	100	14	9.00

Locknuts are furnished with above connectors without charge.

2020 Type Connectors

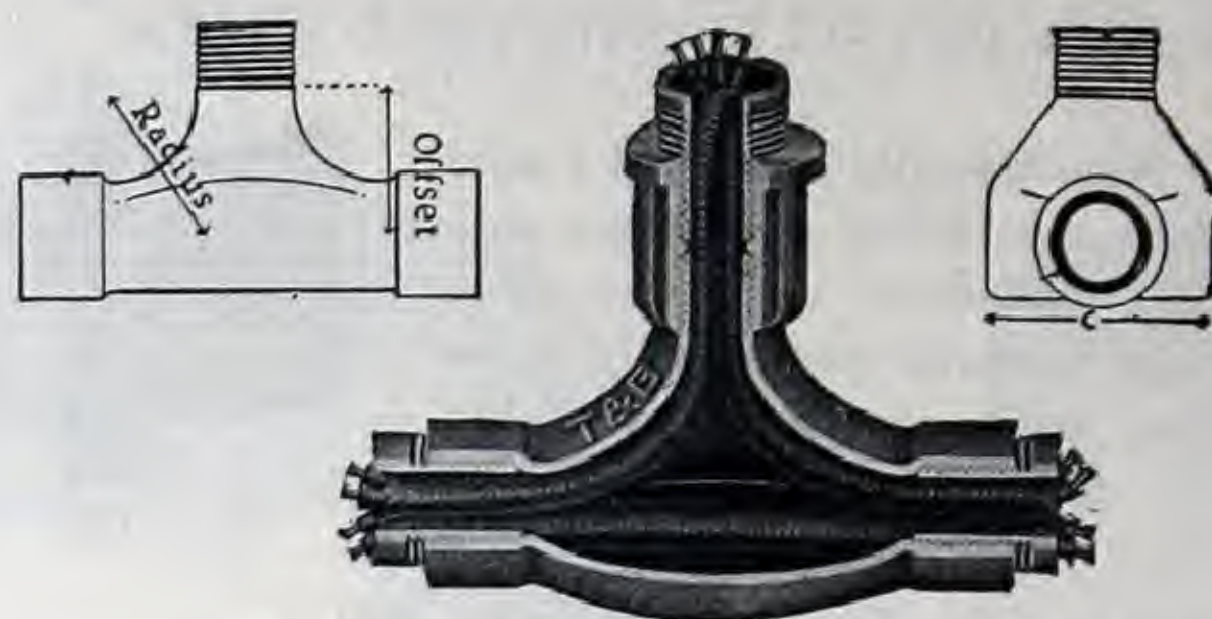
For Non-Metallic Sheathed Cable and Flexible Tubing Made of Steel. Galvanized



Made to Hold Non-Metallic Sheathed Cable

14W2, 14W3, 12W2, 12W3, 10W2, 10W3, also 3/2", 1/4", 3/8" flexible fibre tubing.

List No.	Size Inches	Size K.O.	Std. Pkg.	Wgt. Lbs. Per 100	List Price Per 100
2020	3/8"	1/2"	1000	3 1/2	\$7.50

T. & B. BULB TEES

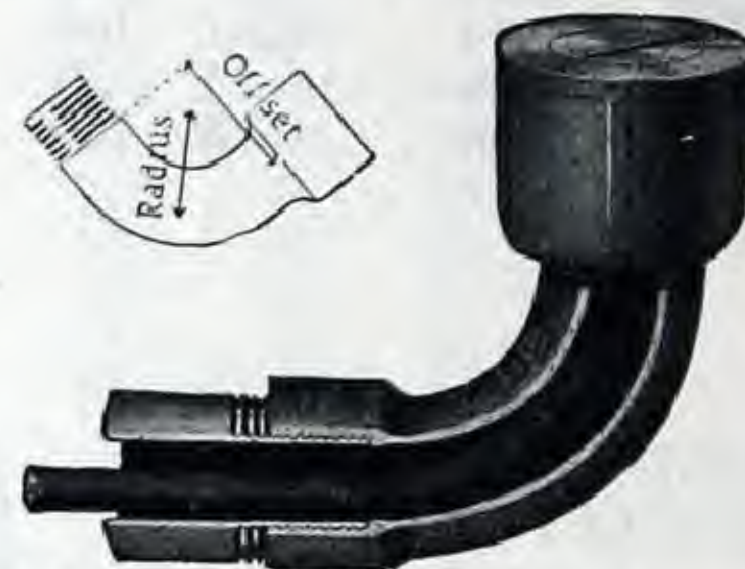
"Bulb" Tee with Brass Floor Coupling

MALLEABLE IRON, GALVANIZED—EASY TO PULL WIRE THROUGH

Approximate Measurements

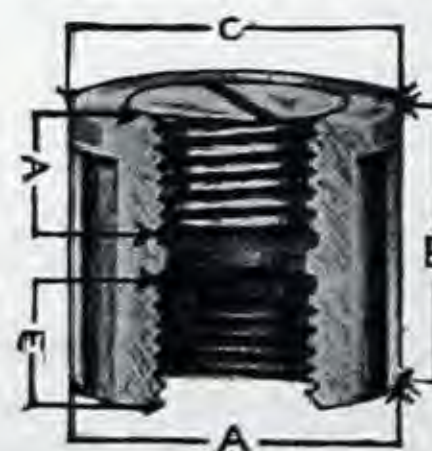
List No.	Size	A	B	C	Std. Pkg.	Weight Per 100 in lbs.	List Price Per 100
464	3/4"	4 11/16"	2 3/4"	2 3/8"	50	116	\$100.00
465	1"	5 1/2"	3 5/16"	2 7/8"	25	160	150.00
466	1 1/4"	6 5/8"	4 1/16"	3 3/4"	10	282	400.00

Radius and offset—same as Bushed Elbow, according to size.

BUSHED ELBOWS

Bushed Elbow with Brass Floor Coupling

List No.	Approx. Size	Measurements Radius	Offset	Std. Pkg.	Weight Per 100 in lbs.	List Price Per 100
460	1/2"	7/8"	1"	100	28	\$ 32.00
461	3/4"	1 1/8"	1 1/2"	100	43	45.00
462	1"	1 1/4"	1 3/4"	25	82	65.00
463	1 1/4"	1 1/2"	2"	10	130	200.00

BRASS FLOOR COUPLINGS

Designed for use with above Bushed Elbows and "Bulb" Tees. Can be used to great advantage with ordinary Conduit Elbows

List No.	Size	A	B	C	D	E	Std. Pkg.	Wt. Per 100 in lbs.	List Price Per 100
480	1/2"	1 1/8"	1 1/4"	1 3/16"	9/16"	9/16"	100	23	\$80.00
481	3/4"	1 3/8"	1 1/4"	1 7/16"	9/16"	9/16"	100	32	95.00
482	1"	1 11/16"	1 9/16"	1 3/4"	3/4"	3/4"	25	60	115.00
483	1 1/4"	2 1/8"	1 5/8"	2 3/16"	1 1/16"	1 1/16"	10	100	250.00

T. & B. CAST IRON JUNCTION BOXES



UNFLANGED TYPE

Boxes listed are all black japan finish.
Add 25% net for hot-dip galvanizing.

Flanged Type

List No.	Size (Inches)			Box Only Japanned	Box and Cover Japanned	Gasket	Approx. Weight Com. In lbs.
	Width	Length	Depth				
10733	12	x 18	x 10	22.00	26.50	2.00	97
10734	12	x 19	x 4	11.00	15.50	2.00	55
10735	12	x 20	x 5	22.00	27.00	2.50	62
10736	12	x 22	x 5	27.00	37.00	2.80	68
10737	12	x 24	x 6	30.00	40.50	3.00	82
10738	12	x 24	x 24	98.00	108.50	3.00	185
10883	14	x 14	x 10	24.00	31.00	3.00	107
10739	14	x 19	x 6	25.00	35.00	3.00	95
10740	14	x 24	x 12	32.00	44.00	3.50	178
10887	16	x 24	x 8	31.00	44.00	3.80	139
10741	16	x 24	x 12	62.00	75.00	3.80	197
10851	16	x 48	x 8	102.00	120.00	5.00	250
10742	18	x 18	x 5	24.00	32.00	2.50	106
10743	18	x 18	x 6	21.00	29.00	2.50	117
10744	18	x 24	x 6	29.00	37.50	3.50	168
10745	18	x 24	x 8	40.00	48.50	3.50	196
10746	24	x 24	x 8	48.00	62.00	4.00	265
10888	24	x 28	x 3 1/2	37.00	52.00	4.50	225
10850	24	x 48	x 8	110.00	140.00	5.50	370
10849	30	x 36	x 8	118.00	130.00	5.50	385
10848	39	x 46	x 8	150.00	176.00	6.00	570

T. & B. CAST IRON JUNCTION BOXES

UNFLANGED TYPE

(Continued)

Boxes listed are all black japan finish. Add 25% net for hot-dip galvanizing.

List No.	Size (Inches)			Box Only Japanned	Box and Cover Japanned	Gasket	Approx. Weight Com. In lbs.
	Width	Length	Depth				
10733	12	x 18	x 10	22.00	26.50	2.00	97
10734	12	x 19	x 4	11.00	15.50	2.00	55
10735	12	x 20	x 5	22.00	27.00	2.50	62
10736	12	x 22	x 5	27.00	37.00	2.80	68
10737	12	x 24	x 6	30.00	40.50	3.00	82
10738	12	x 24	x 24	98.00	108.50	3.00	185
10883	14	x 14	x 10	24.00	31.00	3.00	107
10739	14	x 19	x 6	25.00	35.00	3.00	95
10740	14	x 24	x 12	32.00	44.00	3.50	178
10887	16	x 24	x 8	31.00	44.00	3.80	139
10741	16	x 24	x 12	62.00	75.00	3.80	197
10851	16	x 48	x 8	102.00	120.00	5.00	250
10742	18	x 18	x 5	24.00	32.00	2.50	106
10743	18	x 18	x 6	21.00	29.00	2.50	117
10744	18	x 24	x 6	29.00	37.50	3.50	168
10745	18	x 24	x 8	40.00	48.50	3.50	196
10746	24	x 24	x 8	48.00	62.00	4.00	265
10888	24	x 28	x 3 1/2	37.00	52.00	4.50	225
10850	24	x 48	x 8	110.00	140.00	5.50	370
10849	30	x 36	x 8	118.00	130.00	5.50	385
10848	39	x 46	x 8	150.00	176.00	6.00	570

How To Order Cast Iron Boxes

Numbers of boxes listed apply to cast iron boxes, with cover, but without gasket or drilling or drilling and tapping for conduit.

For box only, use number and add letter "B."

For cover only, use number and add letter "C."

(Illus.—No. 10860 means box and cover; No. 10860-B means box only; No. 10860-C means cover only).

For hot-dip galvanizing add 25% net.

For unbreakable Tabiron, slight additional charge.

For other metals and special finishes, quotations on request.

Dimensions of cast iron boxes are always understood to be inside measurements unless otherwise specified.

Holes

Locate holes desired on a sketch. State trade pipe size and whether holes are to be drilled only, or drilled and tapped. Unless otherwise specified, we will drill slip holes only for conduit size indicated, and locate them at our discretion as near the back of the box as possible.

Trade pipe size.....	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{3}{4}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "
Drilling, slip-hole only....	.10	.10	.12	.16	.30	.40
Drilling and tapping.....	.18	.18	.20	.24	.50	.65
Minimum distance between hole centers. (Allowing for locknut and bushing)		$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	$1\frac{7}{8}$ "	$2\frac{3}{8}$ "	$2\frac{5}{8}$ "
Diameter of slip-hole.....	$1\frac{1}{8}$ "	$\frac{7}{8}$ "	$1\frac{1}{8}$ "	$1\frac{3}{8}$ "	$1\frac{1}{4}$ "	$1\frac{1}{8}$ "

Trade pipe size.....	2"	$2\frac{1}{2}$ "	3"	$3\frac{1}{2}$ "	4"	5"	6"
Drilling, slip-hole only....	.50	.70	.80	1.00	1.30	1.80	2.50
Drilling and tapping.....	.80	1.20	1.40	1.50	1.90	3.50	4.25
Minimum distance between hole centers. (Allowing for locknut and bushing)	$3\frac{1}{4}$ "	$3\frac{3}{4}$ "	$4\frac{3}{4}$ "	$5\frac{1}{2}$ "	6"	$7\frac{1}{4}$ "	$8\frac{1}{4}$ "
Diameter of slip-hole.....	$2\frac{1}{2}$ "	$2\frac{3}{4}$ "	$3\frac{1}{8}$ "	$4\frac{1}{8}$ "	$4\frac{3}{8}$ "	$5\frac{1}{8}$ "	$6\frac{1}{8}$ "

Hinged Covers—The hinges of standard T. & B. boxes with covers are always on the long side of the box.

Special Boxes—For quotations on special sizes and types of boxes, please furnish complete descriptive sketch with dimensions and information noted above.

(Continued next column)

T. & B. CAST IRON JUNCTION BOXES

FLANGED TYPE



Flanged Type

T. & B. Flanged and Unflanged cast iron boxes are watertight and weatherproof when gasketed. They are heavy walled boxes designed to meet the most rigid requirements of subway, railway, industrial, marine, underground work, etc. Thinner walled boxes may be furnished, if desired, at less cost.

Boxes listed are all black japan finish. Add 25% net for hot-dip galvanizing.

List No.	Size (Inches)			Box Only Japanned	Box and Cover Japanned List Price Each	Gasket	Approx. Weight Com. In lbs.
	Width	Length	Depth				
10750	3	x 5 1/4	x 2	\$ 1.70	\$ 2.20	\$.30	4.4
10751	3	x 6	x 2	1.90	2.50	.30	5
10752	3 1/4	x 3 1/4	x 1 1/2	1.10	1.50	.20	2.4
10753	3 1/2	x 3 1/2	x 1 1/2	1.30	1.70	.20	2.7
10754	3 1/2	x 4 1/2	x 1 1/2	1.70	2.20	.30	3
10755	3 1/2	x 4 1/2	x 2	1.80	2.30	.30	3.4
10895	4	x 4	x 3	1.40	2.00	.30	3.8
10756	4	x 4	x 4	2.00	2.60	.30	3.8
10914	4	x 6	x 3	2.80	3.60	.40	7
10899	4	x 8	x 3	3.60	4.80	.60	12.6
10757	4	x 12	x 4	3.80	5.40	.70	10.8
10896	5	x 6	x 3	2.40	3.10	.50	6.8
10897	6	x 6	x 3	2.50	3.70	.60	9
10898	6	x 6	x 4	3.40	4.70	.60	8
10915	6	x 6	x 6	3.80	5.10	.60	14
10900	6	x 8	x 3	4.60	6.00	.70	14
10902	6	x 8	x 4	4.30	5.70	.70	15
10916	6	x 8	x 6	5.00	6.40	.70	15.5
10758	6	x 9	x 4	4.60	6.20	.80	18
10759	6	x 10	x 6	4.80	6.60	.80	24
10906	6	x 12	x 3	6.80	8.80	1.00	20
10908	6	x 12	x 4	7.20	9.20	1.00	19
10910	6	x 12	x 6	10.80	12.80	1.00	24
10760	6	x 24	x 4	12.00	16.00	2.00	44
10761	6 1/4	x 12 1/4	x 6	12.00	14.50	1.40	25
10901	8	x 8	x 3	6.00	8.00	.90	14
10903	8	x 8	x 4	6.20	8.20	.90	16
10904	8	x 8	x 6	7.30	9.30	.90	18
10763	8	x 8	x 8	7.80	9.80	.90	20
10917	8	x 12	x 4	8.50	11.50	1.00	24
10764	8	x 12	x 6	10.00	13.00	1.00	28
10918	8	x 12	x 8	15.00	18.00	1.00	32
10765	8	x 12	x 9	18.00	21.00	1.00	47
10783	8	x 30	x 4	22.00	38.00	3.00	107
10784	9	x 16	x 5	12.00	18.00	2.00	50
10766	9	x 24	x 4	20.00	30.00	2.40	60
10913	9	x 24	x 8	34.00	44.00	2.40	89
10767	9	x 28	x 8	36.00	54.00	3.00	114
10905	10	x 10	x 8	11.10	14.30	1.00	104
10768	10 1/4	x 16 1/4	x 12	24.00	32.00	2.20	74
10907	12	x 12	x 3	9.00	13.00	1.20	41
10909	12	x 12	x 4	9.00	13.00	1.20	45
10911	12	x 12	x 6	14.00	18.00	1.20	52
10769	12	x 12	x 12	20.00	24.00	1.20	96
10770	12	x 16	x 4	10.00	14.60	1.30	42
10771	12	x 18	x 12	32.00	37.50	1.40	130
10785	12	x 24	x 12	34.00	42.00	3.00	113
10786	12	x 28	x 8	42.00	60.00	3.50	165
10772	12	x 36	x 6	66.00	94.00	4.00	178
10912	14	x 18	x 6	20.00	26.20	1.50	80
10773	14	x 20	x 6	28.00	36.00	2.00	88
10774	14	x 24	x 7	34.00	46.00	3.00	119
10775	15 1/2	x 15 1/2	x 5	17.00	26.00	2.00	77
10776	16	x 24	x 12	32.00	46.00	3.00	210
10777	16	x 30	x 8	42.00	64.00	3.50	205
10778	18	x 18	x 8	31.00	44.00	3.00	140
10787	18	x 26	x 5	43.00	64.00	4.00	170
10779	18	x 30	x 8	50.00	74.00	3.80	235
10780	24	x 30	x 12	66.00	94.00	4.00	360
10788	25	x 26	x 9	67.00	88.00	4.00	270
10781	30	x 30	x 12	110.00	172.00	4.50	455
10782	30	x 48	x 12	180.00	290.00	6.00	910

UTILITY OUTLET BOXES & COVERS



No. 2020



No. 20C



No. 20E



No. 20B



No. 20F

UTILITY OUTLET BOX

List No.	Description	Std. Pkg.	Wgt. Per Pkg.	L. Pr.
2020	Flush Device Box, 4 1/2" long, 2 1/8" wide, 1 7/8" deep. 1 knockout in each end, 3 in each side and 3 in bottom for 1/2" conduit.	48	30 lbs.	\$31

STEEL COVERS

List No.	Description	Std. Pkg.	Wgt. Per Pkg.	L. Pr.
20 A	Blank	100	11 lbs.	\$19
20 B	For Double Push Switch	100	11 lbs.	19
20 C	For standard duplex receptacle	100	11 lbs.	19
20 E	For standard square handled Toggle Switch	100	11 lbs.	19
20 F	For single T slot or Edison Receptacle	100	11 lbs.	19

AMALGAMATED WIRING DEVICES

Octagonal Extension Rings
4-Inch

No. 55151-C

14 Gauge Steel—Electro Galvanized Finish

List No.	Description	Std. Pkg.	Wgt. Per Pkg.	L. Pr. Eac
55151-C	4" Octagonal Box Extension. Depth 1 1/2", with lugs. Four 3/4" knockouts in sides and four 1/2" knockouts in corners	100	54	\$0.
55171-C	4" Octagonal Box Extension. Depth 2 1/8" with lugs. Four 3/4" knockouts in sides and four 1/2" knockouts in corners	100	64	

R. & S. WIRING DEVICES

Flush Receptacles and Plugs

TWO AND THREE WIRE POLARIZED
30 AMP. 250 VOLTS

For Standard Outlet Box with Raised Covers



No. 81



No. 80

Receptacles and plugs are made of Bakelite, with heavy self-aligning machined contacts. Cable grip is incorporated in aluminum plug handle.

Plugs will also fit floor receptacles, connectors and other receptacles.

Receptacle plates are $2\frac{3}{4}$ " x $4\frac{1}{2}$ ". Receptacle plates are regularly finished in struck up brass .060". If solid brass or bronze plates are required, they should be specified on the order. Plates upon application.

Standard finish, brush brass. All other finishes extra.

Description	Approx. Net Wgt. Lbs.	List Price Each
Two wire, complete (plug, plate and receptacle).....	1	\$5.65
Two wire plug only.....	$\frac{1}{4}$	2.70
Three wire, complete (plug, plate and receptacle).....	$1\frac{1}{2}$	8.25
Three wire plug only.....	$\frac{3}{4}$	3.15

Switchboard Type Receptacles and Plugs

10 TO 100 AMP.—SINGLE POLE



Receptacles consist of a machined sleeve with insulating heavy nuts (for fastening to switchboard) and lug for wiring cable.

Plugs are of composition with machined contact pins. The plug sizes, i.e., 60 to 100 amp., have removable contact tips, making it convenient to renew plug contact, if damage to contact occurs, due to arcing or mechanical injury.

For mounting, drill proper clearance hole in switchboard and draw up with nuts.

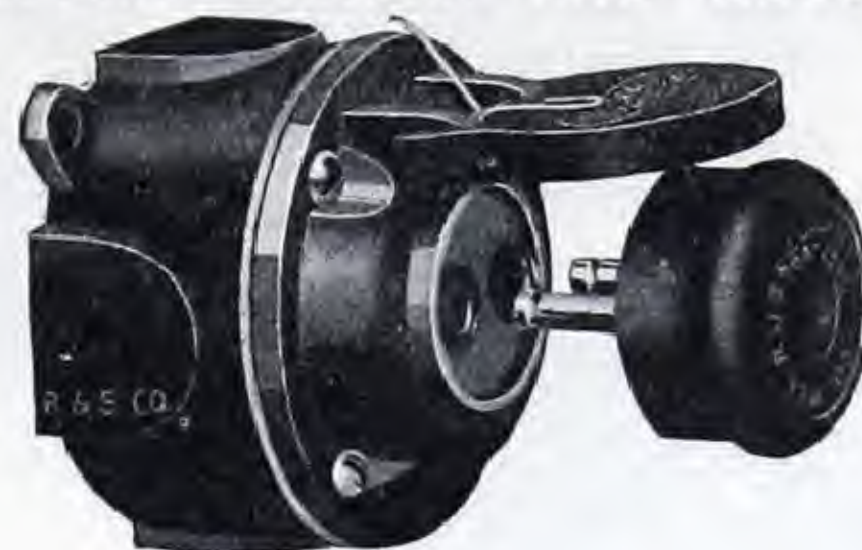
Specify thickness of switchboard, when ordering.

Amp. Rating	Description	Approx. Net Wgt. Lbs.	List Price Each
10	Receptacle only.....	$\frac{1}{4}$	\$1.35
10	Plug only.....	$\frac{1}{8}$	1.00
30	Receptacle only.....	$\frac{1}{4}$	1.45
30	Plug only.....	$\frac{1}{8}$	1.15
60	Receptacle only.....	1	3.75
60	Plug only.....	$\frac{1}{2}$	3.00
100	Receptacle only.....	$1\frac{1}{4}$	4.50
100	Plug only.....	$\frac{1}{2}$	4.50

R. & S. WIRING DEVICES

Surface Type Receptacles and Plugs

10 Amp., 250 Volts—Two Wire—Polarized and Reversible
WEATHERPROOF—SINGLE AND DOUBLE GANG



No. 123

A line of ruggedly designed fittings for use in places where dampness, dust or corrosive vapors exist; such as in greenhouses, garages, factories, power houses, chemical plants, etc.

The receptacles and plugs are of Bakelite with self-aligning contacts. Plugs will also fit connectors and other wall receptacles.

List Nos. 123 and 319, 3" dia. x $1\frac{1}{2}$ " deep. Galvanized cast iron.

Maximum conduit outlet $\frac{3}{4}$ ". Specify size and location of outlets when ordering.

Description	Approx. Net Wgt. Lbs.	Reversible List No.	Reversible List Price Each	Polarized List No.	Polarized List Price Each
Complete with plug..	$2\frac{1}{4}$	123	\$6.75	319	\$6.75
Plug only.....	$\frac{1}{4}$	120	1.80	347	1.80



No. 948

List Nos. 948 and 949, $4\frac{1}{2}$ " x 3" x $1\frac{3}{4}$ " deep.

List Nos. 340 and 345, $4\frac{1}{2}$ " x 6" x $1\frac{3}{4}$ " deep.

Galvanized cast iron.

Maximum conduit outlet 1". Specify size and location of outlets when ordering.

Description	Approx. Net Wgt. Lbs.	Reversible List No.	Reversible List Price Each	Polarized List No.	Polarized List Price Each
Single gang, complete with plug.....	3	948	\$ 7.50	949	\$ 7.50
Double gang, complete with two plugs	$5\frac{1}{2}$	340	15.00	345	15.00
Plug only.....	$\frac{1}{4}$	120	1.80	347	1.80

100 Amp., 250 Volts—Two Wire—Polarized



No. 991

Connectors are used principally for the charging of batteries. They are especially designed for application to industrial electric trucks, provision being made for battery tray mounting. They are frequently used for connecting of cables. Construction is unusually rugged. Bakelite interiors, cast aluminum housings and large self-aligning machined contacts insure successful performance under heavy overloads.

Weights approximately $2\frac{1}{2}$ lbs. net.

List No. 991 complete for flat cable, with side latches, list price..... \$16.65

R. & S. WIRING DEVICES

Angle Type Receptacles and Plugs

15 to 200 Amperes
TWO, THREE AND FOUR WIRE—POLARIZED
250 Volts D.C.—440 Volts A.C.
Weatherproof
(Type A)



Single Gang

RECEPTACLES LESS PLUGS

Single Gang

Amp.	Style	Wires	Poles	List No.	List Price Each	App. Net Wgt. Lbs.
15	2	2		3102	\$ 8.10	4 1/2
*15	2	3		3103	9.00	4 1/2
15	3	3		3103W	9.00	4 1/2
*15	3	4		3104	9.90	4 1/2
15	4	4		3104W	9.90	4 1/2
30	2	2		3112	9.00	6
*30	2	3		3113	9.90	6
30	3	3		3113W	9.90	6
*30	3	4		3114	10.80	6
30	4	4		3114W	10.80	6
60	2	2		3122	15.30	8 1/2
*60	2	3		3123	16.20	8 1/2
60	3	3		3123W	16.20	8 1/2
*60	3	4		3124	17.10	8 1/2
60	4	4		3124W	17.10	8 1/2
100	2	2		3132	42.00	23
*100	2	3		3133	46.50	23
100	3	3		3133W	46.50	23
*100	3	4		3134	51.00	23
100	4	4		3134W	51.00	23
200	2	2		3142	104.25	32 1/2
*200	2	3		3143	117.00	32 1/2
200	3	3		3143W	117.00	32 1/2
*200	3	4		3144	130.50	32 1/2
200	4	4		3144W	130.50	32 1/2

Double gang boxes take twice the list price of single gang.

*Equipment ground through separate pole; all others have equipment ground through shell only.

RECEPTACLE BOXES

Single gang				PLUGS	
Amp.	Dimensions Inches	Max. Cond. Inches	Dimensions Inches	Max. Cond. Inches	Max. O.D. Cable Inches
15	4 1/4 x 3 x 2 1/8	1	4 1/4 x 6 x 1 3/4	1	3/4
30	4 1/4 x 3 x 3 1/4	1	4 1/4 x 6 x 3 1/4	1 1/2	1
60	5 3/8 x 4 x 3	1 1/2	5 3/8 x 8 x 3	1 1/2	1 1/4
100	6 3/4 x 6 3/4 x 5 3/4	2 1/2	6 3/4 x 12 x 5 3/4	2 1/2	2
200	8 x 8 x 6	3	8 x 16 x 6	3	2 1/4

Plugs listed above will also fit connectors.

R. & S. WIRING DEVICES

Angle Type Receptacles and Plugs

15 to 200 Amperes
TWO, THREE AND FOUR POLE—POLARIZED
250 Volts D.C.—440 Volts A.C.
Watertight
(Type B)



Single Gang

RECEPTACLES LESS PLUGS

Single Gang

Amp.	Style	Wires	Poles	List No.	List Price Each	App. Net Wgt. Lbs.
*15	2	2		3302	\$12.15	4 1/2
15	2	3		3303	13.05	4 1/2
15	3	4		3304	13.95	4 1/2
*30	2	2		3312	13.50	6
30	2	3		3313	14.40	6
30	3	4		3314	15.30	6
*60	2	2		3322	22.95	9
60	2	3		3323	23.85	9
60	3	4		3324	24.75	9
*100	2	2		3332	52.50	23 3/4
100	2	3		3333	56.35	23 3/4
100	3	4		3334	60.00	23 3/4
*200	2	2		3342	117.00	29 1/2
200	2	3		3343	129.00	29 1/2
200	3	4		3344	141.00	29 1/2

PLUGS ONLY

Double gang boxes take twice the list price of single gang boxes.

RECEPTACLE BOXES

Single gang				PLUGS	
Amp.	Dimensions Inches	Max. Cond. Inches	Dimensions Inches	Max. Cond. Inches	Max. O.D. Cable Inches
15	4 1/4 x 3 x 2 1/8	1	4 1/4 x 6 x 1 3/4	1	3/4
30	4 1/4 x 3 x 3 1/4	1 1/2	4 1/4 x 6 x 3 1/4	1 1/2	1
60	5 3/8 x 4 x 3	1 1/2	5 3/8 x 8 x 3	1 1/2	1 1/4
100	6 3/4 x 6 3/4 x 5 3/4	2 1/2	6 3/4 x 12 x 5 3/4	2 1/2	2
200	8 x 8 x 6	3	8 x 16 x 6	3	2 1/4

Fittings marked () have no provision for equipment grounding. All others have equipment ground through separate pole.

Plugs listed above will also fit connectors.

Outlets—Maximum sizes as listed above. Specify size and location when ordering.

R. & S. WIRING DEVICES

Watertight Receptacles and Plugs

STANDARD ROUND TYPE

10 Amp., 125 Volts—Two Wire—Polarized



Box is 3" diameter by 1 $\frac{5}{8}$ " deep.
Maximum Conduit Outlet is $\frac{3}{4}$ " one way.
Specify size outlet wanted when ordering.
Can also be furnished with overhang cover for flush mounting.
Price on application.

No. 447

Description	Net Wgt. Lbs.	List Price
Complete with plug.....	2	2
Plug only.....	$\frac{1}{4}$	$\frac{1}{4}$

STANDARD RECTANGULAR TYPE

10 Amp., 125 Volts—Two, Three and Four Wire Polarized

Maximum conduit outlet $\frac{3}{4}$ " straight through.

Specify size and location of outlets when ordering.



No. 479

Description	Approx. Net Wgt. Lbs.	List Price Each
Two wire, complete with plug and 4 $\frac{1}{8}$ " x 3" x 1 $\frac{1}{2}$ " deep box.....	2 $\frac{3}{4}$	\$6.75
Two wire plug only.....	$\frac{1}{4}$	1.50
Three wire, complete with plug and 4 $\frac{1}{8}$ " x 3" x 1 $\frac{3}{4}$ " deep box.....	3	8.25
Three wire plug only.....	$\frac{1}{4}$	2.25
Four wire, complete with plug and 4" x 4" x 1 $\frac{1}{2}$ " deep box.....	3 $\frac{1}{2}$	12.75
Four wire plug only.....	$\frac{1}{2}$	3.75

CAST BRASS BOXES AND COVERS

10 Amp., 125 Volts—Two Wire—Polarized Receptacles



Combination of single pole switch and two wire receptacle mounted in one box as illustrated.

Maximum conduit outlet $\frac{3}{4}$ " straight through.

Specify size and location of outlets when ordering.

Box is 4 $\frac{1}{8}$ " x 3" x 1 $\frac{1}{2}$ " deep.

No. 478

Description	Approx. Net Wgt. Lbs.	List Price Each
Complete with plug.....	3	\$9.00
Plug only.....	$\frac{1}{4}$	1.50

R. & S. WIRING DEVICES

Watertight Snap Switches

CUT BRASS BOXES AND COVERS

10 to 30 Amp., 125 Volts

Single Pole, Double Pole and Three Way



No. 496

10 Amp., maximum conduit outlet $\frac{3}{4}$ " straight through; 30 Amp., 1" conduit.
Specify size and location of outlets when ordering.

List No.	Amp.	Description	Deep Box	Approx. Net Weight Lbs.	List Price Each
496	10	Single pole with 4 $\frac{1}{8}$ " x 3" x 1 $\frac{1}{2}$ "		2 $\frac{1}{4}$	\$ 6.00
1493	10	Double pole with 4 $\frac{1}{8}$ " x 3" x 1 $\frac{7}{8}$ "		2 $\frac{1}{2}$	7.50
1496	10	Three way with 4 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ " x 2"		3 $\frac{3}{4}$	9.90
621	30	Double pole with 4 $\frac{3}{4}$ " x 4 $\frac{1}{4}$ " x 2"		5 $\frac{1}{4}$	18.00

Ever-Lok Conduit Box Type Receptacles

FOR TYPE FS AND SIMILAR CONDUIT FITTINGS

Two, Three and Four Pole—Polarized

With Hinged Door

4 $\frac{5}{16}$ " x 2 $\frac{13}{16}$ ", struck up steel covers .063". With four retained cadmium plated screws for mounting on box. Standard finish, cadmium plated.

Other finishes extra.



No. 8004

Can also be furnished with cadmium galvanized cast iron conduit box No. 8009 for surface mounting at \$1.60 list additional. Maximum conduit $\frac{3}{4}$ ". Specify size when ordering.

List No.	Description	Take Plug	List Price
10 Amp., 250 Volts D.C.—440 Volts A.C.			
20 Amp., 125 Volts D.C.			
8002	Two Pole (receptacle and cover)...	8012	\$3.75
8003	Three Pole (receptacle and cover)...	8013	3.90
8008	Four Pole (receptacle and cover)...	8018	4.05
20 Amp., 250 Volts D.C.—440 Volts A.C.			
30 Amp., 125 Volts D.C.			
8006	Two Pole (receptacle and cover)...	8016	4.00
8005	Three Pole (receptacle and cover)...	8015	4.15
8004	Four Pole (receptacle and cover)...	8014	4.30

Fused Connector

FOUR POLE—POLARIZED

20 Amp., 250 Volts D.C.—30 Amp., 125 Volts D.C.



No. 9124 Interior View

List No.	Description	Max. cable Size	Std. Pkg.	List Price
9124	Cadmium Plated	$\frac{5}{8}$ " dia.	100	\$6.90†

†Without fuses.

R. & S. FLOOR BOXES

Non-Adjustable

10 Amp., 250 Volts—Two and Three Wire and Low Tension or Junction Box Type



No. 2580

A high grade line of floor boxes intended for use in wood flooring. Easy to install and can be firmly secured.

Box is made of galvanized cast iron, floor plate of heavy brass and provided with suitable gaskets to make it watertight.

As listed below, fittings are furnished with or without receptacles, providing for uniformity when used for either low or

high tension installations.

All parts of these floor boxes are interchangeable.

Height $3\frac{1}{4}$ ". Diameter of floor plate $3\frac{1}{2}$ ".

Each box is packed in a strong carton properly labeled.

Two $\frac{1}{2}$ " outlets on sides, two $\frac{1}{2}$ " on bottom (three outlets plugged). Can be tapped on sides only for $\frac{3}{4}$ " upon request without extra charge. Specify size and location of outlets when ordering.

List No.	Description	List Price Each
2580	Two wire complete with receptacle, cone nozzle and $2\frac{1}{8}$ " dia. flush cap.....	\$4.15

Adjustable Floor Boxes

ROUND TYPE



No. 2503

The R. & S. Adjustable Floor Boxes are of simple design, making them easy to install by reducing the number of parts comprising a complete fitting to a minimum. The adjustment and grounding feature eliminates the use of special cement and naturally reduces the installation cost. They are ruggedly designed to withstand the rough usage to which they are put. Gaskets are provided to make the boxes watertight.

Boxes are provided with a flanged ring which is desirable as the floor plate may then be removed without danger of chipping the surrounding marble or finished floor.

The complete fitting consists of a galvanized heavy cast iron box, an adjustable ring, a heavy brass floor plate with a flanged ring and a flush $\frac{1}{2}$ " pipe size cap or a $2\frac{1}{8}$ " diameter cap.

List No. 2503 Floor Boxes with $2\frac{1}{8}$ " diameter caps should be ordered when cone nozzles are to be installed. They can also be furnished with combination $\frac{1}{2}$ " and $2\frac{1}{8}$ " caps if desired.

Height $3\frac{5}{8}$ " minimum. Diameter of box $4\frac{1}{2}$ ".

Diameter of flanged ring $4\frac{1}{8}$ ".

Ample angular and $\frac{3}{4}$ " vertical adjustments.

Receptacles are not furnished. Boxes will take any standard convenience receptacle that is arranged for switch box mounting.

Each box is packed in a strong carton properly labeled.

Regularly furnished drilled and tapped $\frac{1}{2}$ " outlets—four way (three outlets plugged). Can be tapped up to 1" upon request without extra charge. Specify size and location of outlets when ordering.

List No.	Description	Net Wght. Lbs.	List Price
2503	Complete with List No. 2525 cover plate $2\frac{1}{8}$ " in diameter.....	$4\frac{1}{4}$	\$6.00

R. & S. FLOOR BOXES

Adjustable Floor Boxes

RECTANGULAR TYPE



No. 2511

Complete with No. 2538 Cover Plate

These boxes consist of a galvanized cast iron body, with heavy adjustable floor flange, and provided with heavy brass floor plates. Regularly fitted with either $\frac{1}{2}$ " pipe size or $2\frac{1}{8}$ " diameter flush caps. Suitable gaskets are provided to make the boxes watertight.

The adjustment and grounding feature eliminates the use of special cement and naturally reduces the installation cost.

Gang boxes have partitions separating the sections so that both high and low tension circuits may be run into the same box.

List No. 2537 floor plates with $\frac{1}{2}$ " pipe size caps are required when stand pipes are to be used. They are also furnished with $\frac{3}{4}$ " or 1" pipe size caps if desired. Prices upon application.

List No. 2538 plates with $2\frac{1}{8}$ " caps should be ordered when cone nozzles are to be installed.

Height, $3\frac{3}{4}$ " minimum. Width, $5\frac{5}{16}$ ".

Gangs.....	One	Two	Three	Four	Five
Length.....	$4\frac{3}{4}$ "	$7\frac{3}{4}$ "	$10\frac{3}{4}$ "	$13\frac{3}{4}$ "	$16\frac{3}{4}$ "

Ample angular and $\frac{5}{8}$ " vertical adjustments.

Receptacles are not furnished. Boxes will take any standard convenience receptacle that is arranged for switch box mounting.

Outlets regularly drilled and tapped as follows: Single box—four $\frac{1}{2}$ " (three of them plugged). Gang boxes—two $\frac{1}{2}$ " in each section and one $\frac{1}{2}$ " on each end (all but one in each section plugged). Can be tapped to order up to $1\frac{1}{2}$ " upon request without extra charge. Specify size and location of outlets when ordering.

List No.	Description	Wgt. Lbs.	List Price
2511	Single Gang Complete with No. 2537 or No. 2538 cover plate.....	$6\frac{1}{2}$	\$7.50

Fan Hanger Outlets

YOKE LOCK TYPE



No. 661

The Yoke Lock Fan Hanger Outlet affords convenience, flexibility and lowest cost installation.

They are also particularly well adapted for individually illuminated pictures, electric heaters, radio loud speakers, etc. Pictures can be hung on supporting screw, concealing the receptacle outlet, cord and hangings.

List No.	Description	List Price Each
661	Two wire T slot type, with brush brass plate..	\$3.75
Above fan hangers can be supplied in other finishes. Prices upon application.		
Standard package 50.		

FLOOR BOXES

No. 1200 FLOOR BOX

For telephone and electric light outlets.

Hot Galvanized.

Cover is a heavy brass casting.
Absolutely watertight.

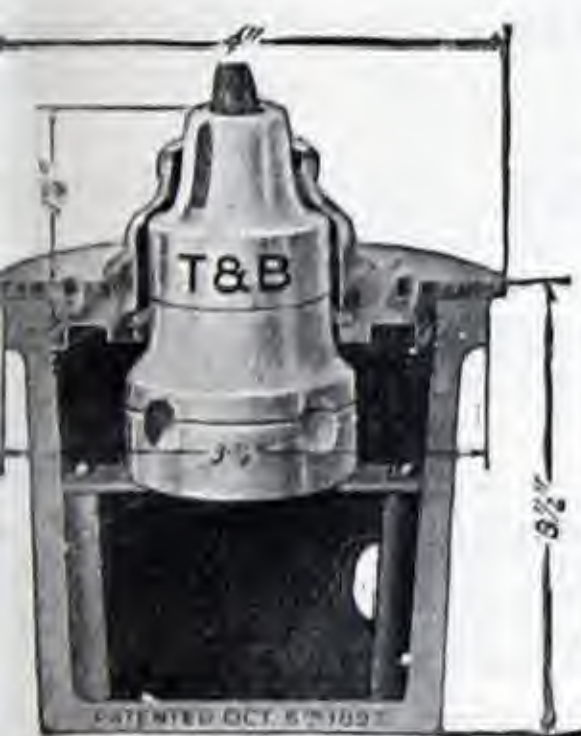
Std. Pkg., 25

List No.	List Price each
201* Iron Box with 3 plugs.....	\$1.30
202 Brass cover with 1/2" removable plug.....	.85
200 Box complete as per cut (weight 1 3/4 lbs. each)...	3.00
207 Rubber gasket....	.05



Box No. 1200

*Same iron box as used in No. 100 floor box.



No. 1100 WATERTIGHT FLOOR BOX

Takes from 1/2 inch to 1-inch conduit with receptacle in place. No hard taps required.

No rubber bushing to break.

Small, yet large enough.

Std. Pkg., 25

Box No. 1100

List No.	List Price Each
101 Iron Box.....	\$1.50
102 Brass Cover (without No. 1103 Disc).....	1.75
103 Brass Disc for Cover.....	.75
104 Brass Nozzle.....	1.50
105 Receptacle and Supporting Strap.....	.90
106 Brass Cover with 1/2" Removable Plug.....	2.50
107 Large Rubber Gasket.....	.20
108 Small Rubber Gasket.....	.10
100 Box complete as per cut (weight 3 3/4 lbs. each).	5.00

General

Specify number, size and location of holes. Prices for drilling or drilling and tapping are given below.

Size Hole	List Price Drilling Hole	Drilling and Tapping Hole
1/2"	.12	.18
3/4"	.15	.24
1"	.23	.45
1 1/4"	.30	.63
1 1/2" to 3"	.30	.90

EXPLOSION-PROOF ELECTRICAL SPECIALTIES



No. 4231
Explosion Proof Switch

All articles listed in this section have been designed to meet the exacting requirements of the Underwriters' Laboratories.

Industrial manufacturing plants, laboratories, hospital operating rooms, mines, distilleries, gas plants, oil refineries and wherever there exists a combustible vapor or dust area classified by the National Electric Code as hazardous, requires electrical material of an explosion-resisting type.

Particular attention is called to the generous dimensions of R. & S. junction boxes, switches, push-button stations, etc. More wiring space, extra heavy wall section and mounting lugs, easy access to interior for installation or inspection and many other points of superiority will be found in R. & S. Explosion-Proof fittings.

An exclusive R. & S. feature in all front operated switches is the double bearing for operating push rod. This feature permits the internal pressure resulting from the combustion and expansion of gases in the inclosure to equalize the thrust on operating plunger, permitting switch setting to remain unchanged. On devices having only a single bearing or one-way plunger, an internal pressure will actuate the plunger and switch automatically unless held forcibly in position.

Prices on application.

MARK TIME SWITCHES



Radio Switch

MARK-TIME RADIO SWITCH

This switch is specially designed for use to turn radio sets on or off at pre-set times, up to 10 hours. It is equipped with 6 ft. of cord and series plug into which the radio cap is inserted. You can leave your favorite station tuned in and use it as an alarm clock to wake you in the morning, or you can leave a program tuned in and have it automatically shut off any time up to 10 hours.

No installation necessary.

2 AMPERES, 110 VOLT A.C.

List No.	Casing	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
610	Bakelite	5 minutes	10 hours	10	\$6.25

Weight standard package 7 pounds.

MARK TIME SWITCHES

Mark-Time switches may be used to turn circuits off or on at set times, from seconds to hours. The switches may be used as ordinary toggle switches if desired.

Flush switches are installed in ordinary switch boxes in the same manner as the regular type flush toggle switch, and will be found very convenient for garage, cellar, warehouse, porch, window lighting or display lighting use.

Portable switches may be used for radio or other portable appliances if it is desired to turn on or off at pre-set times.

Mark-Time is also made in many types for use of manufacturers to incorporate in appliances for time control of electrical current.



Series 100



Series 200

SERIES 100

This series is used to turn one circuit off at pre-set time. The timing set dial at the side has ten graduations, each representing the minimum time as shown in schedule below.

To set switch the "off" and "on" lever in lower left-hand corner of plate is moved to the "on" position, and the bakelite switch lever pulled down as many times as time intervals desired. The bakelite lever is then left in the "off" position and switch will shut off at the time designated.

To operate as a regular type toggle switch, move time lever in lower left-hand corner to "off" position and use bakelite switch lever in same manner as operating standard type flush toggle switch.

Safety Toggle—Forcibly returns bakelite switch lever to the "off" position immediately the circuit is on. An extra safety feature to control heaters, sun lamps, etc. Specify list number and Safety Toggle—add 40c. to list.

May be used as a three-way switch. See wiring diagram in carton.

20 AMPERES, 110 VOLT

List No.	Plate	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
101	Bakelite	15 seconds	150 seconds	10	\$3.15
133	Bakelite	3 minutes	30 minutes	10	3.15

Weight, standard package, 5 lbs.

SERIES 200

This series operates in the same manner as Series 100, but has an additional convenience outlet. This device is a switched outlet for portable appliance use.

This type of switch will be found very convenient for use to control the following:

Air Conditioners	Fans	Percolators
Alarms	Grills	Radiators
Battery Chargers	Heaters	Radios
Nursery	Heating Pads	Refrigerators
Casseroles	Humidifiers	Sun Lamps
Clothes Washers	Ironing Machines	Thermostats
Curling Irons	Irons	Toasters
Dishwashers	Mixers	Ventilating Fans
Egg Boilers	Oil Burners	Waffle Irons
Exercisers		

10 AMPERES, 110 VOLT

List No.	Plate	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
240	Bakelite	36 seconds	6 minutes	10	\$3.75
233	Bakelite	3 minutes	30 minutes	10	3.75

Weight standard package 5½ pounds.

MARK TIME SWITCHES



Series 300



Series 400

SERIES 300

These switches can be used in three ways:

To use as ordinary flush toggle switch, leave timing dial at zero, and operate toggle lever "on" or "off."

To turn circuit on at pre-set time, set the toggle to the "off" position, set the timing dial to the time desired, then throw the toggle to the "on" position.

To turn circuit off at pre-set time, throw the toggle to the "on" position, set the timing dial to time desired, then throw the toggle to the "off" position.

May be used as a three-way switch. See wiring diagram in carton.

20 AMPERES, 110 VOLT

List No.	Plate	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
305	Bakelite	5 minutes	5 hours	10	\$ 8.75
310	Bakelite	5 minutes	10 hours	10	10.00
319	Bakelite	5 minutes	19 hours	10	12.50

Weight standard package 6¼ pounds.

SERIES 400

This series is the same as 300, with convenience outlet. This is a switched outlet for portable appliances.

Wiring diagram printed on inside of each carton.

This type of switch will be found very convenient for use to control the following:

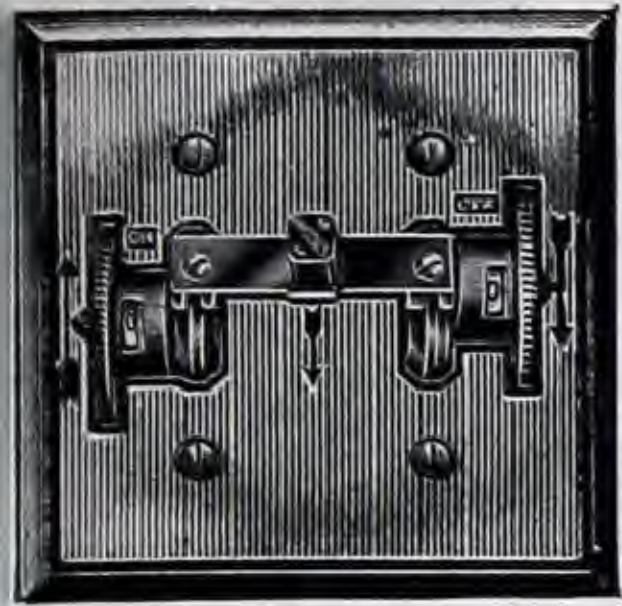
Air Conditioners	Fans	Percolators
Alarms	Grills	Radiators
Battery Chargers	Heaters	Radios
Nursery	Heating Pads	Refrigerators
Casseroles	Humidifiers	Sun Lamps
Clothes Washers	Ironing Machines	Thermostats
Curling Irons	Irons	Toasters
Dishwashers	Mixers	Ventilating Fans
Egg Boilers	Oil Burners	Waffle Irons
Exercisers		

10 AMPERES, 110 VOLT

List No.	Plate	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
405	Bakelite	5 minutes	5 hours	10	\$ 9.40
410	Bakelite	5 minutes	10 hours	10	10.65
419	Bakelite	5 minutes	19 hours	10	13.15

Weight standard package 7 pounds.

MARK TIME SWITCHES



Series 500 Switch



One Interval Switch

SERIES 500

This is a double duty series.

Turn on and off at pre-set time:

Have toggle in "up" position, then adjust left-hand dial to desired time to turn lights on, then adjust right-hand dial to desired time to turn lights off, throw toggle to "down" position.

Turn on instantly and off at pre-set time:

Have toggle in "up" position, leave left-hand dial at zero, adjust right-hand dial to desired time to turn lights off, then throw toggle to "down" position.

Installed in standard two-gang switch box.

20 AMPERES, 110 VOLT

	Plate	Maximum on	Maximum off	Std. Pkg.	List Price Each
109	Bakelite	19 hours	19 hours	10	\$20.00

Weight standard package 10 pounds.

ONE INTERVAL SWITCHES

One Interval Switches are operated the same as an ordinary toggle switch. When the switch is turned off, however, the lights remain on for the intervals shown in schedule below.

The switches listed below with suffix "L" to list number are equipped with safety return toggle and special locking feature. The current is automatically turned off at the time shown in schedule. Special locking feature prevents current from automatically shutting off when it is desired to keep the lights on longer than switch time.

Installed in single gang switch box.

To be used on:

Bedroom.....	No. 140	Closet.....	No. 107-L
Bathing-room.....	No. 107	Attic.....	No. 140-L
Bathing-room.....	No. 107	Cellar.....	No. 140-L
Living-room.....	No. 107	Kitchen.....	No. 107
Bottom of Stairs.....	No. 140-L	Pantry.....	No. 140-L
Top of Stairs.....	No. 140-L	Rear Porch.....	No. 140-L
Bedroom.....	No. 107	Garage.....	No. 140
Bedroom.....	No. 107		

20 AMPERES, 110 VOLT

	Plate	Time	Std. Pkg.	List Price Each
109	.040 B.B.	7 seconds	10	\$1.85
109-L	.040 B.B.	7 seconds	10	2.10
109	.040 B.B.	40 seconds	10	2.20
109-L	.040 B.B.	40 seconds	10	2.50
109	.040 B.B.	3 minutes	10	2.85
109-L	.040 B.B.	3 minutes	10	3.10

Weight standard package 5½ pounds.

MARK TIME SWITCHES



Series 1800
PORTABLE TYPE

These portable switches are equipped with 6 ft. of cord and series attachment tap into which the cap to fit appliance is plugged.

Mark-Time portable switches have many uses, such as turning off signs, spotlights, window displays, portable heaters, sun lamps, etc.

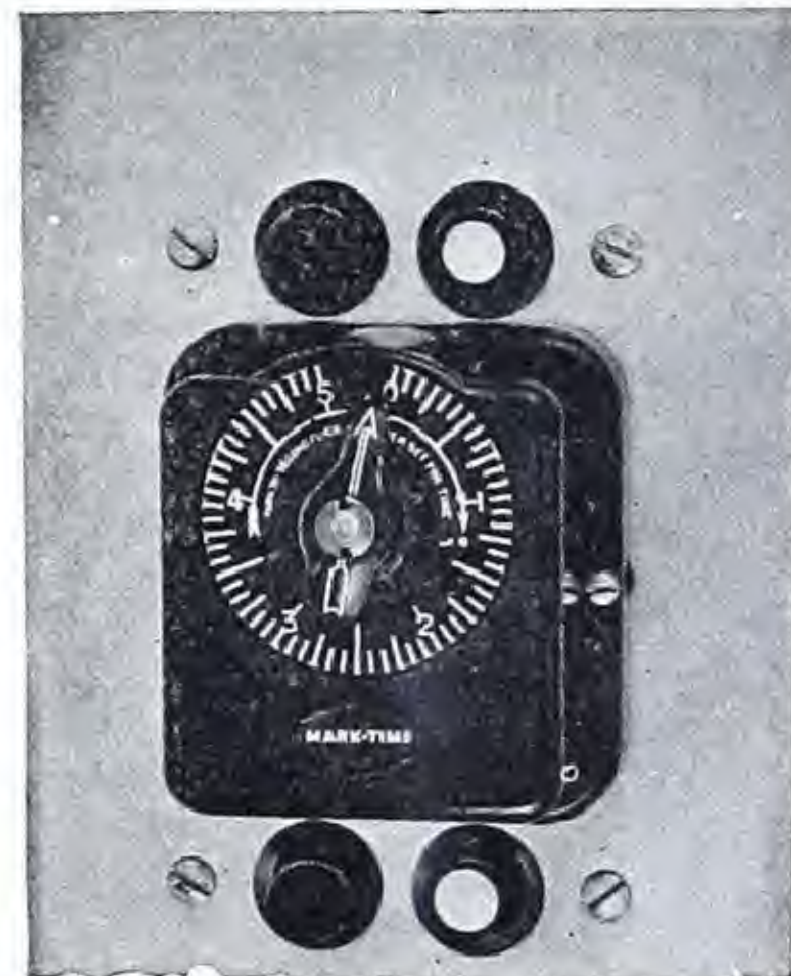
No installation necessary.

Special timing may be supplied at extra cost.

20 AMPERES, 110 VOLT A.C.

List No.	Casing	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
1802	Bakelite	1 second	30 seconds	10	\$6.25
1814	Bakelite	1 minute	30 minutes	10	6.25
1825	Bakelite	5 minutes	5 hours	10	7.50

Weight standard package 10 pounds.



Series 4200
For Gang Plate Mounting

SERIES 4200

4200 series is used to replace an ordinary push button or toggle switch in gang mounting. As shown in illustration, it is mounted on the surface of the plate after the push button or toggle switch has been removed.

Studs furnished to attach to switch plate.

20 AMPERES, 110 VOLT A.C.

List No.	Casing	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
4204-B	Bakelite	1 minute	30 minutes	10	\$8.75
4205-B	Bakelite	5 minutes	5 hours	10	8.75

Weight standard package 6¼ pounds.



Mate Switch

MARK-TIME MATE SWITCH

The 1600 is a standard 20 amp., 110 volt switch, which has the same type of toggle lever as the Mark-Time flush switch and is used to match up with Mark-Time switches.

It is a high-class, heavy duty switch, using the same "on" and "off" mechanism as the Mark-Time switch.

List No.	Casing	Time Minimum	Time Maximum	Std. Pkg.	List Price Each
1600	None	.....	.....	10	\$0.85

Weight standard package 3 pounds.

AMALGAMATED WIRING DEVICES



No. 950

Flush Toggle Switches

ALL BAKELITE
TOTALLY ENCLOSED

Shallow Type

Two-piece heavy bronze blades.
Strong brass terminals in positive alignment.
Small number of parts.
Easy, quiet, and positive operation.
Compression spring mechanism.

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
950	Single Pole—Indicating. 20 Amps. 125 Volts, or 10 Amps. 250 Volts	50	15	\$1.80
951	Single Pole—Indicating. 10 Amps. 125 Volts, or 5 Amps. 250 Volts	100	27	1.10
952	Double Pole—Indicating. 10 Amps. 125 Volts, or 10 Amps. 250 Volts	50	15	1.80
953	Three Way—Non-Indicating. 10 Amps. 125 Volts, or 5 Amps. 250 Volts	50	15	1.40
954	Four Way—Non-Indicating. 10 Amps. 125 Volts or 5 Amps. 250 Volts	10	5	4.40
955	Double Pole—Indicating. 20 Amps. 125 Volts or 10 Amps. 250 Volts	50	15	2.00

Flush Switches

PORCELAIN BASE

Shallow Type



No. 941

Two-piece heavy bronze blades.
Strong brass terminals in positive alignment.
Small number of parts.
Easy, quiet, and positive operation.
Compression spring mechanism.
Mechanism entirely separate from mounting strap.



No. 981

Toggle Switch

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
940	Single Pole—Indicating. 20 Amps. 125 Volts, or 10 Amps. 250 Volts	50	18½	\$1.40
941	Single Pole—Indicating. 10 Amps. 125 Volts or 5 Amps. 250 Volts	100	34	.70
942	Double Pole—Indicating. 10 Amps. 125 Volts or 10 Amps. 250 Volts	50	18½	1.40
943	Three Way—Non-Indicating. 10 Amps. 125 Volts or 5 Amps. 250 Volts	50	18½	1.00

Push-Button Switch

980	Single Pole—Indicating. 20 Amps. 125 Volts or 10 Amps. 250 Volts	50	18½	\$1.40
981	Single Pole—Indicating. 10 Amps. 125 Volts or 5 Amps. 250 Volts	100	34	.70
982	Double Pole—Indicating. 10 Amps. 125 Volts or 10 Amps. 250 Volts	50	18½	1.40
983	Three Way—Non-Indicating. 10 Amps. 125 Volts or 5 Amps. 250 Volts	50	18½	1.00

AMALGAMATED WIRING DEVICES



No. 2000



No. 2753

Surface Rotary Switches

Porcelain Slotted Base

These surface rotary switches have a strong reinforced porcelain base. High quality spring and case hardened locking plate assures positive action and long service.

List No.	List No.	Description	Single Pole
2000	2602	Non-indicating	6 amperes, 125 volts 3 amperes, 250 volts
2047	2604	Indicating	6 amperes, 125 volts 3 amperes, 250 volts
Diameter at base 2". Height overall 2⅛". Supporting screws spaced at 1⅜".			
2001	2753	Non-indicating	10 amperes, 125 volts 5 amperes, 250 volts
2048	2754	Indicating	10 amperes, 125 volts 5 amperes, 250 volts
Diameter at base 2½". Height overall 2⅛". Supporting screws spaced at 1¾".			
Double Pole			
2392	2608	Non-indicating	6 amperes, 250 volts
2394	2610	Indicating	6 amperes, 250 volts
Diameter at base 2". Height overall 2⅛". Supporting screws spaced at 1⅜".			
2017	2763	Non-indicating	10 amperes, 250 volts
2050	2764	Indicating	10 amperes, 250 volts
Diameter at base 2½". Height overall 2⅛". Supporting screws spaced at 1¾".			
Three Way			
2456	2606	Non-indicating	6 amperes, 125 volts 3 amperes, 250 volts
Diameter at base 2". Height overall 2⅛". Supporting screws spaced at 1⅜".			

Nickel Plated—Metal Covered				Composition Covered			
List No.	Std. Pkg.	Std. Wgt.	List Price Each	List No.	Std. Pkg.	Std. Wgt.	List Price Each
2000	100	28	\$0.40	2602	100	30	\$0.45
2047	100	28	.75	2604	100	30	.65
2001	100	39	.80	2753	30	12	.90
2048	100	35	1.00	2754	30	12	1.10
2392	100	30	.90	2608	10	4	.95
2394	100	30	1.10	2610	10	4	1.15
2017	100	40	1.10	2763	10	4	1.20
2050	100	45	1.30	2764	10	4	1.40
2456	100	29	.75	2606	10	4	.80

Note:—All surface rotary switches are equipped with List No. 2777 round composition handles unless specified with List No. 2783 white porcelain handle.

Rotary Switch Handles



No. 2777



No. 2783

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
2777	Round composition	100	10	\$0.15
2783	Flat white porcelain	100	12	.20

AMALGAMATED WIRING DEVICES

Surface Toggle Switches

WITH BLACK GLAZED PORCELAIN BASE

Base Diameter, 2 1/8"

Overall Height 1 3/8"

Supporting Screws spaced at 1 7/16"



No. 2021

Nos. 2021 and 2011 are single pole, indicating switches, 6 amperes, 125 volts or 3 amperes, 250 volts.

Nos. 2023 and 2013 are three way, non-indicating switches, 6 amperes, 125 volts, 3 amperes, 250 volts.

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
2021	Nickel Plated, Metal Cover.....	100	26	\$0.40
2023	Nickel Plated, Metal Cover.....	100	28	.75
2011	Black Bakelite Cover.....	100	27	.40
2013	Black Bakelite Cover.....	100	28	.75

WITH 3 1/2" OUTLET BOX COVER

14 Gauge Steel—Black Enamelled



No. 2031

No. 2031 is single pole, indicating, with black bakelite cover and cover, 6 amperes, 125 volts or 3 amperes, 250 volts.

No. 2033 is three way toggle switch, non-indicating. 6 amperes, 125 volts, 3 amperes, 250 volts.

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
2031	Black Bakelite Cover.....	100	40	\$0.60
2033	Black Bakelite Cover.....	100	43	.95



No. 7007

BRASS-SHELL PENDENT SWITCH

6 Amperes 125 Volts

Quick make-and-break mechanism is used in this pendent switch. It is positive in action and has a high current-carrying capacity.

Finished in brushed brass.

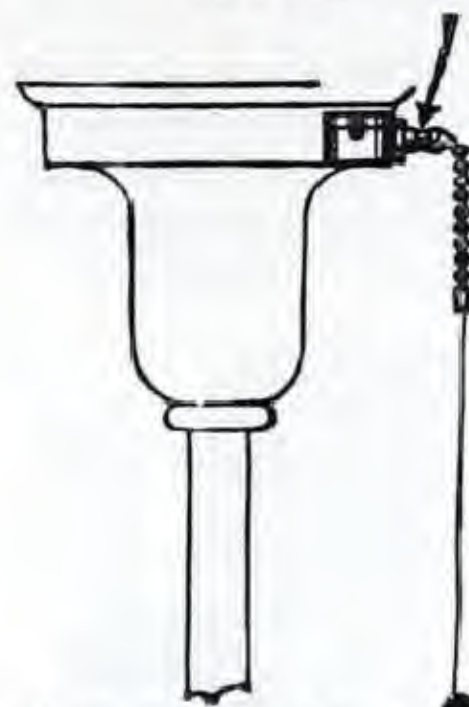
List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
7007	Single-pole, brass shell pendent...	200	26	\$0.70

AMALGAMATED WIRING DEVICES

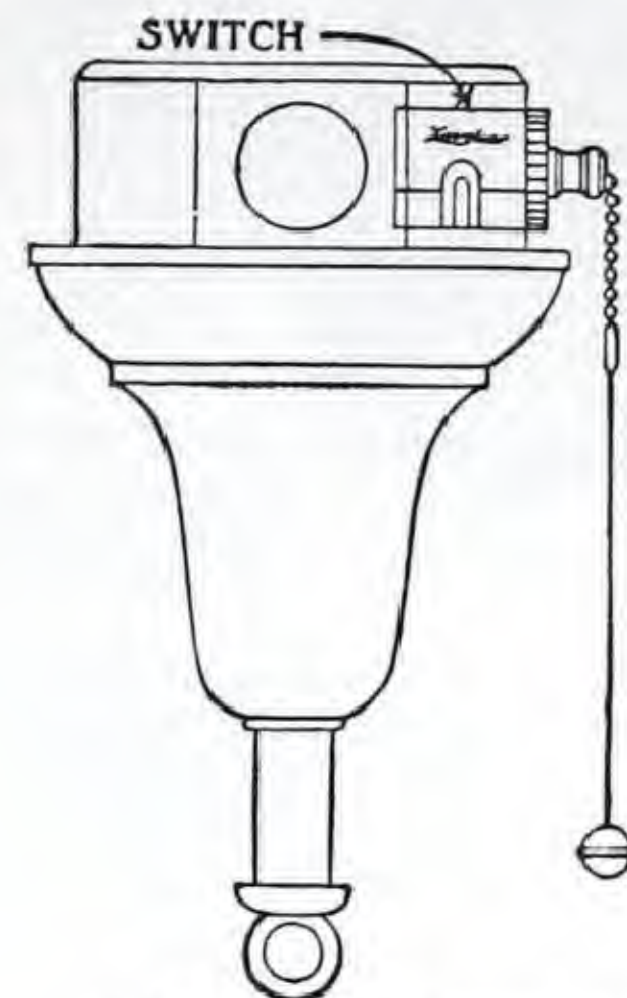
Levolier Fixture Switch



No. 61



Method of Mounting in Canopy



Method of Mounting in Outlet Box

Made especially for individual light control of Standard Medium Base Lamps or fractional horse-power motors such as portable tools, drills, grinders, etc. It is also the perfect switch for small types of exhaust fans and has many other uses.

No other method of unit light control gives so much in dependable operation, low cost of installation and lasting quality as do Levolver Switches. In every style of fixture and for every type of installation, they are easy to fit and inexpensive to apply.

Each switch supplied with seven feet of linen cord.

6 Amperes, 125 Volts 3 Amperes, 250 Volts

Stem Diameter: 7/16"

List No.	Description	Stem Length	Std. Pkg.	Std. Wgt.	List Price Each
61	Brushed Brass.....	3/16"	100	13	\$1.00
61A	Bronze.....	3/16"	100	13	1.10
62	Brushed Brass.....	3/8"	50	8	1.25
63	Brushed Brass.....	3/4"	50	9	1.25

Levolier Pendent Switch

Neat, Inexpensive, Easy to Install



Method of Installing



No. 59

It can be used in any fixture, old or new, and between any two links of chain. When installed in fixtures that have been previously hung, it fits in place of one of the chain links without altering the length of the fixture or necessitating rewiring or splicing of wires. The switch is so small that it is hardly noticeable when installed, yet it has contact points that withstand the instantaneous overload when gas-filled lamps are turned on. Compared with other methods, Levolver Link Switches are better looking and far easier to install.

Each switch is supplied with seven feet of linen cord.

6 Amperes, 125 Volts 3 Amperes, 250 Volts

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
59	Brushed Brass.....	100	15	\$1.00
59A	Bronze.....	100	15	1.10

AMALGAMATED WIRING DEVICES

Porcelain Pendent Switches



No. 7000

Pendent Switch No. 7000 is made of porcelain. One screw fastens tightly, and makes wiring a simple matter. The switch mechanism is fastened to one side. Nothing to fall out or get lost. Large space above the mechanism for the wires. Colored buttons indicate whether current is "off" or "on."

Standard finish is gray.

The Porcelain Switch Shell is a non-conductor and especially suitable for installation in basements, laundries, industrial plants, and other damp locations, where it is desirable to guard against the possibility of shock.

6 Amps. 125 Volts, 3 Amps. 250 Volts.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
7000	Single pole, porcelain pendent....	100	34	\$0.70

Appliance Switch

FEED THROUGH TYPE

6 Amps., 125 Volts

3 Amps., 250 Volts

No. 7050



List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
7050	Black Bakelite.....	50	5	\$0.70



No. 7245

No. 7246

Door Switches

With Plate and Approved Box for Armored Cable

6 Amps., 125 Volts

3 Amps., 250 Volts



No. 7240

No. 7241

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
7240	Circuit closed when door is open..	25	20	\$3.75
7241	Circuit closed when door is closed	25	20	3.75

Supporting screw holes are spaced $3\frac{3}{16}$ inches on centers.

Note:—The box is $1\frac{1}{2}$ inches wide by $2\frac{3}{4}$ inches long and is arranged for use with armored or non-metallic No. 14 two-wire cable. The plate is $4\frac{5}{8}$ inches by $1\frac{1}{4}$ inches and will fit no other box. These switches are enclosed in approved boxes and it is not necessary to install conduit or outlet boxes.

Without Box but with Universal Plate

6 Amps., 125 Volts 3 Amps., 250 Volts

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
7245	Circuit closed when door is open..	25	15	\$3.50
7246	Circuit closed when door is closed.	25	15	3.50

No outlet box is furnished with these switches but with the "Universal Plate" and the yoke by which it is attached to the switch any door switch outlet box may be used regardless of distance between screw holes. The plate is $5\frac{3}{8}$ " by $1\frac{3}{8}$ ".

Supporting screw holes are spaced $4\frac{3}{4}$ " on centers.

AMALGAMATED WIRING DEVICES

Flush Receptacles

"T" SLOT



No. 140



No. 142

Brown Bakelite. Heavy spring contacts. Large head, strong binding screws. Grooved face guide. Perfect contact for all types of parallel or tandem blade caps.

No. 142 has two terminal screws on each side for looping through.

15 Amperes, 125 Volts. * 10 Amperes, 250 Volts.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
140	Brown Bakelite—Single.....	100	14	\$0.20
142	Brown Bakelite—Duplex.....	100	22	.30



No. 158-160



No. 159-161



No. 315

Flush Receptacles with Round Plates

Standard Package 100

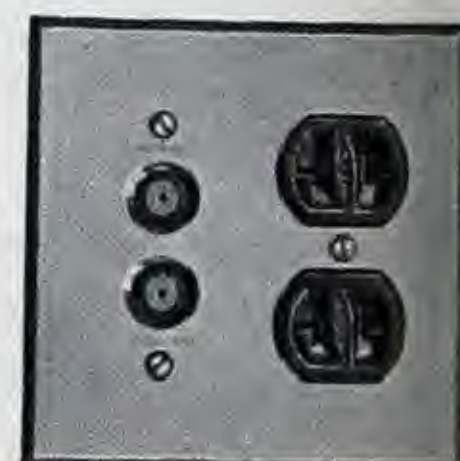
List No.	Description	Std. Pkg.	List Price Each
158	No. 140 Receptacle with No. 24-C64 $3\frac{1}{2}$ " Round Cover.....	28	\$0.35
159	No. 142 Duplex Receptacle with No. 24-C65 $3\frac{1}{2}$ " Round Cover.....	38	.45
160	No. 140 Receptacle with No. 54-C64 4" Round Cover.....	42	.40
161	No. 142 Duplex Receptacle with No. 54-C65 4" Round Cover.....	49	.50
315	Single Receptacle with $2\frac{3}{4}$ " Round BB Plate.....	25	.65

Radio Outlets



No. 171

Combination Aerial and Ground Connections with Duplex Receptacle. Equipped with approved barrier for use in 2 gang 775 or 2 gang 1104 Box.



No. 172

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
172	With .040 B.B. Plate—with approved barrier.....	10	7 $\frac{1}{2}$	\$1.55
172B	With Bakelite Plate—with approved barrier.....	10	6 $\frac{1}{2}$	1.80

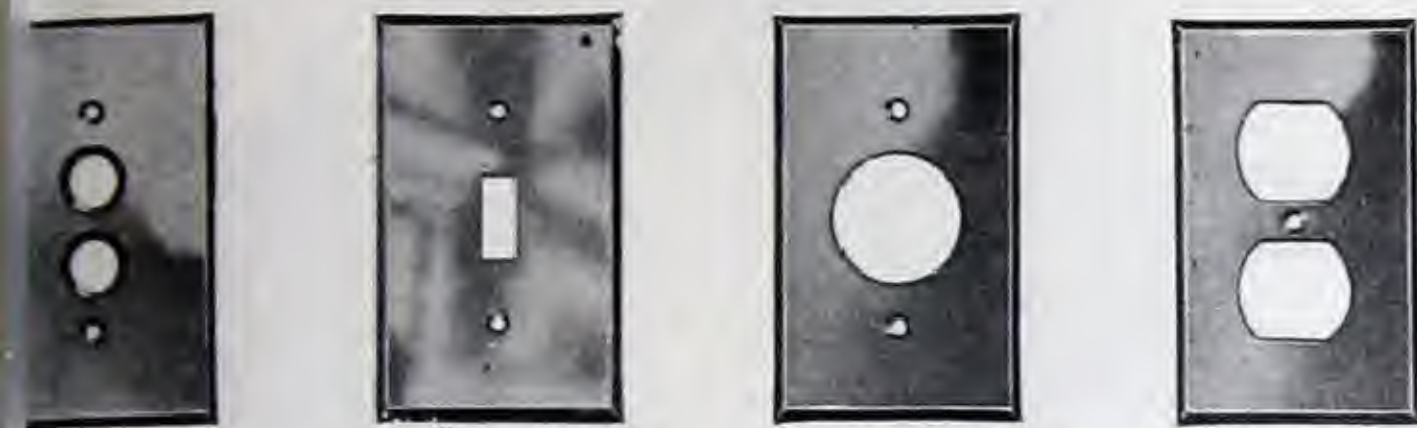
AERIAL AND GROUND CONNECTIONS

For installation in all types of switch boxes.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
171	With .040 B.B. Plate.....	10	3 $\frac{1}{2}$	\$1.00
171B	With Bakelite Plate.....	10	2 $\frac{1}{2}$	1.10

AMALGAMATED WIRING DEVICES

METAL PLATES



No. 7280 No. 4904 No. 7288 No. 7292

Amalgamated Electric Switch Plates have pronounced bevelled edges, giving them a smart, finished appearance. In finishing, the best material is used, carefully and thoroughly applied, producing a product which will render many years satisfactory service under almost every condition.

Permo finish is a rust-proof and non-tarnishable lacquer spray which produces a serviceable and pleasing satin brass finish.

STRUCK-UP (.040 INCH BRASS) PERMO FINISH

List No.	Push	Description	Std. Pkg.	Std. Wgt.	List Price Each
3104	7280	Single Gang†	200	36	\$0.13
3105	7282	Two Gang	100	28	.26
3106	7284	Three Gang	50	19	.39
3107	7286	Four Gang	20	10	1.25
3108	7278	Five Gang	10	7	1.75

†Takes Single Receptacle No. 7288 or Duplex Receptacle No. 7292.

SOLID BRASS (.100 INCH BRASS) B. B. FINISH

List No.	Push	Description	Std. Pkg.	Std. Wgt.	List Price Each
3151	3165	Single Gang*	25	12½	\$1.25
3152	3166	Two Gang	10	8½	2.50
3153	3167	Three Gang	5	6	3.75
3154	3168	Four Gang	1	1¼	5.00
3155	3169	Five Gang	1	1½	6.25
3156	3170	Six Gang	1	2	7.50
3157	3171	Seven Gang	1	2¼	8.75
3158	3172	Eight Gang	1	2½	10.00
3159	3173	Nine Gang	1	2¾	11.25
3160	3174	Ten Gang	1	3	12.50

*Takes Single Receptacle No. 3161 or Duplex Receptacle No. 3162.

STRUCK-UP (.040 INCH STEEL) PERMO FINISH

List No.	Push	Description	Std. Pkg.	Std. Wgt.	List Price Each
4904	17280	Single Gang†	200	36	\$0.08
4905	17282	Two Gang	100	28	.16
4906	17284	Three Gang	50	19	.24
4907	17286	Four Gang	20	10	.40
4908	17278	Five Gang	10	7	.50

†Takes Single Receptacle No. 17288 or Duplex Receptacle No. 17292.

TELEPHONE PLATE

With Composition Bushing and Strap with Box Spacing. Struck-up (.040 inch Brass) Permo Finish



List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3649	Single Gang	100	23	\$0.35

AMALGAMATED WIRING DEVICES

COMBINATION PLATES



No. 3651 No. 3716
Push Button and Duplex Toggle and Jewel
No. 3650 No. 3705
Push Button and Single Push Button and Jewel



No. 738 No. 3735
Single Gang Toggle, Jewel and Duplex
with Jewel

STRUCK-UP (.040 INCH BRASS) PERMO FINISH

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3650	Push Button and Single Receptacle Plate	100	29	\$0.39
3651	Push Button and Duplex Receptacle Plate	100	29	.39
738	Single Gang Plate with Jewel	10	2	.45
3705	Two Gang Combination Push Button with Jewel	10	3	.75
3716	Two Gang Combination Toggle Switch with Jewel	10	3	.75

SOLID BRASS (.100 INCH BRASS) B.B. FINISH

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3737	Three Gang Plate for one Push Button Switch, one Ruby Jewel and one Single Receptacle	10	10	\$3.75
3739	Three Gang Plate for one Push Button Switch, one Ruby Jewel and one Duplex Receptacle	10	10	3.75
3729	Three Gang Plate for one Flush Toggle Switch, one Ruby Jewel and one Single Receptacle	10	10	3.75
3735	Three Gang Plate for one Flush Toggle Switch, one Ruby Jewel and one Duplex Receptacle	10	10	3.75
7907	Ruby Jewel	30	2	.35

BLANK PLATES

Including Strap with Box Spacing Struck-up (.040 inch Brass) Permo Finish



List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3551	Single Gang	100	25	\$0.20
3624	Two Gang	50	17½	.40

AMALGAMATED WIRING DEVICES

Brass Shell Sockets

Wrinkle Cap and Shell

No. 651
KeylessNo. 660
KeyNo. 5660
Pull Chain

KEYLESS SOCKETS—660 WATTS, 250 VOLTS

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
651	1/8" Cap, electrolier type	250	30	\$0.25
661	1/8" Cap	250	47	.25
663	3/8" Cap	100	22	.30
665	1/8" Cap, side inlet	100	22	.35

KEY SOCKETS—660 WATTS, 250 VOLTS

660	1/8" Cap	250	50	\$0.35
662	3/8" Cap	100	23	.45
664	1/8" Cap, side inlet	100	23	.50

PULL CHAIN SOCKETS—660 WATTS, 250 VOLTS

5660	1/8" Cap	100	22	\$0.50
5661	3/8" Cap	100	22	.60
5662	1/8" Cap, side inlet	100	22	.65

No. 671
Push ThroughNo. 412
Twin

PUSH THROUGH SOCKETS—660 WATTS, 250 VOLTS

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
671	1/8" Cap	100	22	\$0.35
673	3/8" Cap	100	22	.45

KEYLESS TWIN SOCKETS—660 WATTS, 250 VOLTS

412	1/8" Cap, B.B.	50	12	\$1.00
432	3/8" Cap, B.B.	50	13	1.10



No. 7400

Porcelain Push Sockets

Medium Base, 660 Watts, 250 Volts

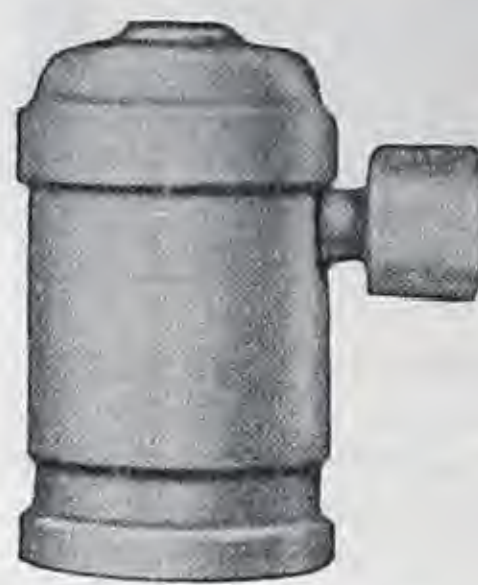
No. 7400

PENDANT CAP

Overall height	2 3/4"
Standard Package	100
Weight, lbs., standard package	38
List Price	\$0.50

AMALGAMATED WIRING DEVICES

Porcelain Key Sockets

MEDIUM BASE
660 Watts, 250 Volts

No. 3103



No. 3104



No. 3105

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3101*	1/8" Cap	100	41	\$0.60
3102*	3/8" Cap	100	41	.65
3103†	Pendent Cap	100	38	.45
3104†	3 1/4" Outlet Box Cover	50	35	.80
3105†	Wall Socket (fits Condulet and Metal Molding Fittings)	50	35	.80

*Overall height: 3 3/16"

†Overall height: 3"

Porcelain Keyless Sockets

MEDIUM BASE
660 Watts, 250 Volts

No. 3133



No. 3132

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
3133	Pendent Cap	100	26	\$0.30
3131	1/8" Die Cast Cap	100	28	.40
3132	3/8" Die Cast Cap	100	30	.45

Overall height: 2 11/16"

Socket Reducer

660 Watts, 250 Volts



No. 98

Reducer 98 is designed for adapting mogul screw base sockets for use with medium screw base lamps. When attached, the center contact is lowered 1/16 inch, thus bringing the filament of the medium base lamp close to its proper position. Both threaded shells are made of copper.

List No.	Description	Std. Pkg.	Std. Wgt.	List Price Each
98	Reducer only	50	9 1/2	\$0.50

AMALGAMATED WIRING DEVICES



No. 91



No. 4397

Socket Extensions

Medium Base—660 Watts, 250 Volts

Socket Extension No. 91 offers a convenient means of attaching glassware where the outlet does not otherwise admit it. The brass shell is provided with a bead for taking standard shade holders. It increases the length of socket by 1 1/4 inches, and is especially serviceable in connection with flush sockets or ceiling receptacles. In fixture work it is useful in dropping small wattage lamps to lower position with reference to deep reflectors. Standard finish is dipped ss.

Description	Std. Pkg.	List Price Each
1 Extension only.....	50 5	\$0.50

Mogul Base—1500 Watts, 250 Volts

By means of this device the socket may be extended 2 1/2 inches, and the lamp filament lowered correspondingly. Fixtures designed for 750 and 1000 watt lamps may be converted for use with 300 and 500 watt lamps, with the same character of distribution, by addition of this extension. Body of porcelain with shell and contact parts of copper.

7 With Lamp Grip.....	10 6 1/2	\$2.00
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No. 23



No. 211B

Dim-a-lite

Dim-a-lites are attachments which screw into any medium electric light socket and turn the electric light "up" or "down," giving five changes of light, full, half, dim, "nite" and out. Finish is brushed brass.

3 110 Volts, 50 Watts or less.....	10 5	\$2.25
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A.C. Voltage Regulator

Excessive line voltage ruins both A-C tubes and A-C sets. Why? Because A-C sets and tubes are built to operate on a voltage of 110 volts. Any higher voltage overloads the tubes, burns them out or shortens their lives, injures the filter condensers, and lowers the efficiency of your set.

In many cities, the normal line voltage runs from 112 to 115 volts. In nearly all cities, the voltage varies with the amount of electricity being used, so that at some periods during the day or night the voltage is sufficiently high to damage the delicate tube filaments. That is why tubes lose their "pep" after short service—and why the Wirt A-C Voltage Regulator is an essential accessory for A-C radios.

And while you are protecting your valuable radio set and saving it from these dangerous peak-loads of voltage, you are also improving reception and purity and clarity of tone.

Description	Std. Pkg.	List Price Each
3 For sets drawing over 65 watts and not over 150 watts.....	10 6	\$5.00

AMALGAMATED WIRING DEVICES



No. 90



Nos. 121-122



No. 127



Nos. 680-681-682

Candle Pull Socket

660 Watts, 250 Volts

Bakelite housing; contacts riveted directly to terminals which in turn are riveted to Bakelite plates. Possibility of loose screws and contacts eliminated. No flickering of lamps. Open yokes make wiring easy. Terminals so arranged that connecting wires may be of same length. Tubing readily attached or detached.

List No.	Description	Std. Pkg.	List Price Each
90	1/8" Bushing. Length overall 3 1/16"...	50 7	\$0.80

Lever Socket

660 Watts, 250 Volts

List No.	Description	Std. Pkg.	List Price Each
121	Bracket Socket with Porcelain Lever, 5/8" Nipple.....	50 9	\$1.00
122	Bracket Socket with Porcelain Lever, 3/8" Nipple.....	50 9	1.00
127	Bracket Socket with Square Post for Porcelain Brackets.....	50 9	1.00

Adjustable Keyless Candle Sockets

660 Watts, 250 Volts

Adjustable with one screw; rigid construction; large binding screws; cadmium-plated frame. 1/8" I.P.S. Mounting.

List No.	Description	Std. Pkg.	List Price Each
680	Adjustable, 2 7/8" to 3 1/2".....	250 30	\$0.34
681	Adjustable, 3 1/2" to 4 1/2".....	250 40	.34
682	Adjustable, 4 1/2" to 5 1/2".....	250 50	.34

Rubber Vase Adapter

With 1/8" I.P.S. Male Thread for Socket Mounting



No. 7553

List No.	Std. Pkg.	List Price Each
7553.....	50 2 1/4	\$0.15

Lectrolet Fitting

Combination 2- or 3-hole

List No.	Std. Pkg.	List Price Each
2750....	200 80	\$0.20



No. 2750

AMALGAMATED SOCKETS



No. 4410

No. 985-986

No. 9367

Porcelain Copper Cap Sockets

Medium Base, 660 Watts, 250 Volts

These sockets have copper cap with threaded bushing. They can be used for either indoor or outdoor service.

List No.	Description	Size of Bushing	Wgt of Std. Pkg.	List Price Each
4410	Less Lamp Grip	3/8" Female	32	\$0.71
4410C	With " "	3/8" Female	32	1.00
4410M	" " "	3/8" Male	32	1.00
4411	Less " "	1/2" Female	36	.98
4422	With Lamp Grip	3/8" Female	33	.81
4423	" " "	1/2" Female	37	1.08

Standard Package 100.

Overall height, 2 9/16".

4410C and 4410M have heavy solid centre contact.

Porcelain Mogul Keyless Sockets

1500 Watts, 250 Volts

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
985	3/8" Cap.....	50	40	\$0.60
986	1/2" Cap.....	50	45	.70

Overall height, 3 3/16".

Rubber Weatherproof Socket

660 Watts, 250 Volts

List No.	Description	Std. Pkg.	Wgt. Std. Pkg.	List Price Each
9367	With 8-in. leads, No. 14 stranded R.C. wire.....	250	75	\$0.50

Overall height 2 1/4".

P. AND S. TRANSFORMER CUTOUTS

Dry Process Type



No. 139 1/2

No. 139 1/2 is made of dry process porcelain. The body has a smooth, highly glazed finish. The plug handles are designed so that fuse puller may be used. However, the handles also permit a sure hand grip, even though the lineman is wearing 3-ply gloves. Wood screws for fastening the cutout to the crossarm are supplied with each cutout.

List No.	Description	Car-ton	List Price
139 1/2	Coutout Complete with Twist Terminals.....	4	4.00
139 1/2C	Case Only for No. 139 1/2.....	10	2.50
141	Plug Only for No. 139 1/2.....	10	1.50

Standard Package, 30.

AMALGAMATED WIRING DEVICES

Porcelain Receptacles

660 Watts
250 Volts

No. 1700



No. 9402

ONE PIECE MEDIUM BASE SIGN TYPE

Dimensions

List No.	Diam.	Hgt.	Mtg.	Description	Std. Pkg.	Wt. Std. Pkg.	List Price Each
1700	1 13/16"	1 1/2"	1 7/8"	Pony Type.....	200	50	\$0.14
9401	2 9/16"	1 3/2"	2 1/16"	With Lamp Grip..	200	60	.35
9402	2 9/16"	1 3/2"	2 1/16"	Exposed Terminals	200	55	.15



No. 988



No. 989



No. 990



No. 1088

REMOVABLE RING TYPE

List No.	Description	Screw Shell	Std. Pkg.	Wt. Std. Pkg.	List Price Each
988	Open Terminals....	Medium	200	40	\$0.20
988S	Open Terminals with Shadeholder Groove	Medium	200	40	.25
989	Concealed Terminals	Medium	200	63 1/2	.25
990	Concealed Terminals with 6" Leads....	Medium	200	51 1/2	.20
0690	Open Terminals....	Inter-mediate	200	27	.25
1088	Open Terminals with Heavy Contact and Asbestos Gasket....	Medium	200	40	.30

PULL CHAIN TYPE

No. 995	Concealed Terminals, 6" Chain, and Insulator, medium base.
No. 996	Concealed Terminals, 6' Linen Cord, Medium base.

List No.	Std. Pkg.	Wt. Std. Pkg.	List Price Each
995	100	33	\$0.75
996	100	34	1.00



No. 995



No. 987



No. 2747

HANGER OR WALL TYPE MEDIUM BASE

List No.	Dimensions	Description	Std. Pkg.	Wt. Std. Pkg.	List Price Each
987	2 5/16" 1 5/8" 1 7/16"		100	38	\$0.30
997	2 5/16" 1 5/8" 1 7/16"	With Mounting Bushings	100	38	.35

CLEAT TYPE—MEDIUM BASE

2747	Concealed Terminals.....	100	40	\$0.25
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AMALGAMATED WIRING DEVICES

Porcelain Rosettes



No. 870A



No. 871A

Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
71A Concealed Terminals.....	200	77	\$0.20
70A Open Terminals.....	200	77	.20

*Diameter at Base, $2\frac{3}{8}$ ". Height overall, $1\frac{9}{16}$ ". Supporting screws spaced $1\frac{1}{2}$ ".
†Diameter at Base, $3\frac{3}{16}$ ". Height overall, $1\frac{3}{4}$ ". Supporting screws spaced $1\frac{5}{8}$ ".

Porcelain Cut-Outs

COVERED TYPE—DOUBLE POLE—0-30 AMPERES



No. 61936



No. 62588

Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
936 Single Branch.....	100	132	\$0.40
588 Double Branch.....	100	186	.75



No. 2748

Conduit Fitting Receptacles

660 WATTS, 250 VOLTS

Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
8 For $\frac{1}{2}$ " Oblong Conduit Fittings	100	42	\$0.40
9 For $\frac{1}{2}$ " Square Conduit Fittings	100	62½	.60

AMALGAMATED WIRING DEVICES

Unbreakable Rubber Caps

One-Piece



Nos. 7684-7685



Nos. 7683-7686

Made of soft, springy, black rubber. This Cap is not only unbreakable, but will not mar floor or furniture. Terminals are fastened in a strong fibre base, firmly imbedded in the rubber. Staked screws prevent loss and save wiring time.
Heavy brass blades fit any standard receptacle.
Tandem—15 Amp., 125 Volts 10 Amp., 250 Volts.
Parallel—660 Watts.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
7684*	Parallel Blades.....	100	11	\$0.25
7685*	Tandem Blades.....	100	11	.25
7683†	Parallel Blades.....	200	16	.23
7686†	Tandem Blades.....	200	16	.23

* $\frac{11}{32}$ " Cord Hole. † $\frac{13}{32}$ " Cord Hole.

Porcelain Caps

HEAVY WHITE GLAZED

Tandem—15 Amp., 125 Volts 10 Amp., 250 Volts
Parallel—660 Watts



Nos. 308-318

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
308	Tandem Blades†.....	100	8	\$0.15
318	Parallel Blades†.....	100	8	.15

† $\frac{13}{32}$ " Cord Hole.

Swivel Attachment Plug



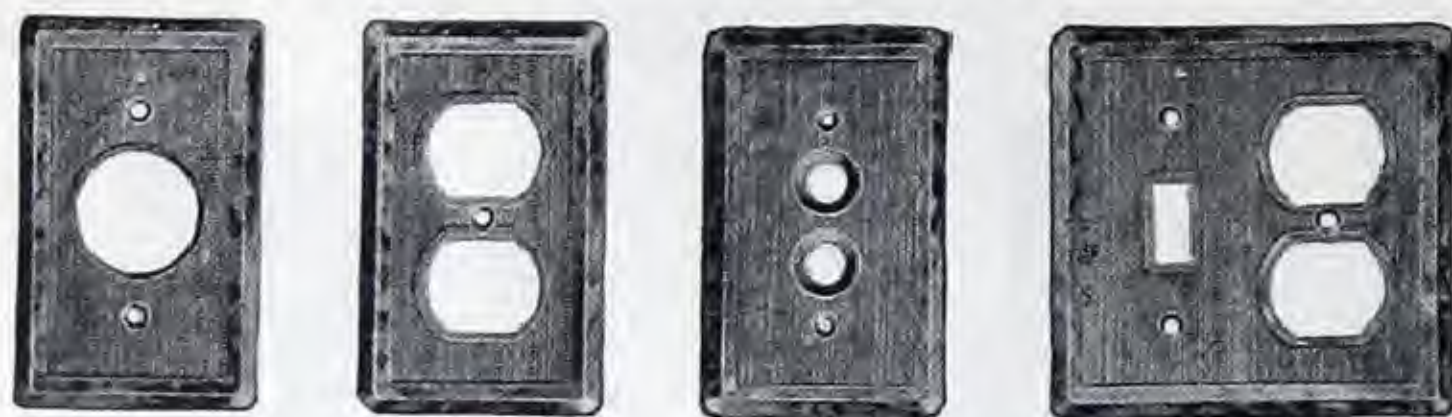
No. 903

With Fibre Ring—660 Watts, 250 Volts
An ingeniously devised swivel shell—a feature protected by patents—makes it possible to affix or remove the plug quickly, and without turning the device or twisting the cord. Each is provided with an effectual cord-gripping means contained in the cap, and will take either plain or reinforced cord.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
903	With Standard Bushing.....	100	10	\$0.25

AMALGAMATED WIRING DEVICES

BAKELITE PLATES



No. 5140

No. 5142

No. 5981

No. 5143



No. 5144

A conventional design in faintly mottled walnut bakelite which harmonizes with room decorations. Finely ribbed body with wide polished bevel and beading. Latest development in reinforcing to prevent breakage. No sharp corners to chip off.

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
5140	Single Gang for Single Receptacle	100	11	\$0.30
5142	Single Gang for Duplex Receptacle	100	11	.30
5143	Two Gang Combination Plate for Toggle Switch and Duplex Receptacle.....	50	15	.60
5144	Two Gang Combination Plate for Push Button Switch and Duplex Receptacle.....	50	15	.60
5981	Single Gang Push Button.....	100	11	.30



No. 1325

"T" Slot Surface Receptacles

10 Amp., 250 Volts
15 Amp., 125 Volts



No. 307

HEAVY GLAZED WHITE PORCELAIN

List No.	Description	Std. Pkg.	Std. Pkg. Wgt.	List Price Each
1325*	3 11/16" diameter by 1 1/16" high.....	100	57 1/2	\$0.30
307†	Diameter base 2 1/4". Screw centers spaced at 1 1/2".....	100	31	.25

*For 3 1/2" or 3 1/4" Octagon Box.

†For Condulet or Wall.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

SHADE HOLDERS



Weatherproof Shade Holder

For porcelain socket

List No.	Description	List Price per 100
4124	2 1/4" Fitter.....	\$12.00
4125	3 1/4" Fitter.....	16.25

48 to a carton—10 gross to a case.

Nickel finish 25% extra.



Acme Shade Holder

For brass shell socket

List No.	Description	List Price Per 100
4120	2 1/4" Fitter.....	\$ 6.50
4121	3 1/4" Fitter.....	14.60
4122	4" Fitter.....	31.70

Finish: Dipped and Lacquered

4120—72 to a carton—12 1/2 Gross to a case

4121—12 to a carton— 5 Gross to a case

4122—24 to a carton— 1 Gross to a case

Nickel finish 25% extra.



No. 119

P. & S. SHADEHOLDERS

No. 119 is a 2 1/4-inch shadeholder for use with standard porcelain sockets and receptacles. Standard finish of Nos. 1245 and 119 is brush brass.

List No.	Description	Size Inches	Std. Pkg.	Car- ton	List Price Per 100
119	For Standard Porcelain Sockets	2 1/4	288	24	\$15.80

HUBBELL WIRING DEVICES

Shade Holders

Standard finish is brush brass.

Direct Threading 3-Screw Type

These shade holders can be furnished less screws, untapped and unfinished.

Prices quoted on application.



No. 501

List No.	Size Inches	Description	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
501	2 1/4	Finished.....	50	500	26	\$0.10
501	2 1/4	Unfinished.....	50	500	26	.09
505	3 1/4	Finished.....	25	250	30	.30

HUBBELL TWIST-LOCK DEVICES

2-Wire Twist-Lock Caps

20 Amperes, 250 Volts



No. 9763



No. 7102



No. 7062

Rubber Cord Grip Caps

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
9763	$\frac{9}{16}$ " Cord Hole.....	10	30	5	\$0.63
9764	$\frac{9}{16}$ " Cord Hole.....	10	30	5	0.63
9765	$\frac{5}{8}$ " Cord Hole.....	10	30	5	0.63
9766	$\frac{5}{8}$ " Cord Hole.....	10	30	5	0.63

Metal Covered Cord Grip Caps

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7102	$\frac{9}{16}$ " Cord Hole.....	10	30	5	0.54
9102	$\frac{9}{16}$ " Cord Hole.....	10	30	5	0.63
7238	$\frac{5}{8}$ " Cord Hole.....	10	30	5	0.54
9103	$\frac{5}{8}$ " Cord Hole.....	10	30	5	0.63

Composition Caps

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7062	$\frac{13}{32}$ " Cord Hole.....	10	50	7	0.48
7063	$\frac{13}{32}$ " Cord Hole.....	10	50	7	0.48

*Polarized—One wide and one narrow blade.

2-Wire Plug Base

660 Watts, 250 Volts



No. 7612



No. 7210



No. 7216

List No.	Standard Carton	Wt., lbs. Package	List Price
7612	10	100	\$0.45

2-Wire Porcelain Flush Receptacles

20 Amperes, 250 Volts

This receptacle may be used with either polarized or non-polarized Twist-Lock Caps.

Supporting screw holes spaced $3\frac{3}{4}$ inches.

No. 7210 receptacle fits any standard single convenience outlet plate.

List No.	Standard Carton	Wt., lbs. Package	List Price
7210	10	50	\$0.54
7216	5	50	0.71
7217	5	30	0.79

Standard finish of covers is cadmium finish. Black japan covers may be had on special order at no advance in price.

2-Wire Porcelain Receptacles

20 Amperes, 250 Volts

Mounting screws $\frac{31}{32}$ inches. Diameter $\frac{3}{4}$ inches, height $1\frac{27}{64}$ inches. Face diameter $1\frac{1}{2}$ inches.



No. 7624

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7624	Receptacle.....	10	50	14	\$0.63

HUBBELL TWIST-LOCK DEVICES

2-Wire Cord-Grip Connectors

20 Amperes, 250 Volts



Nos. 7101-7102



Nos. 7101-7191



Nos. 7101-8808

Bakelite. Steel covered, cadmium plated.
Bodies may be used with either polarized or non-polarized caps.

With $\frac{9}{16}$ -Inch Cord Hole

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7101	Bakelite Body.....	10	30	9	\$0.95
7102	Cap.....	10	30	5	0.54
*9102	Cap.....	10	30	3	0.63

With $\frac{5}{8}$ -Inch Cord Hole

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7224	Bakelite Body.....	10	30	9	0.95
7238	Cap.....	10	30	5	0.54
*9103	Cap.....	10	30	5	0.63

*Polarized.

2-Wire Motor Plugs

20 Amperes, 250 Volts

Bakelite. Steel covered, cadmium plated.

Bodies may be used with either polarized or non-polarized bases.

With $\frac{9}{16}$ -Inch Cord Hole

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7101	Bakelite Body.....	10	30	9	\$0.95
7191	Composition Base....	10	30	4	0.41
*9104	Composition Base....	10	30	4	0.47

With $\frac{5}{8}$ -Inch Cord Hole

List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7224	Bakelite Body.....	10	30	9	0.95
7191	Composition Base....	10	30	4	0.41
*9104	Composition Base....	10	30	4	0.41

*Polarized.

2-Wire Flush Motor Plugs

20 Amperes, 250 Volts

Bodies may be used with polarized or non-polarized bases.

List No.	Description	Cord Hole In.	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7101	Bakelite Body	$\frac{9}{16}$	10	30	9	\$0.95
7224	Bakelite Body	$\frac{5}{8}$	10	30	9	0.95
8808	Base in Casing	..	10	30	6	0.79
*9105	Base in Casing	..	10	30	4	0.79

*Polarized. Metal container is nickel-plated.

Rubber Casings



List No.	Description	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7510	Casing only for No. 7101 or 7102.....	10	30	5	†

†Price on application.

These casings are designed to make the complete 2-wire Twist-Lock Connector waterproof. Being made of rubber, they also act as protection against breakage. List number covers half only and does not include connector, cap, or wire. Two No. 7510's are required for each complete connector.

HUBBELL TWIST-LOCK DEVICES

3-Wire Polarized
Plug Caps

20 Amperes, 250 Volts

Cord-Grip for $\frac{23}{32}$ " diam-
eter cords.

No. 9965



No. 7311

List No.	Description	Car- ton	Std. Pkg.	Wt. Lbs. Std. Pkg.	List Price
*7311	Composition, Armored	10	30	8	\$1.25
9965	Rubber.....	10	30	8	1.23

3-Wire Porcelain Flush Receptacles

20 Amperes, 250 Volts

Supporting screw holes spaced $3\frac{3}{32}$ ".

List No.	Car- ton	Std. Pkg.	Wt. Lbs. Std. Pkg.	List Price
*7310	10	30	11	\$1.58
†7502	5	10	5	0.71

†Plate for two outlets. Requires 3-gang
outlet box.

No. 7310

4-Inch Box Covers Attached

Standard finish is cadmium.
Black japan may be had at no
advance in price.*For grounding information
see foot-note.

List No.	Car- ton	Std. Pkg.	Wt., lbs. Std. Pkg.	List Price
7517	5	20	13	\$1.83



3-Wire Connectors

20 Amperes, 250 Volts

Bakelite. Cord-Grips accommodate $\frac{23}{32}$ "
diameter cords.*For grounding information see foot-
note.

Cord Connectors

List No.	Description	Wt., Lbs. Std. Pkg.	List Price
7313	Bakelite Body.....	11	\$2.12
7311	Cap.....	8	1.25

Carton 10. Standard Package 30.



Nos. 7311-7313

3-Wire Flush Motor Plugs

20 Amperes, 250 Volts

Diameter of casing flange, $2\frac{7}{8}$ ".Diameter of casing base, $2\frac{3}{32}$ ".Depth of casing, $1\frac{19}{32}$ ".Three mounting screw holes spaced
120 degrees apart on $1\frac{1}{4}$ " radius.*For grounding information see foot-
note.

No. 7327



List No.	Description	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
7327	Base in Casing.....	10	30	13	\$1.11
7318	Base, Composition....	10	30	6	0.63

*If 3 or 4-wire Twist-Lock devices are desired with ground
shunt from one contact to cover or casing, suffix letter "G"
to list number.

HUBBELL TWIST-LOCK DEVICES

3-Wire Conduit Box Receptacle

20 Amperes, 250 Volts

Designed for permanent grounding from
one contact to conduit system.Mounting screws $\frac{5}{8}$ -inch centers. Suit-
able for use with Crouse-Hinds "W" condulets
and "O" cover, Appleton Electric Co. "W"
unilets with No. 5680 cover, and Adalet
Mfg. Co. fittings Nos. G2H, G3H and G4H.

No. 7329

7329 Receptacle, Porcelain..	10	30	10	\$1.02
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4-Wire Polarized
Plug Caps20 Amperes, 250 Volts
Cord-Grip for $\frac{23}{32}$ " diam-
eter cords.

No. 9967



No. 7411

List No.	Description	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
*7411	Composition, Armored	10	20	8	\$1.59
9967	Rubber.....	10	20	9	1.59

4-Wire Porcelain Flush Receptacles

20 Amperes, 250 Volts

Supporting screw holes spaced $3\frac{3}{32}$ ".*For grounding information see foot-
note.

List No.	Description	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
7410	Recep- tacle.....	10	20	9	\$2.14
7421	Single Plate, .060"				
	Brass....	10	20	6	0.33
†7422	3-Gang Plate.....	5	10	5	1.00

†Plate for two outlets. Requires 3-gang outlet box.

With 4-Inch Box Covers
AttachedStandard finish is cadmium.
Black japan may be had at no
advance in price.*For grounding information
see foot note.

List No.	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
7417	5	15	10	\$2.30



No. 7410



4-Wire Connectors

20 Amperes, 250 Volts

Bakelite. Cord-Grips accommodate $\frac{23}{32}$ "
diameter cords.Diameter of base, $2\frac{3}{8}$ inches; height,
 $\frac{3}{4}$ inch. Holding screws are spaced $1\frac{7}{8}$
inches on centers for No. 6 screws.*For grounding information see foot-
note.

Cord Connectors

List No.	Description	Wt., Lbs. Std. Pkg.	List Price
7413	Bakelite Body.....	11	\$2.91
7411	Cap.....	8	1.59

Carton 10. Standard Package 20.



No. 7411-7413

HUBBELL TWIST-LOCK DEVICES

Wire Flush Motor Plugs

20 Amperes, 250 Volts

Diameter of casing flange, $3\frac{5}{16}$ ".

Diameter of casing base, $2\frac{1}{2}$ ".

Depth of casing, $1\frac{1}{2}$ ".

Four mounting screw holes are spaced $2\frac{3}{32}$ " on centers, 90 degrees apart.

For grounding information see footnote.



No. 7415



No. 7408

Description	Car-ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
08 Base in Casing.....	10	20	10	\$1.43
15 Base, Composition.....	10	20	7	0.79

*If 3 or 4-wire Twist-Lock devices are desired with ground contact from one contact to cover or casing, suffix letter "G" list number.

HUBBELL WIRING DEVICES

Surface Toggle Switches

Metal Handles

Brush brass and nickel plate are standard finishes for switch covers. Brush brass covers furnished unless otherwise specified.

Black porcelain base. Screw holes are elongated. Screw spacings, $1\frac{1}{2}$ to $1\frac{1}{2}$ inches.

Outside diameter of base, $2\frac{1}{4}$ inches.



No. 8171

List No.	Description	Amperes		Std. Wt., Lbs.		List Price
		125-V.	250-V.	Pkg.	Std. Pkg.	
71	S.P., Solid.....	5	3	100	37	\$0.45
91	S.P., Slotted.....	5	3	100	37	0.45
21	S.P., Solid.....	10	5	100	37	0.88
31	S.P., Slotted.....	10	5	100	39	0.88
73	3-Way, Solid.....	5	3	100	37	0.88
93	3-Way, Slotted...	5	3	100	37	0.88

Packed 10 in a carton.

10 Amp. Double Pole and 3-Way

Black porcelain base. Screw holes are elongated. Screw spacings, $1\frac{2}{32}$ to $1\frac{1}{2}$ ".

Outside diameter of base, $2\frac{5}{8}$ ".



No. 8112

st o.	Description	Amperes		Std. Wt., Lbs.		List Price
		125-V.	250-V.	Pkg.	Std. Pkg.	
12	D.P., Solid.....	10	10	100	67	\$0.91
62	D.P., Slotted.....	10	10	100	58	1.60
53	3-Way, Solid.....	10	5	50	20	1.60
33	3-Way, Slotted...	10	5	50	34	1.60

Packed 10 in a carton.

HUBBELL WIRING DEVICES

10 Amp. and 20 Amp. 3-Wire Polarized Receptacles

Round Flush Type, Composition

Screw holes, $1\frac{3}{4}$ inches on centers, tapped for 8 x 32 screws. Fits in $1\frac{1}{2}$ inch diameter hole.



No. 7214

10 Amperes, 250 Volts; 15 Amperes, 125 Volts

List No.	Description	Car-ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
7214	Grounded. Two Binding Screws.....	10	30	5	\$1.05
7215	Not grounded. Three Binding Screws.....	10	30	7	1.05

20 Amp. 3-Wire Polarized Flush Receptacle

Porcelain, Single
20 Amperes, 250 Volts

Will fit standard single convenience outlet plates.

Supporting screw holes spaced $3\frac{9}{32}$ inches on centers. If desired Grounded suffix letter "G" to catalogue number.

List No.	Car-ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
6810	10	30	13	\$1.18



No. 6810

10-Amp. and 20-Amp. Polarized Flush Receptacles

Will fit standard single convenience outlet plates.

Supporting screw holes spaced $3\frac{9}{32}$ inches. 10 Amps., 250 Volts; 15 Amps., 125 Volts

List No.	Description	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
5566	Black Porcelain	30	11	\$0.70
5566-B	Black Bakelite	30	10	.70

20 Amperes, 250 Volts

5552	Black Porcelain	30	11	1.03
5552-B	Black Bakelite	30	10	1.03

Carton 10.



Nos. 5566, 5566B

2 to 3 Wire Plug Adapters, Composition

10 Amperes, 250 Volts
15 Amperes, 125 Volts



No. 7052



No. 9052-L

These adapters have two blades for insertion in any standard convenience outlet, while other end is equipped with three slots to take standard 10-ampere 3-wire caps as listed in opposite column.

Grounding of the third blade is accomplished by the use of a binding post at the side of the body from which a wire is led to one of the flush plate screws of outlet or other grounding object.

List No.	Description	Car-ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
7052	Tandem Blades.....	10	30	6	\$0.49
9052	Parallel Blades.....	10	30	6	.49
7052-L	Tandem Blades, Ground Wire....	10	30	7	.51
9052-L	Parallel Blades, Ground Wire....	10	30	7	.51

HUBBELL WIRING DEVICES

Bakelite Face Single Convenience Outlets

Top Wired

Supporting screw holes spaced $3\frac{3}{4}$ inches.

List No.	Description	Std. Pkg.	Wt., Lbs.	List Price
5547	Black Porc.	100	32	\$0.35
5850	Brown Comp. ...	100	30	.35

Carton 10.

Brown composition is standard on No. 5850, but black may be had on special order at no advance in price.



No. 5547



No. 5467

Bakelite Separable Attachment Plugs

Large Size—Tandem Blades

660 WATTS, 250 VOLTS

With double T slots.

Nickel-plated screw shells are standard on all attachment plugs.



No. 5612

List No.	Description	Cord Hole, Ins.	Car-ton	Std. Pkg.	Wt., Lbs.	List Price
5467	Plug, Complete.	$\frac{1}{32}$	10	100	24	\$0.43
5420	Cap.	$\frac{1}{32}$	10	100	8	.15
5612	Body. ....	..	10	100	18	.28

Weatherproof Plug Receptacles

10 Amperes, 250 Volts

15 Amperes, 125 Volts

With double T slots. Composition.

List No.	Car-ton	Std. Pkg.	Wt., Lbs.	List Price
6293	10	30	9	\$1.22



No. 6293

10 Amp. Porcelain Receptacles With double T Slots

10 Amperes, 250 Volts; 15 Amperes, 125 Volts

Conduit Box

Screws, $\frac{5}{8}$ -inch centers.

With double T slots.

Appleton "W" Unilet and Crouse-Hinds Type "W" Condulet accommodate No. 5624 Receptacle.



No. 5624

List No.	Car-ton	Std. Pkg.	Wt., Lbs.	List Price
5624	10	50	13	\$0.70

Surface Motor Plugs

Small Size—Flush Type

Base is composition with metal casing.

Supporting screw holes are spaced $1\frac{3}{4}$ " on centers. Diameter of brass shell, $1\frac{3}{8}$ ".



No. 6808 or 9808



No. 6630

Non-Polarized

List No.	Description	Cord Hole, In.	Wt., Lbs.	List Price
6808	Base in Casing	$\frac{1}{32}$	7	\$0.49
6630	Body.	$\frac{1}{32}$	5	.17

Polarized, One Wide, One Narrow Blade

List No.	Description	Cord Hole, In.	Wt., Lbs.	List Price
9808	Base in Casing	$\frac{1}{32}$	7	\$0.49
6630	Body.	$\frac{1}{32}$	5	.17

Carton 10.

Standard Package 50.

HUBBELL WIRING DEVICES

10-Ampere 2-Wire Plug Caps

10 Amperes, 250 Volts; 15 Amperes, 125 Volts
"Cord-Grip" All Rubber



No. 9752



No. 9754



No. 9759

List No.	Description	Cord Hole Inches	Wt., Lbs.	List Price
9752	Tandem Blade.	$\frac{9}{16}$	7	\$0.33
9753	Tandem Blade.	$\frac{5}{8}$	7	0.33
9754	Parallel Blade.	$\frac{9}{16}$	7	0.33
9755	Parallel, Polarized.	$\frac{9}{16}$	7	0.47
9756	Parallel Blade.	$\frac{5}{8}$	7	0.47
9757	Parallel, Polarized.	$\frac{5}{8}$	7	0.47
9759	Double T Blade.	$\frac{9}{16}$	7	0.63
9760	Double T Blade, Pol'z'd.	$\frac{9}{16}$	7	0.63
9761	Double T Blade.	$\frac{5}{8}$	7	0.63
9762	Double T Blade, Pol'z'd.	$\frac{5}{8}$	7	0.63

Carton 10. Standard Package 50.

Armored "Cord-Grip" Caps



No. 7057

Composition cap, steel covered, cadmium plated. Can be supplied in brush brass or gun metal finish at \$5.00 per 100 extra list.

Polarization of Nos. 7059 and 7185 is effected by one wide and one narrow blade.



No. 7056

List No.	Description	Cord Hole Inches	Wt., Lbs.	List Price
7056	Tandem Blades.	$\frac{9}{16}$	7	\$0.35
7057	Parallel Blades.	$\frac{9}{16}$	7	0.35
7059	Parallel, Polarized.	$\frac{9}{16}$	7	0.48
7183	Tandem Blades.	$\frac{5}{8}$	7	0.43
7184	Parallel Blades.	$\frac{5}{8}$	8	0.43
7185	Parallel, Polarized.	$\frac{5}{8}$	8	0.48

Carton 10. Standard Package 50.

"Cord-Grip" Type

10 Amperes, 250 Volts

15 Amperes, 125 Volts

Composition cap, steel covered, cadmium plated.



No. 7055



No. 7089

List No.	Cord Hole Inches	Carton	Standard Package	Wt., Lbs.	List Price
7055	$\frac{9}{16}$	10	50	8	\$0.65
7309	$\frac{5}{8}$	10	50	8	0.65
7089	$\frac{5}{8}$	10	20	9	1.00

If desired grounded, suffix letter "G" to list number.



No. 6058

20-Ampere Caps

20 Amperes, 250 Volts

Brush brass is standard finish for No. 6058.



No. 7198

If No. 6058 is desired grounded, suffix letter "G" to list number.

List No.	Cord Hole Inches	Carton	Standard Package	Wt., Lbs.	List Price
6058	$\frac{1}{2}$	10	30	6	\$0.88
7198	$\frac{5}{8}$	10	30	6	0.35

HUBBELL WIRING DEVICES

Pull Socket with Lamp Base Attachment

250 Watts, 250 Volts

Can be attached to any ordinary socket receptacle. Equipped with 6½-inch pull in. Standard finish is brush brass.

List No.	Car- ton	Std. Pkg.	Wt., Lbs. Std. Pkg.	List Price
3190	10	10	4	\$0.86



Pull Socket Te-Taps

Plug Outlet
660 Watts, 250 Volts

Socket Outlets
250 Watts, 250 Volts



No. 3190

No. 3191

Standard finish is brush brass, and will be furnished on all orders unless otherwise specified.

With Screw Base

List No.	Description	Wt., Lbs. Std. Pkg.	List Price
3190	With Medium Screw Base.....	5	\$1.63

With Standard Socket Caps

3191	With ⅛-inch Cap.....	4	1.70
3193	With ⅜-inch Cap.....	4	1.47
3194	With Pendant Cap.....	4	1.42

Carton 10. Standard Package 10.

Current Taps

660 Watts, 250 Volts

Single Outlet

Multiple

Composition



No. 6338

No. 6298

List No.	Description	Wt., Lbs. Std. Pkg.	List Price
6338	With Cap.....	24	\$1.03
6339	Less Cap.....	18	0.88

Series—Porcelain

6298	Less Cap.....	20	0.87
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Carton 10. Standard Package 50.

Double Outlet, Multiple—Composition



No. 6710

List No.	Description	Wt., Lbs. Std. Pkg.	List Price
6710	With 2 No. 5420 Caps.....	11	\$1.35
6711	Less Caps.....	8	1.05

Carton 10. Standard Package 20.

HUBBELL WIRING DEVICES

10-Amp. and 20-Amp. 2-Wire Cord Connectors

Cord-Grip—Polarized

Composition. Caps are steel covered, cadmium plated.

10 Amps. 250 Volts; 15 Amps. 125 Volts

List No.	Description	Cord Hole Inches	Wt., Lbs. Std. Pkg.	List Price
7091	Body.....	⅞	9	\$1.05
7092	Cap.....	⅞	5	0.65
7240	Body.....	⅝	8	1.05
7241	Cap.....	⅝	6	0.97



20 Amperes, 250 Volts

7086	Body.....	⅝	11	1.21
7058	Cap.....	⅝	8	0.74

Carton 10. Standard Package 30.



10 and 20-Amp. 3-Wire Cord Connectors

Polarized

10 Amperes, 250 Volts
15 Amperes, 125 Volts

Composition.

List No.	Description	Cord Hole Inches	Wt., Lbs. Std. Pkg.	List Price
6409	Body.....	⅞	12	\$0.70
6149	Cap.....	⅞	5	0.34
7252	Cap.....	¼	6	0.34

Carton 10. Standard Package 50.

With Grip-Cord

Composition. Caps are steel covered, cadmium plated. If desired Grounded suffix letter "G" to list number.

10 Amps., 250 Volts; 15 Amps., 125 Volts

List No.	Description	Cord Hole Inches	Wt., Lbs. Std. Pkg.	List Price
7082	Body.....	⅞	13	\$1.06
7055	Cap.....	⅞	7	0.65
7308	Body.....	⅝	8	1.13
7309	Cap.....	⅝	8	0.65

Carton 10. Standard Package 50.

20 Amperes, 250 Volts

7088	Body.....	⅝	9	1.78
7089	Cap.....	⅝	9	1.00

Carton 10. Standard Package 20.



No. 7055

No. 7082

Separable Attachment Plugs

660 Watts, 250 Volts

Pony Size—Parallel Blades

With Composition Cap

Regularly furnished in solid black composition and with nickel-plated screw shells, but may be had in solid brown composition at same price.



No. 7000

List No.	Description	Cord Hole, Ins.	Wt., Lbs. Std. Pkg.	List Price
7000	Plug, Oval Cord Hole.....	⅜x⅝	60	\$0.90
7001	Body.....		40	0.05
7002	Cap, Oval Cord Hole.....	⅜x⅝	30	0.05
7066	Cap, Round Hole.....	⅝	28	0.05
7068	Cap, Round Hole.....	⅜	27	0.05

Carton 25. Standard Package 500.

Bayonet Base—Composition

Non-Separable



List No.	Description	Car- ton	Std. Wt., Lbs. Pkg. Std. Pkg.	List Price
6712	Bayonet Base....	25	100 9	Special

ARROW WIRING DEVICES

Polarized Devices
3 Wire, 30 Amperes

30 Amp. 250 Volts



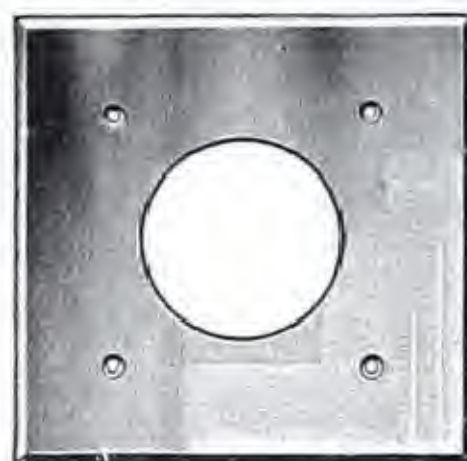
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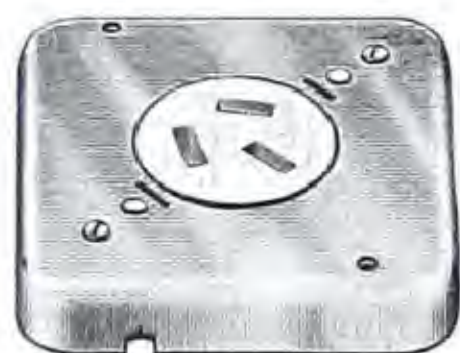
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No. 8385



No. 8288



No. 7737

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
8286	1/2" Porcelain Cap.....	10	2	7	\$1.25
7771	3/4" Composition Cap.....	10	2	7	1.85
8292	3/4" Composition Cap with Ground Contacts.....	10	2	9	3.05
8385	Flush Receptacle and Cover*..	10	2	16	9.45
8288	Solid Brass Plate.....	10	2	9	2.45
8298	Solid Brass Plate with Ground Contacts.....	10	2	9	3.05
8293	.060" Steel Plate with Ground Contacts.....	10	2	5	1.45
7737	Flush Receptacle with Galvanized Cover for surface work..	10	2	20	11.00

Standard brass plate finish is Brush Brass. For special finishes, add twice the usual advance. Steel plate has straight edges and cadmium finish.

*Flush Receptacle fits standard boxes $4\frac{11}{16}$ " square and not less than $2\frac{1}{8}$ " deep. It is equipped with special plaster cover for use with standard boxes. Plates are $5\frac{1}{2}$ " square, allowing an overhang over the box to make up for any irregularities in the plaster work.

Caps with ground contacts have ears for permanently attaching to plate, also for ground connection. Ears can be removed if not required.

ARROW WIRING DEVICES

Polarized Devices

3-Wire, 50 Amp.
50 Amp. 250 VoltsCAPS
For Armored Cable

No. 8291



No. 8295

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
8291	Straight.....	10	2	15	\$4.30
8295	90° Angle.....	10	2	16	4.60

Supplied with spring reducer bushing for 8-3 A. B. C. Cable when specified, at no extra charge.

RECEPTACLES



No. 8285



No. 7738



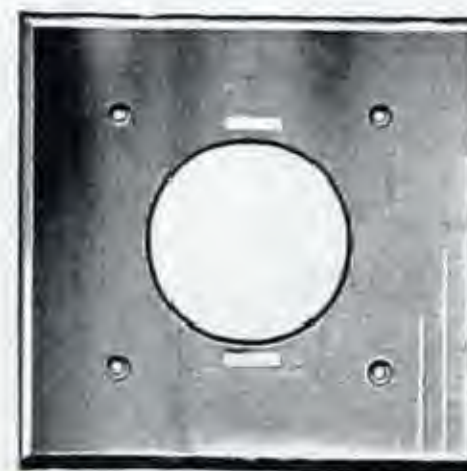
No. 8299

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
8285	Flush, with plaster box cover...	10	2	17	\$11.05
8289	Flush, without cover.....	10	2	9	9.50
8284	Plaster box cover.....	10	2	5	1.55
7738	With surface box cover.....	10	2	21	13.60
8299	Porcelain surface*.....	10	2	11	2.15

No. 8285 flush receptacle fits standard boxes $4\frac{11}{16}$ inches square and not less than $2\frac{1}{8}$ inches deep. It is equipped with a plaster cover of special construction for use with standard boxes. The finished plate is $5\frac{1}{2}$ inches square, allowing an overhang over the box in order to make up for any irregularities in the plaster work.

No. 7738 Receptacle for surface work is furnished with a galvanized box cover to fit standard boxes $4\frac{11}{16}$ inches square and not less than $2\frac{1}{8}$ inches deep.

*Will fit SP 72C 102 cover for $4\frac{11}{16}$ -inch outlet box.



No. 8298

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
8288	Solid Brass, without Ground Contacts.....	10	2	9	\$2.45
8298	Solid Brass, with Ground Contacts.....	10	2	9	3.20
8293	.060" Steel, with Ground Contacts.....	10	2	5	1.55

Standard finish on brass plates is brush brass. For special finishes add twice the usual advance. Steel plate has straight edges and cadmium finish.

PLATES

ARROW WIRING DEVICES

Fan Hanger Outlet

15 Amp. 125 V., 10 Amp. 250 V.

Provides electrical connection and mechanical support for fans. It is easy to install and fits a standard 4" square box. Supports a weight many times greater than a fan. Two standard types are supplied: (a) Clamp type for the average job where the outlet fastens to the box cover, and (b) Stud type where hickey fastens to the box stud. Brush Brass, .060" plate is standard on both types.

No. 7750

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
750	Clamp type, with plate.....	50	10	32	\$4.10
751	Stud type, with plate.....	50	10	33	4.10
752	Clamp type, without plate.....	50	10	16	3.70
753	Stud type, without plate.....	50	10	18	3.70
755	Plate for Nos. 7752, 7753.....	50	10	12	.45

Clock Hanger Outlet

15 Amp. 125 V., 10 Amp., 250 V.

A double service device providing mechanical support for the clock and electrical connection. Receptacle is recessed so the plug cap goes flush with the plate. This allows the clock to hang flat over the outlet, entirely covering it, with all wiring concealed. May be installed in a mantle for shelf clocks. Standard plate finish is Brush Brass.

No. 7707

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
7707	Complete with .040" Plate.....	10	2	5	2.50

Outdoor Flush Receptacle

15 Amp. 125 V., 10 Amp. 250 V.

A permanent, weatherproof convenience outlet for plugging in outdoor lighting connections or appliances. Saves the nuisance of temporary wiring from the inside. Sturdily designed to weather rain, snow, ice and dampness. Cadmium finished .060" brass plate and cap defies rust and corrosion. When not in use, a metal cap screws over the opening—when connected, the regular cap may be covered with metal cap No. 7793. A rubber mat, fitting under the plate, completes the weatherproofing. For holiday and decorative tree and lawn lighting, for porch and terrace lighting, outdoor appliances, etc.

No. 7792



No. 7793

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
7792	With Plate, 2-Wire.....	10	2	7	2.95
7796	With Plate, 3-Wire*.....	10	2	7	4.60
7793	Metal Cap.....	10	2	1	.75

*Pony size Cap must be used.

Floor Outlet

15 Amp. 125 V., 10 Amp. 250 V.

To plug in lamps or appliances without the nuisance of running long cords from the wall. Made in two styles: (1) bevel edge plate .060" brass and (2) square edge solid brass plate where it is desired to make an absolutely flush job. Two threaded solid brass covers are supplied, one for completely closing the outlet when not in use; the other with cord hole and bushing to shield the plug cap when connected. Receptacle is recessed so the plug is sunk flush with the floor.

No. 7797

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
7797	With bevel edge plate.....	10	2	8	2.80
7798	With square edge plate.....	10	2	8	3.40

ARROW WIRING DEVICES

Type "C" Flush Tumbler Switches

20 AMPERE

Bakelite Base, 2-Inch

Specially designed to handle the initial current surge of medium size, gas filled Type "C" Lamps.

No. 6301

List No.	Description	Amperes 125V. 250V.	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
6301	Single Pole.....	20	30	10	12	\$2.65
6302	Double Pole.....	20	10	2	4	3.05
6303	Three-Way.....	20	10	2	4	3.05
6306	Four-Way.....	20	10	2	4	9.15
6304	S. P. Quadruple Break	20	10	2	4	3.05



No. 4277

No. 6301-L

LOCK

20 Ampere

Bakelite Base, 2-Inch

6301-L	Single Pole.....	20	30	10	12	\$4.10
6302-L	Double Pole.....	20	10	2	4	4.40
6303-L	Three-Way.....	20	10	2	4	4.40
6306-L	Four-Way.....	20	10	2	4	10.50
6304-L	S. P. Quadruple Break.....	20	10	2	4	4.40
4277	Key for Lock Type.		10	2	5 oz.	.30



No. 6465

30 AMPERE

Bakelite Base, 2-Inch

6464	Single Pole.....	30	30	10	13	\$3.30
6465	Double Pole.....	30	10	2	4	4.35
6466	Three-Way.....	30	10	2	4	4.35
6469	Four-Way.....	20	10	2	4	13.10
6467	S. P. Quadruple Break	30	10	2	4	4.35



No. 6464-L

LOCK

30 Ampere

Bakelite Base, 2-Inch

6464-L	Single Pole.....	30	30	10	12	\$4.65
6465-L	Double Pole.....	30	10	2	4	5.70
6466-L	Three-Way.....	30	10	2	4	5.70
6469-L	Four-Way.....	20	10	2	4	14.65
6467-L	S. P. Quadruple Break.....	30	10	2	4	5.70
4277	Key for Lock Type.		10	2	5 oz.	.30

All above Type "C" Switches take standard Tumbler Plates, brass or bakelite.

ARROW WIRING DEVICES

Intermediate Base Devices

75 Watts, 250 Volts



No. 485



No. 488



No. 490

PORCELAIN RECEPTACLES

List No.	Description	Screw Spacing	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
485	Cleat, Base dia., 1 7/8".....	1 7/16"	100	25	15	\$0.37
488*	Sign, 2 Screw, 1" hole.....	1 3/8"	250	25	42	.37
490	Sign, Rem. Ring, 1 1/16" hole.....		250	25	36	.37

Can be supplied with Anti-Paint Discs when specified without extra charge.

Discs will be sold separately, price on application.

*Can be furnished with wire grooves running at right angles to the mounting screws. If so desired, add "B" to the catalog number.



No. 492

ADAPTER

Medium to Intermediate

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
492	Bakelite Adapter.....	100	25	4	\$0.30

Candelabra Base Devices

75 Watts, 125 Volts



No. 386



No. 384



No. 321



No. 7701

ASSEMBLED BRASS SHELL SOCKETS, 1/8" CAP

386	Pull.....	50	10	5	\$1.70
384	Key.....	100	25	10	1.05
321	Keyless.....	100	25	8	.85
7701	Push.....	100	25	10	1.10



No. 328



No. 347



No. 349



No. 357



No. 381

CANDLE SOCKETS

with 1/8" female bushing except No. 328 which has a male thread 5/16-27

328	Keyless, ht. 1 9/16", male thread...	100	25	4	\$0.65
347	Keyless, Loop Hickey, ht. 2"....	100	25	5	.50
349	Keyless, Close Hickey, ht. 1 9/16"....	100	25	5	.50
357	Keyless, Adj. 3 3/16" to 4 11/16".....	100	25	8	.55
381	Pull, ht. 2 5/16", 3" Chain.....	50	25	4	2.30

ARROW WIRING DEVICES

Candelabra Base Devices

75 Watts, 125 Volts



No. 323

WEATHERPROOF SOCKET

Has 6 Inches of No. 18 Rubber Covered Wire

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
323	Green Porcelain.....	100	25	6	\$0.54



No. 367



No. 9446



No. 7706



No. 390

PORCELAIN RECEPTACLES

List No.	Description	Base Dia.	Screw Spacing	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
367	Cleat, round.....	1 7/16"	1 1/16"	100	25	10	\$0.40
9446	Cleat, round.....	1 5/16"	1 1/32"	200	25	12	.30
7706	Cleat, oblong.....	1 9/16 x 1"	1 7/32 x 1 1/2"	100	10	10	.35
390	Sign, with Ring.....	3/4" hole		100	25	8	.31

Miniature Base Devices

75 Watts, 125 Volts



No. 320



No. 322



No. 9445

320	Keyless Socket, 1/8"								
	Cap, Brass Shell.	100	25	5	\$1.10				
322	Weatherproof Socket,								
	green porcelain, 6"								
	lds.....	100	25	5	.54				
9445	Cleat Receptacle.....	1 1/4"	1 21/32"	200	25	11	.30		



No. 5000

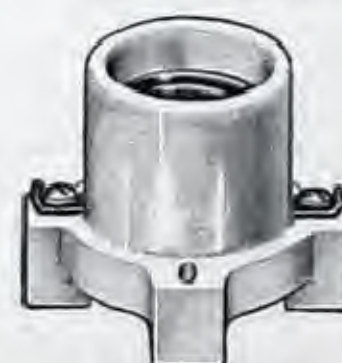
Mogul Base Devices

1500 Watts, 600 Volts

KEYLESS BRASS SHELL SOCKETS

5000	3/8" Cap.....	50	10	34	\$4.60
5001	1/2" Cap.....	50	10	34	4.60

PORCELAIN RECEPTACLES



No. 5012



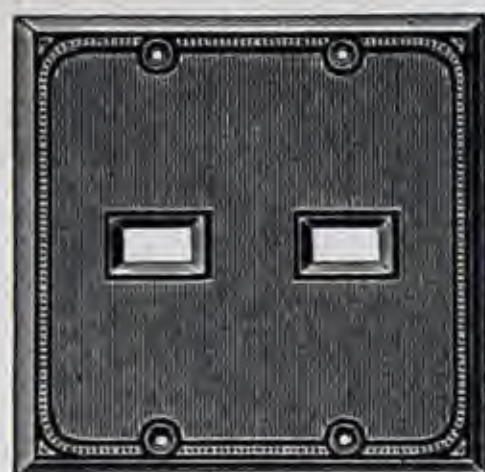
No. 7156

5012	Cleat, Screw Spacing 2 7/8".....	50	5	42	1.65
7156	Sign, Hole 2 1/4", Screw Spacing 2 1/16".....	100	5	96	1.86

ARROW WIRING DEVICES



No. 9064



No. 9065

Bakelite
Plates

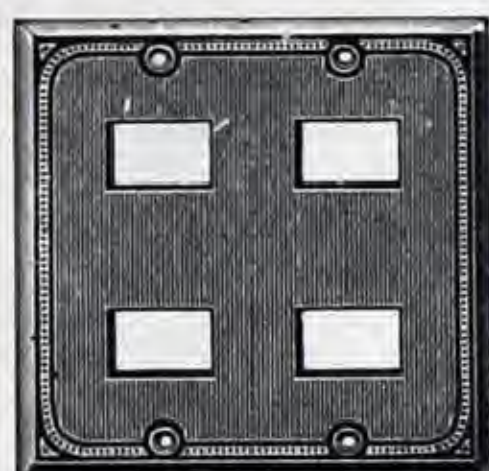
ONE OPENING

For Horizontal
Operating
Single Switches

Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
1 Gang, 1 Opening.....	100	10	9	\$0.21
2 Gangs, 2 Openings.....	50	10	8	.42



No. 9060



No. 9062

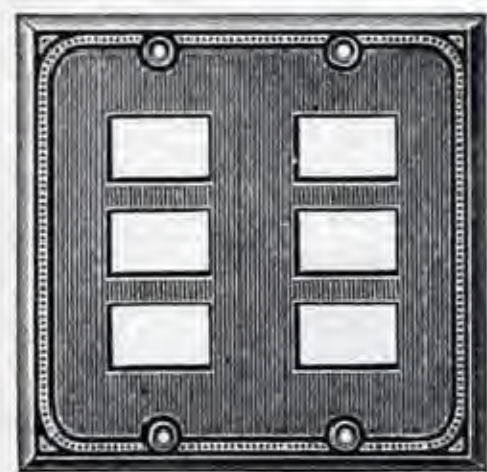
TWO OPENINGS

For all two section
combinations

1 Gang, 2 Openings.....	50	10	5	\$0.30
2 Gangs, 4 Openings.....	30	10	2	.60



No. 9061



No. 9063

THREE OPENINGS

For all three section
combinations

1 Gang, 3 Openings.....	30	10	2	\$0.42
2 Gangs, 6 Openings.....	20	10	2	.85

All Timesaver Devices are listed as Standard by the
Underwriters' Laboratories, Inc.



No. 292



No. 492

Reducers or
Adapters

For Sockets and Receptacles

Mogul to Medium.....	100	10	18	\$0.70
Medium to Intermediate.....	100	25	4	.30
Medium to Candelabra.....	100	25	5	.26
Candelabra to Miniature.....	100	20	1	.18

ARROW WIRING DEVICES



KK

Pull Socket Switches, Single Pole

6 Amps., 125 Volts

3 Amp., 250 Volts

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
KK	Bottom Pull High Capacity.....	20	10	4	\$1.70

Equipped with short chain and 4 feet of cord.



No. 21

Interchangeable Socket Base

PORCELAIN

List No.	Description	Screw Spac- ings	Base Dim. or Dia.	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
21	Small, Concealed	1 1/8"	2 1/16"	100	10	18	\$42.00



No. 6651

Ceiling Pull Switches

Base diameter 2 1/2"

Screw Hole Spacing 1 21/32"

List No.	Description	Amperes 125V. 250V.	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
6650	Single Pole, Slotted..	10 5	30	10	18	\$3.35
6651	Single Pole, Closed...	10 5	30	10	18	2.80
6652	Double Pole, Slotted..	10 10	10	2	7	4.00
6653	Double Pole, Closed..	10 10	10	2	7	4.00
6654	Three-Way, Slotted..	10 5	10	2	7	4.35
6655	Three-Way, Closed..	10 5	10	2	7	4.35
6657	Four-Way, Closed...	10 5	10	2	7	8.15
6659	Two Circuit, Closed..	10 5	10	2	7	4.80
6661	Three Circuit, Closed	10 5	10	2	7	4.80



No. 6663

Wall Pull Switches

Base diameter 2 1/2"

Screw Hole Spacing 1 21/32"

6662	Single Pole, Slotted..	10 5	30	10	18	\$3.35
6663	Single Pole, Closed...	10 5	30	10	18	3.35
6664	Double Pole, Slotted..	10 10	10	2	7	4.00
6665	Double Pole, Closed..	10 10	10	2	7	4.00
6666	Three-Way, Slotted..	10 5	10	2	7	4.35
6667	Three-Way, Closed..	10 5	10	2	7	4.35
6669	Four-Way, Closed...	10 5	10	2	7	8.15
6671	Two Circuit, Closed..	10 5	10	2	7	4.80
6673	Three Circuit, Closed	10 5	10	2	7	4.80

Two circuit switches operate: 1, 2, 1&2, Off.

Three circuit switches operate: 1, 1&2, 1&2&3, Off.

ARROW WIRING DEVICES

Threaded Catch Sockets

These caps and bodies are fastened together by a threaded ring which may be very tightly set. The cap cannot pull away from the body and vibration will not loosen the parts.



BODIES, 250 VOLTS

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
TCA	Key, 660 Watts.....	250	25	47	\$0.80
TCC	Keyless, 660 Watts.....	250	25	40	.56
TCD	Pull, 660 Watts.....	250	25	46	.80
TCW	Push, 660 Watts.....	250	25	47	.80



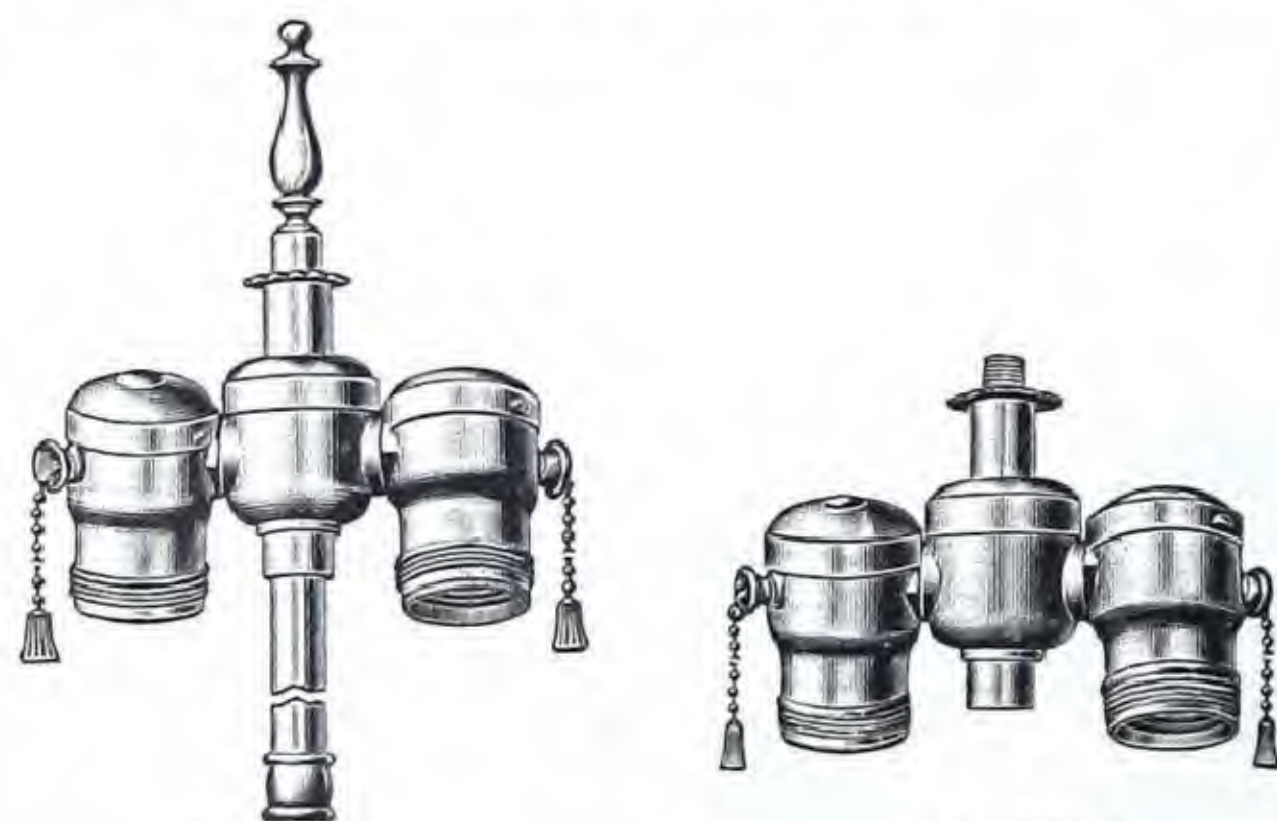
CAPS

701	1/8-inch.....	250	25	9	\$1.75
703	3/8-inch.....	100	25	6	.30
717	Pendent, 1 1/2-inch Cord Hole.....	250	25	6	.17
762	Pendent Cord Grip, 3/8-1/2" Cord.....	100	25	8	.39
763	Pendent Cord Grip, 1/4-3/8" Cord.....	100	25	8	.39

Lamp Clusters

With Adjustable Sockets from Vertical to Horizontal

Nos. 5341 and 5343 have a Finial or Top Ornament and 1/4-inch Pipe. No. 5341 has a 6-inch Stem and No. 5343 has an adjustable Stem, 4 1/2"-8". 660 Watts.



No. 5341

No. 5340

5340	With Top Stud Assembly.....	10	2	6	\$2.25
5341	With Finial and Ornament, 6" Stem.....	10	2	8	2.55
5343	With Finial and Ornament, Adjustable Stem, 4 1/2"-8".....	10	2	8	2.70



No. 112

Outlet Box Accessories

For 3 1/4" and 4" Boxes

No. 112 fits box covers with 1/2" knockouts and is suitable for cord from 1/4" to 1/2". Has a 1 1/2" dia. Cord Hole. Can be furnished without locknut when specified.

112	1/2" Cord Grip for Covers.....	25	5	2	\$0.22
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ARROW WIRING DEVICES

Intermediate Base Devices

Key and Pull, 75 Watts, 125 Volts

Keyless, 75 Watts, 250 Volts



No. 484

No. 481

No. 486

No. 7702

ASSEMBLED SOCKETS, with 1/8" Cap (Brass Shell)

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
484	Key.....	100	25	10	\$1.05
481	Keyless.....	100	25	9	.80
486	Pull.....	100	25	10	1.55
7702	Push.....	100	25	10	1.10



NA

NC

ND

NW

BODIES, BRASS SHELL

NA	Key.....	100	25	8	\$0.80
NC	Keyless.....	100	25	7	.55
ND	Pull.....	100	25	8	1.25
NW	Push.....	100	25	7	.85

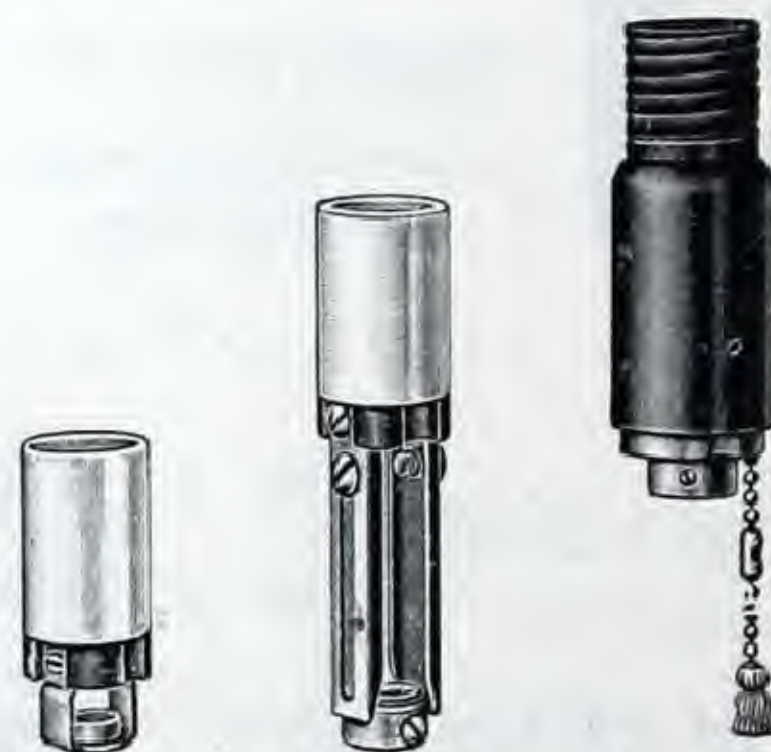


No. 751

No. 772

1/8-INCH CAPS

751	Straight.....	100	25	3	\$0.26
772	90° Angle.....	50	25	3	.65



No. 7748

No. 480

No. 482

CANDLE SOCKETS

3 Inches of Chain is supplied on Pull Sockets

7748	Keyless, length 2".....	100	25	6	\$0.33
480	Keyless, Adj., 3 1/2" to 4 1/8".....	100	25	7	.43
482	Pull, Length 2 1/16".....	100	25	8	2.30

WEATHERPROOF SOCKET AND RECEPTACLE



No. 483

No. 7710

6 Inches of No. 18 Stranded Rubber Covered Wire

List No.	Description	Screw Spacing	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
483	Bakelite Socket.....		100	25	5	\$0.37
7710	Porcelain Rec., 1 1/2"x1 7/8". 1 7/16"		100	25	17	.55

ARROW WIRING DEVICES

Timesaver Switches

SINGLE SWITCHES

All Bakelite, fully enclosed and sealed, making a dust proof, tamper proof job. Small, compact and sturdy, with plenty of wiring room. Designed especially for type C Lamp Loads. Fits standard tumbler plates, brass or Bakelite.



TL-1

List No.	Description	Amperes		Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
		125V.	250V.				
L-1	Single Pole.....	10	5	100	10	19	\$0.70
L-2	Double Pole.....		10	10	2	2	1.85
L-3	Three-Way.....	10	5	50	10	9	1.10
L-4	Four-Way.....	5	2	10	2	2	6.10

These switches can also be supplied on order, mounted on 4" or 4" Outlet Box covers, at a slight increase for the cost the cover.



L-1 Lock

LOCK STYLE SINGLE SWITCHES

Keyhole is flush with the plate. Attractive appearance which harmonizes with the lever style. A thoroughly dependable lock switch, operable only with the proper key. Fits standard tumbler plates.

L-1 Lock	Single Pole.....	10	5	100	10	18	\$2.10
L-2 Lock	Double Pole.....		10	10	2	2	3.20
L-3 Lock	Three-Way.....	10	5	50	10	9	2.45
L-4 Lock	Four-Way.....	5	2	10	2	2	7.55
08	Key.....			1	1		.43

One No. 7908 key is supplied with each lock switch.



TL-01

HORIZONTAL OPERATION SINGLE SWITCHES

For use where a single switch is desired to match in appearance the horizontal operating levers of switch sections in Timesaver Combinations. Fits Horizontal One Opening Bakelite Plates.

L-01	Single Pole.....	10	5	100	10	19	\$0.69
L-02	Double Pole.....		10	10	2	2	1.82
L-03	Three-Way.....	10	5	50	10	9	1.10
L-04	Four-Way.....	5	2	10	2	2	6.10

Can be furnished in Lock Style if desired. Add "Lock" the List number.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

ARROW WIRING DEVICES

Timesaver Switch Combinations

2 AND 3 LEVERS

The usual arrangement of Single Pole and 3-Way is listed. Any combination can be supplied, including Double Pole and Four-Way. Ratings same as single switches. Plates are not included.



TL-11



TL-111

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
TL-11	2 Single Pole.....	10	2	3	\$1.40
TL-13	Single Pole and Three-Way...	10	2	3	1.80
TL-33	2 Three-Way.....	10	2	3	2.20
TL-111	3 Single Pole.....	10	2	3	2.10
TL-113	2 S. P. and 1 Three-Way.....	10	2	3	2.50

Connecting shunt is furnished with each switch.



TL-61



TL-611

Switch and Warning Light

For Closets, Cellarways, and wherever a warning light is desired to flash a warning of current left on and otherwise wasted. Plates are not included.

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
TL-61	Warn. Lt. and S. P. Sw.....	10	2	3	\$2.80
TL-611	Warn. Lt. and 2 S. P. Sw.....	10	2	4	3.30

Other Combinations

Listings show only single pole switches in combination with Warning Lights and Receptacles. Double Pole, 3-Way and 4-Way Switches are also available in these combinations and may be substituted at the difference in list prices in the following manner: Simply order Double Pole by symbol 2; 3-Way by symbol 3; 4-Way by symbol 4 in place of Single Pole symbol 1. Example: TL-135 is a Single Pole Switch, a 3-Way Switch and Receptacle.

Similarly, any combination of switches (2 or 3 levers) may be ordered in addition to those listed. Example: TL-123 is a Single Pole, Double Pole and 3-Way Switch Combination.

Receptacle Rating: 15A. 125V., 10 A. 250 V.

Warning Light Rating: 75 W., 125 V.

Extra Lamps and Hood for Warning Lights



7903-R



7909

These Lamps and Hood may be used for replacement in any Timesaver Warning Light. Candelabra base lamps are used; choice of two colors, Red or White.

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
7903-R	Red Lamp.....	120	10	1 1/2	\$1.10
7903-W	White Lamp.....	120	10	1 1/2	.87
7909	Bakelite Hood.....	30	10	5 oz.	.44

Lamp Rating: 125 volts.

ARROW WIRING DEVICES



No. 6896

No. 6897

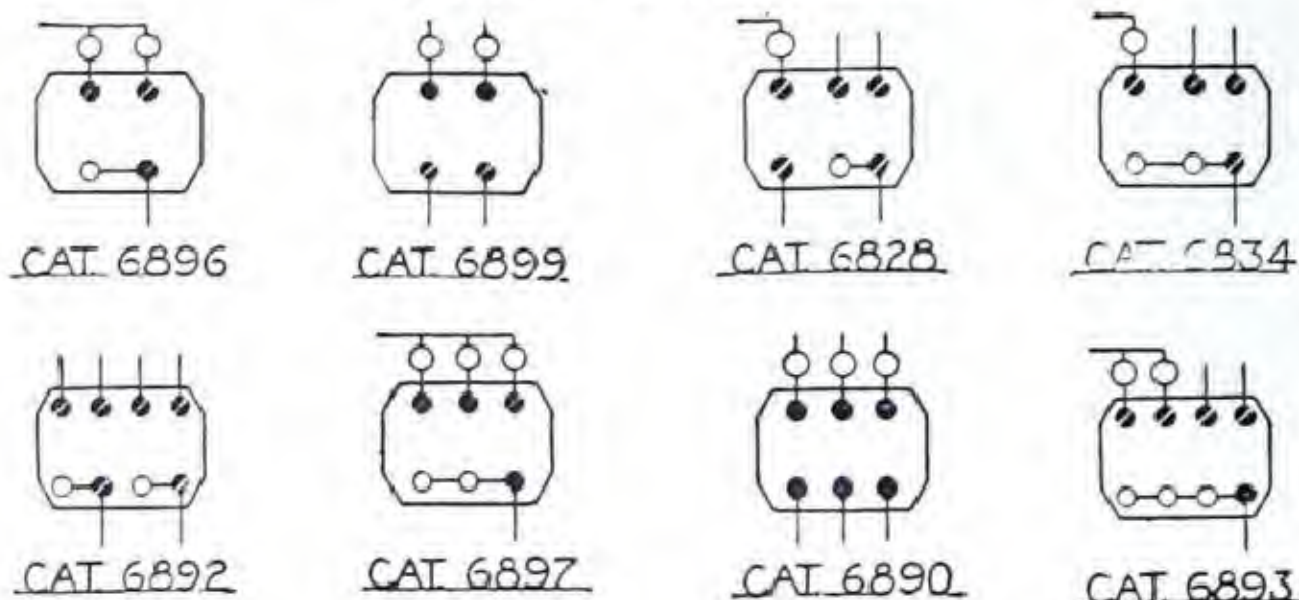
Tumbler Switches

Shallow Bakelite Base, 6 Amps.
125 V., 3 Amps. 250 V. ea.

Supplied in Lock Style at an additional list. If desired add "L" to the list number. All sections will be furnished "Lock" unless otherwise specified. One Key No. 4243 is furnished with each lock switch. Regular and Lock switches take the same plates

List No.	Description	Levers	Feeds	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
6896	2 Single Pole....	2	Common	10	2	3	\$2.60
6899	2 Single Pole....	2	Separate	10	2	3	2.10
6834	1 S.P. & 3-W....	2	Common	10	2	3	2.90
6828	1 S.P. & 3-W....	2	Separate	10	2	3	2.35
6892	2 Three-Way....	2	Separate	10	2	3	3.25
6897	3 Single Pole....	3	Common	10	2	3	3.90
6890	3 Single Pole....	3	Separate	10	2	3	3.20
6893	2 S.P. & 1 3-W.	3	Common	10	2	3	3.45
4243	Key for Lock Type.....			10	2	1/4	.31

WIRING DIAGRAMS



Momentary Contact Switches

PUSH BUTTON



No. 2179

1-Circuit, 1 Push Button, 2 3/16 Inch Porcelain Base

List No.	Description	Amperes 125V. 250V.	Pkg. Wgt.	List Price
2179	S. P. Normally Open.....	6	6	\$5.85
2179-L	Same, Lock Style.....	6	6	7.20
3661	S. P. Normally Closed.....	6	6	5.95
3661-L	Same, Lock Style.....	6	6	7.20
5003	Key for Lock Switches.....		1	.31

Standard Package 10, Carton 2.

These switches take 1-Button opening plates.



No. 6870

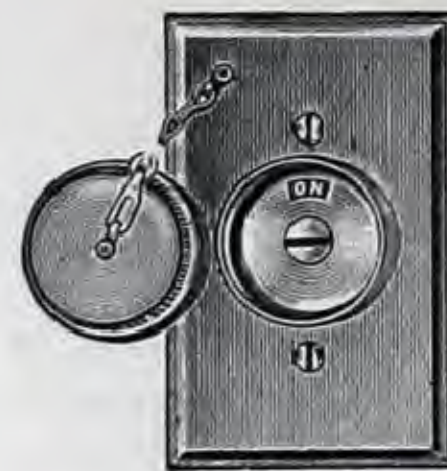
6870	S. P. Normally Open.....	10	5	3	\$2.80
6871	S. P. Normally Closed.....	10	5	3	3.00
1608	3-Way.....	10	5	4	3.70
6874	D. P. Normally Open.....		10	4	3.70
1607	D. P. Normally Closed.....		10	4	3.70

Standard Package 10, Carton 2.

These switches take 1-Button opening plates.

Supplied in Lock style if desired.

ARROW WIRING DEVICES



No. 1281-WP

Outdoor Weatherproof Rotary Lock Switches

With Corbin Tumbler Locks,
Weatherproof Plate and Cap

One key is furnished with each switch, and additional keys may be ordered but lock or key number must be given.

List No.	Description	Amperes 125V. 250V.	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
1281-WP	Single Pole.....	10 5	30	10	28	\$11.85
1282-WP	Double Pole.....	10	10	2	9	12.15
1283-WP	3-Way.....	10 5	10	2	9	12.15
1284-WP	4-Way.....	10 5	5	2	5	13.35

No. 1281 with
No. 1285 plate

Rotary Lock Switches

With Genuine Corbin Tumbler Locks

One key is furnished with each switch. Additional keys may be ordered, but lock or key number must be given.

List No.	Description	Amperes 125V. 250V.	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
1281	Single Pole.....	10 5	30	10	18	\$7.60
1282	Double Pole.....	10	10	2	6	8.95
1283	Three-Way.....	10 5	10	2	6	8.95
1284	Four-Way.....	10 5	5	2	3	10.15
1285	Single Solid Plate....		30	10	9	1.25

These switches take standard Single Convenience Outlet Plates, .040" and .060". If a solid plate is desired, No. 1285 must be used.



No. 2335

600 Volt

Fused Barrier Switches

The cover, base and handle are chocolate glazed porcelain.

One 5 Ampere fuse is included with each switch. If fuses are not desired, order should specify "without fuses."

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
2335	Single Pole, Indicating.....	25	5	46	\$7.65
2340	Double Pole, Indicating.....	25	5	46	7.65
2336	Three-Way, Non-Indicating....	25	5	46	7.65
2338	2 Circuit, Connections 1, Off, 2, Off, Indicating.....	25	5	46	7.65
3705	Fuse, 3 Amp. 600 Volts.....	100	10	5	.83
2319	Fuse, 5 Amp. 600 Volts.....	100	10	5	1.35

Switch dimensions, 3 1/8" wide, 4" long.

Supporting screws spaced 3 1/4" on centers.

Height over all, 2 1/2".

Fuse dimensions, 3 1/4" x 9/16".

ARROW WIRING DEVICES

Warning Light and Receptacle



No. 7728



No. 7711

Jewel Flush with Plate
15 Amp. 125 V.,
10 Amp. 250 V.

The telltale light gives a warning of current left on in toasters, percolators, flat irons, and other appliances. Removes the hazard of damage to appliances or more serious results. Saves current otherwise wasted.

	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
28	With Bakelite Plate.....	10	2	7	\$3.30
11	With .060" Brass Plate.....	10	2	8	3.40
12	Without Plate.....	10	2	4	2.25
29	Bakelite Plate.....	10	2	2	1.30
79	.060" Brass Plate.....	10	2	3	1.05

Switch and Receptacle

15 Amp. 125 V., 10 Amp. 250 V.

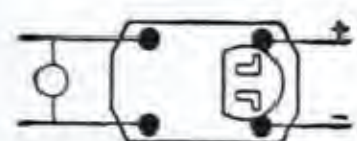


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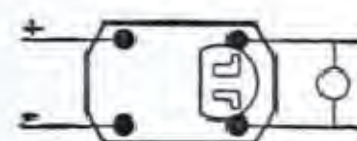


No. 548

Wiring Diagrams



Receptacle always on
Switch controls lights only



Switch controls
receptacle and lights

May be wired so the switch controls the receptacle or so that the receptacle is always on and the switch controls overhead lights.

With Double Pole Switch, 10 Amp. 250 Volts

	Description	Plate	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
98	Composition.....	.060" Brass	10	2	8	\$3.80
74	Composition.....	Bakelite	10	2	7	3.80
96	Composition.....	None	10	2	4	3.35
47	Porcelain.....	.060" Brass	10	2	8	2.70
48	Porcelain.....	Bakelite	10	2	7	2.85
56	Porcelain.....	None	10	2	4	2.55
97	.060" Brass Plate...		10	2	3	.47
43	Bakelite Plate.....		10	2	1	.47

With Double Pole Switch, 20 Amp. 250 Volts

54	Composition.....	.060" Brass	10	2	8	\$4.10
53	Composition.....	None	10	2	4	3.60

With Single Pole Switch, 10 Amp. 250 Volts

18	Composition.....	.060" Brass	10	2	8	\$3.80
17	Composition.....	None	10	2	4	2.35

2 INDEPENDENT CIRCUITS

With Double Pole Switch, 10 Amp. 250 Volts

42	Porcelain.....	.060" Brass	10	2	8	\$3.55
44	Porcelain.....	Bakelite	10	2	7	3.55
43	Porcelain.....	None	10	2	4	3.10

ARROW WIRING DEVICES

2-Gang Units

Switch, Receptacle and Warning Light with
Double Pole Switches, 20 A. 250 V., and
.040" Chromium Plates

RECEPTACLE RATING

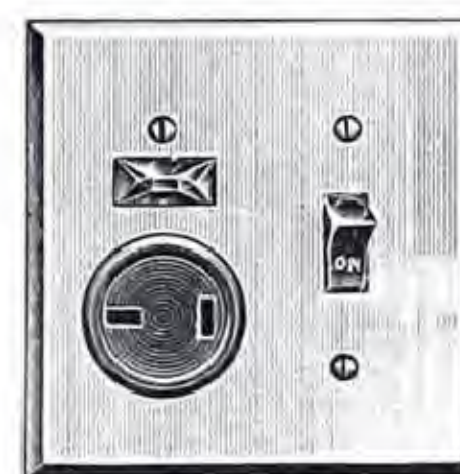
T Slot and 3 Wire, 15 A. 125 V., 10 A. 250 V.
2 Wire Polarized, 20 A. 250 V.



Nos. 5351, 5359



Nos. 5350, 5358



Nos. 5355, 5362

These units are made in two styles: (1) switch controlling outlet, in Series; (2) Switch and Receptacle separate and independent of each other. .040" Struck-Up plates are regularly supplied. If .060" plates are desired, order units without plates and .060" plates separate. Intermediate base lamps are used for the warning lights. These 2-Gang units are suitable for modern appliances in kitchens, laundries, restaurants, beauty parlors, professional offices, laboratories, etc. For rugged, heavy duty service to meet code requirements for a switch controlled outlet.

SERIES SWITCH CONTROLS OUTLET

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
5350	T Slots.....	10	2	12	\$7.40
5351	3 Wire (2 Wire with Ground)...	10	2	13	8.95
5355	2 Wire Polarized.....	10	2	12	8.70

.040" Chromium finish plates are included.

SEPARATE SWITCH AND RECEPTACLE INDEPENDENT

5358	T Slots.....	10	2	13	\$7.40
5359	3 Wire (2 Wire with Ground)...	10	2	13	8.95
5362	2 Wire Polarized.....	10	2	13	8.70

.040" Chromium finish plates are included.

WITHOUT PLATES

5352	T Slots.....Series.....	10	2	9	\$4.72
5353	3 Wire.....Series.....	10	2	9	6.30
5356	2 Wire Polarized.....Series.....	10	2	9	6.10
5360	T Slots.....Separate.....	10	2	9	4.75
5361	3 Wire.....Separate.....	10	2	9	6.30
5363	2 Wire Polarized.....Separate.....	10	2	9	6.10

Series: Switch controls outlet. Separate: Switch is independent and separate from outlet.

2-GANG PLATES, POLISHED CHROMIUM

5354	.040" for T Slot & 3 Wire Recpt.	10	2	3	2.65
5357	.040" for 2 Wire Polarized Recpt.	10	2	3	2.65
5364	.060" for T Slot and 3 Wire Recpt.	10	2	3	2.85
5365	.060" for 2 Wire Polarized Recpt.	10	2	3	2.86

Other finishes will be supplied on special order.

ARROW WIRING DEVICES



No. 9021

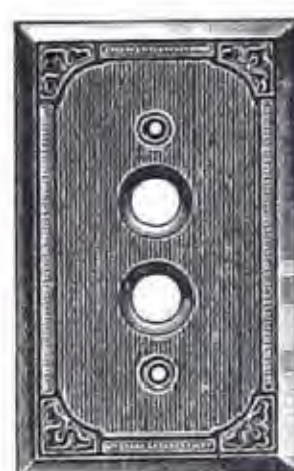
Bakelite Plates

Decorative Border—Ribbed Finish

Bakelite head screws are standard, except on plates for Duplex Receptacles which require metal screws finished to match the plate. Metal screws will be supplied and when desired add "M" to the List number, thus: List No. 9021-M.

For Tumbler Switches

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
9021	1-Gang.....	100 G	10 G	11	\$0.14
9022	2-Gang.....	100 G	10 G	8	.29
9023	3-Gang.....	100 G	10 G	8	.43
9024	4-Gang.....	100 G	10 G	8	.58
9025	5-Gang.....	100 G	10 G	7	1.95
9026	6-Gang.....	100 G	10 G	7	2.40
9042	2-Gang, Tandem.....	100 G	10 G	11	1.40

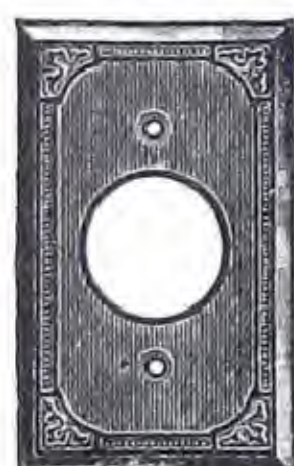


No. 9011

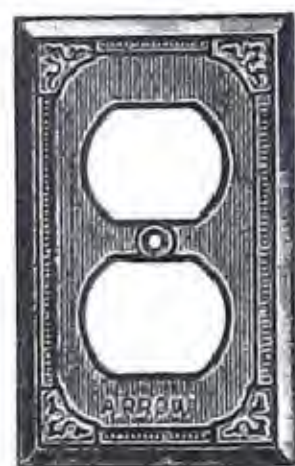
For Push Switches

1 Gang plate has a decorative border design. 2, 3 and 4 gang plates have a ribbed surface, but no border design. Plates fit Duplex Radio Jack Receptacle.

9011	1-Gang, Decorative Border.....	100 G	10 G	11	\$0.15
9012	2-Gang, Plain Border.....	100 G	10 G	9	.29
9013	3-Gang, Plain Border.....	100 G	10 G	8	.43
9014	4-Gang, Plain Border.....	100 G	10 G	8	.58



No. 9030



No. 9040

For Convenience Outlets

9030	1-Gang, Single.....	100 G	10 G	10	\$0.15
9040	1-Gang, Duplex.....	100 G	10 G	10	.15



No. 9034



No. 9036

Blank and Telephone

No. 9036 may also be used for Single Radio Jack Receptacle No. 2139.

9034	1-Gang, Blank.....	50 G	10 G	5	\$0.48
9035	2-Gang, Blank.....	50 G	10 G	5	.96
9036	1-Gang, Telephone, 1 opening, .450" Dia.....	50 G	10 G	5	.48



No. 91

Bakelite Plate Screw

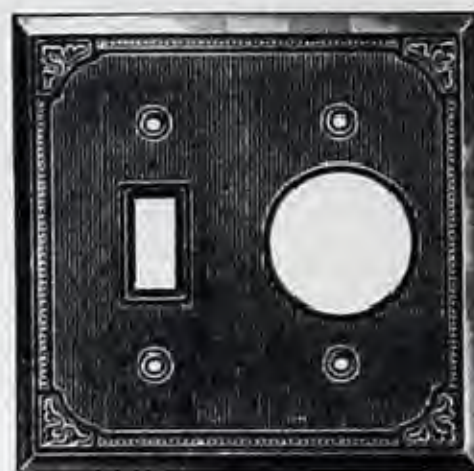
91	For all Bakelite Plates.....	100	20	2	\$1.40
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ARROW WIRING DEVICES—Bakelite Plates

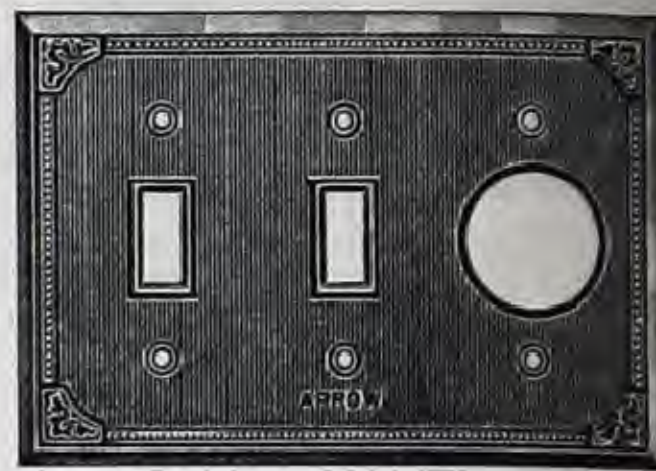
Decorative Border—Ribbed Finish

Bakelite head screws are standard, except on plates for Duplex Receptacles which require metal screws finished to match the plate. Metal screws will be supplied and when desired add "M" to the List number, thus: List No. 9018-M.

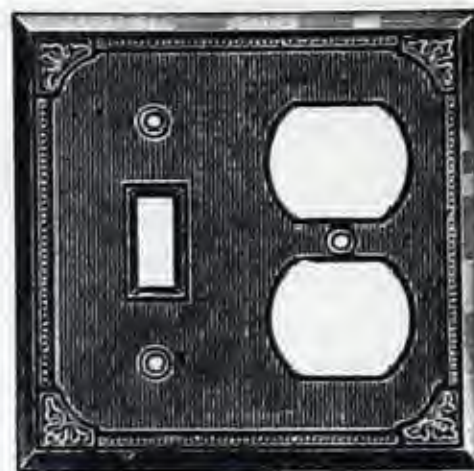
Combination Plates



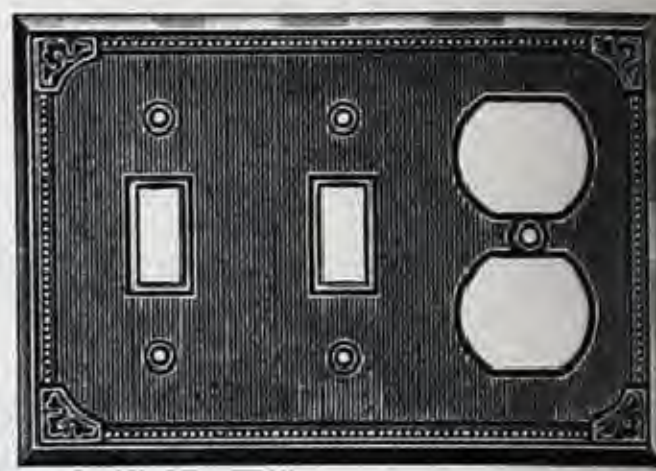
No. 9018



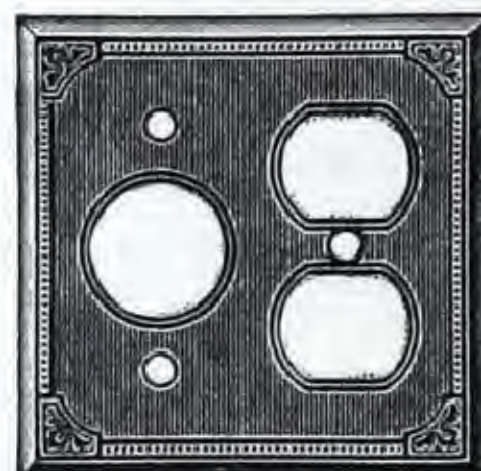
No. 9057



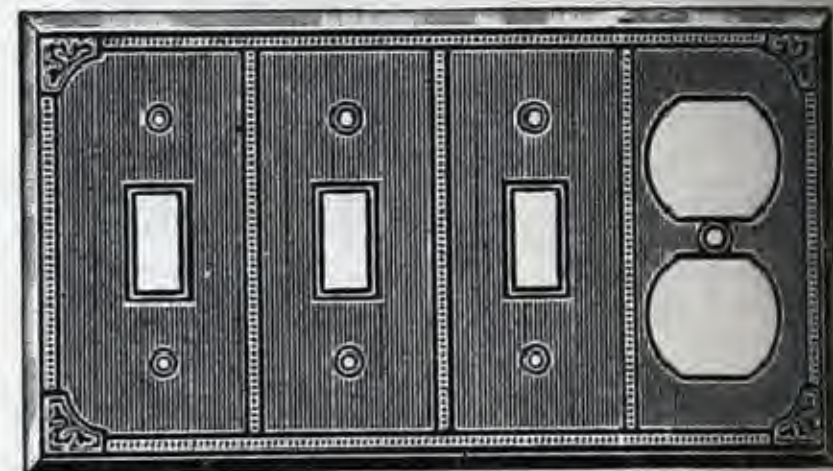
No. 9019



No. 9056



No. 9058



No. 9059

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
9018	2-G. Tumbler and Single Recpt..	10	2	1 1/2	\$0.29
9019	2-G. Tumbler and Duplex Rec..	10	2	1 1/2	.29
9058	2-G. Single and Duplex Recpt..	10	2	2	.29
9057	3-G. 2 Tumbler and Single Rec..	10	2	2 1/2	.43
9056	3-G. 2 Tumbler and Duplex Rec..	10	2	2 1/2	.43
9059	4-G. 3 Tumbler and Duplex Rec..	10	2	3	1.95



No. 7754



No. 7729



No. 9043

7754	Switch & Warning Light.....	10	2	1	\$1.50
7729	Warning Light & Receptacle.....	10	2	2	1.30
9043	Switch and Receptacle.....	10 G	2 G	1	.45



No. 9045



No. 9050

For Tumbler Switches

9045	2 Openings.....	10 G	2 G	1	\$0.40
9050	3 Openings.....	10 G	2 G	1	.48

ARROW WIRING DEVICES

Radio Outlets

2-Gang for Standard Wall Cases

This Unit gives Aerial, Ground and two power outlets—one for set and the other for table or floor lamps.



No. 2184

Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
Radio, and 2 Power Outlets; Cap, and Bakelite Plate No. 9058.....	10	2	8	1.75
Same, without plate.....	10	2	6	1.45

Duplex, for Surface Wiring



No. 2178

Provides Aerial, Ground and Power connections for installation on the wall or baseboard near the radio. Provides a connecting point for straggling wires. Receptacle and cover is all Bakelite and is easily and quickly installed.

Receptacle, including GH Cap...	10	2	4	\$1.95
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Cap for Radio Outlets

Plug fingers are set at an angle so it cannot be inserted in a power outlet and it is impossible to reverse the Aerial and Ground when inserting.

Radio Cap.....	10	2	1/2	\$0.26
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Radio Jack Receptacles



No. 2139



No. 2142



W-109

Single, Insulated Yoke.....	30	10	9	\$1.55
Duplex, Insulated Yoke.....	30	10	10	2.15
9 Plug for Nos. 2139, 2142.....	100	25	9	.69
Plate for Single Recept., .040".....	30	10	6	.29
Plate for Duplex Recept., .040".....	30	10	6	.43

Single Receptacles fit Bakelite One Outlet Telephone Nos. 9036 and 4118.

Duplex Receptacles fit Bakelite Push Plates.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Wharehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

ARROW WIRING DEVICES

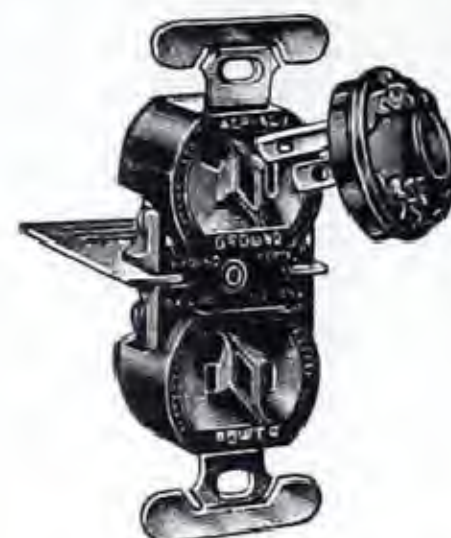
Radio Outlets — Single



No. 2147

For Aerial and Ground connections. Made of Bakelite, fits standard wall cases and takes standard plates. Has patented finding grooves with slots and plug fingers set at an angle so that it is impossible to reverse Aerial and Ground when inserting plugs. GH Radio Plug Cap must be used.

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
2147	Receptacle and GH Cap.....	10	2	2	\$1.10
2149	Receptacle only.....	10	2	2	.80



No. 2145

Duplex

For Aerial, Ground and Power. Similar to the Single, except the addition of a standard Power outlet. Duplex Radio Outlets fit standard wall cases and Duplex Plates. GH Radio Plug Cap must be used.

2145	Receptacle and GH Cap.....	10	2	4	\$2.00
2146	Recept. GH Cap and Bakelite Pl.	10	2	5	2.10
2144	Receptacle only.....	10	2	4	1.70



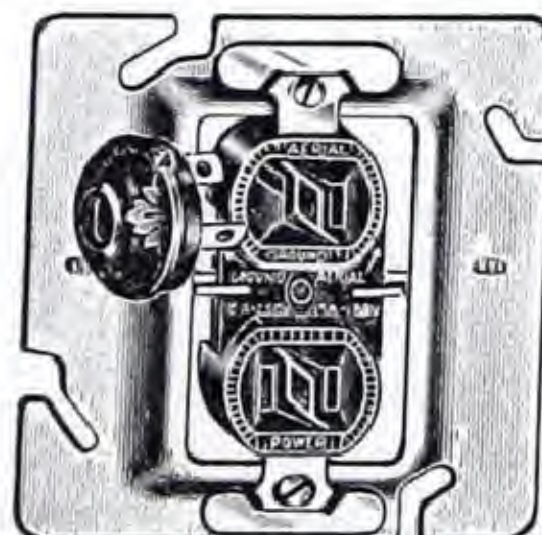
No. 2154

Twin Outlet

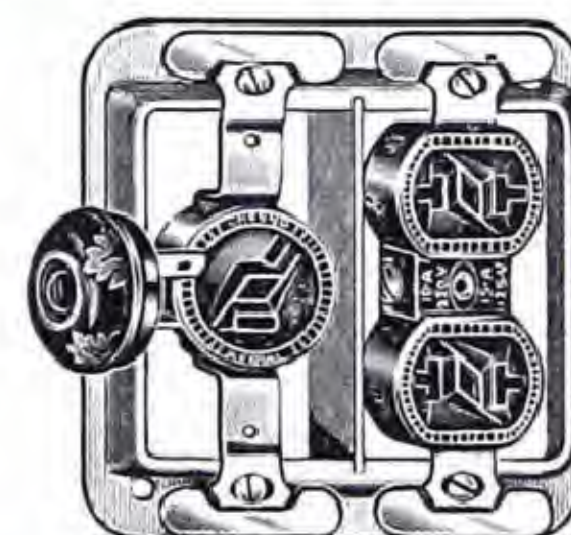
Gives two polarized Radio Outlets from one gang. Slots are set at an angle so that standard parallel blade caps cannot be inserted.

2154	Twin Radio Receptacle.....	10	2	2	\$1.80
2155	Same, with two GH Caps.....	10	2	2	2.35

Radio and Power Outlets for 4-Inch Square Boxes



No. 2151



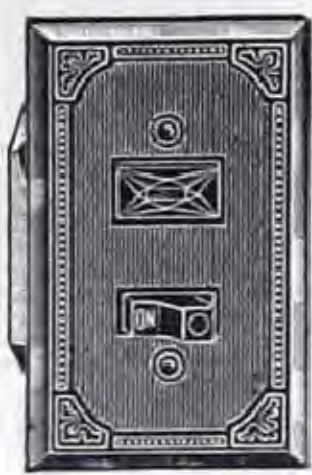
No. 2150

Supplied with Covers for 4-Inch square boxes and designed to meet the revised Underwriters' requirements covering radio and power circuits in the same box. GH Radio Plug Cap must be used.

2151	Radio and Power, Cap and Cover	10	2	8	\$2.20
2180	No. 2151 with Bakelite Plate No. 9040.....	10	2	9	2.35
2150	2 Gang, Radio and 2 Power Outlets, Cap and Cover....	10	2	11	2.60
2183	No. 2150 with Bakelite Plate No. 9058.....	10	2	13	2.90

ARROW WIRING DEVICES

Switch and Warning Light



No. 7759

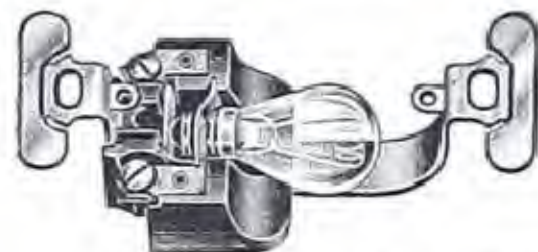


No. 7739

Jewel Flush with Plate
S. P. and 3-Way,
10 Amp. 125 V.,
5 Amp. 250 V.
D. P., 10 Amp. 250 V.

Warning light shows at a glance when lights are left on in cellars, attics, closets, etc. The jewel is flush with the plate, thus eliminating lamp breakage. Intermediate base lamps are used. Brass plates are .060".

List No.	Description	Plate	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
7739	Single Pole.....	Brass	10	2	9	\$4.90
7759	Single Pole.....	Bakelite	10	2	7	4.90
7741	Single Pole.....	None	10	2	4	3.80
7956	Double Pole.....	Brass	10	2	8	4.90
7957	Double Pole.....	Bakelite	10	2	6	4.90
7958	Double Pole.....	None	10	2	4	4.00
7953	Three-Way.....	Brass	10	2	8	6.15
7954	Three-Way.....	Bakelite	10	2	6	6.15
7955	Three-Way.....	None	10	2	4	2.66
7742	Brass Plate.....		10	2	3	1.30
7754	Bakelite Plate.....		10	2	1	1.45



No. 1711



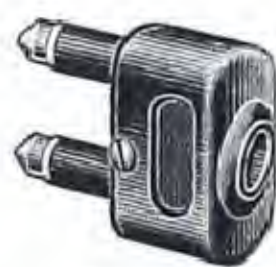
No. 1710

Warning Light Receptacles and Lamps

1711	Candelabra Rect. and 125V. Lamp	30	10	18	\$2.15
1710	Candelabra Lamp, 125V.....	30	10	10 oz	.70
3487	Candelabra Lamp, 250V.....	30	10	3/4	3.10
5820	Intermediate Rec. and 125V. Lamp.....	30	10	5	2.15
5821	Intermediate Lamp, 125 V.....	30	10	1	1.10
5822	Intermediate Lamp, 250V.....	30	10	1	3.10



No. 2850



No. 2002

Shutter Receptacle

10 Amps. 250 Volts

Openings have automatic shutters that open and close as the plug is inserted and withdrawn, thus keeping out dirt and dust.

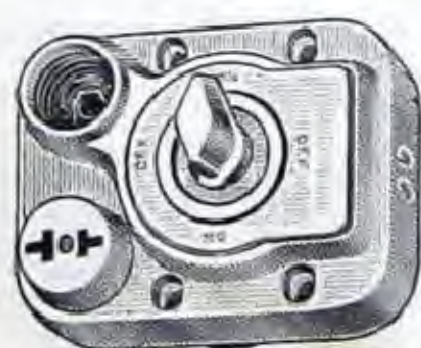
Shutter Receptacles take Standard Push Plates

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
2850	Base.....	30	10	14	\$2.70
2002	Plug.....	30	10	5	.45

Receptacle, Switch and Pilot

Porcelain

15 Amp. 125 Volts, 10 Amp. 250 Volts



No. 466

Double Pole Switch is in parallel with the receptacle and outlet for Pilot Lamp. When the switch is "Off," both lamp receptacle and plug outlet are dead. Vertical mounting is preferred. Four supporting screw holes fit a two gang switch box.

466	Complete Unit.....	10	2	25	\$5.10
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ARROW WIRING DEVICES

Attachment Plugs
Bakelite Pony Caps

GA



GR

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
GA	9/32" x 3/8" Cord Hole.....	500	50	20	\$0.06
GB	3/16" x 1/4" Cord Hole.....	500	50	20	.07
GD	1/32" Cord Hole.....	500	50	20	.06
GR	Pull Handle, 5/16" Cord Hole....	100	25	5	.09



GG



GNL

Rubber Caps

GG	13/32" Cord Hole.....	100	25	8	\$0.13
GN	5/16" Cord Hole.....	100	25	8	.13
GNL	Long Handle, 11/32" Cord Hole...	100	25	9	.15

Bakelite Taps and Sockets



No. 7778



No. 7772



No. 7774



No. 7773

7778	Cord Cube Tap.....	100	25	8	\$0.19
7772	Cube Tap.....	100	25	10	.16
7774	Current Tap.....	100	25	12	.26
7773	2-Way Socket.....	100	25	12	.26



No. 8308



No. 8311

Current Taps
Composition

8308	Single Tap, Multiple.....	50	10	19	\$1.30
8309	Single Tap, Series.....	50	10	19	1.30
8311	Double Tap, Multiple.....	20	10	8	1.60



No. 29000

Pendent Switch and
Current Tap
Composition

6 Amp. 125 V., 3 Amp. 250 V.

29000	With double T Slot Tap.....	50	10	10	\$1.30
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ARROW WIRING DEVICES

Attachment Plugs



ARMORED CORD GRIP CAPS

Cord Hole	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
G $\frac{5}{16}$ "	Pony.....	50	10	7	\$0.52
T $\frac{13}{32}$ "	Standard for Heater Cord..	50	10	7	.52
U $\frac{13}{32}$ "	Pony.....	50	10	7	.52
H $\frac{13}{32}$ "	Standard.....	50	10	7	.52
I $\frac{1}{2}$ "	Standard.....	50	10	7	.52
S $\frac{13}{32}$ "	Steel Covered.....	50	10	7	.69
L $\frac{13}{32}$ "	Rubber.....	50	10	7	.56

Countersunk to seat $\frac{5}{8}$ " Cord.

For Duplex Receptacles.



Motor Plug Caps, Composition

Pony.....	50	10	3	\$0.32
Pony, with plate.....	50	10	7	.48
Standard.....	50	10	5	.34



Bases

1 Bakelite, Pony.....	500	50	19	\$0.08
0 With "GA" Cap.....	500	25	40	.12



One-Piece Plugs

FUSELESS

No. 345

Molded Weatherproof, 660W. 600V.....	250	10	45	\$0.67
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45 has 6-inch leads of No. 14 rubber covered wire.

ARROW WIRING DEVICES



Feed Through Cord Switches

Single Heat

No. 6837

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
6837	Bakelite, D. P.....	50	10	8	\$2.05

No. 6837 is Double Pole.



No. 7762

No. 7760

No. 7761

Bakelite Heater Plugs

There are no screws to lose or loosen on these standard Plugs. Bakelite sections are held together by spring clips which are self-adjusting to yanks, strains and temperature changes. Plugs are made with or without switch. Pony size plug has the usual screw fastening.

7762	With Switch.....	100	25	21	\$0.46
7760	Without Switch.....	100	25	14	.20
7761	Pony Size, Without Switch.....	100	25	8	.23

Illuminated House Number Unit



No. 7902



No. 7901

For residences and apartments on 125 V. service. Connections should be made to the usual lighting service. Can be controlled from inside switch. Numerals are white, illuminated at night. Plate is brass, brushed cadmium finish, which fits over a rubber mat to make a weatherproof job. Standard candelabra base lamp 125 Volt is furnished.

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
7901	1 Gang, Complete.....	10	2	8	\$4.55
7902	2 Gangs, Complete.....	10	2	15	6.35
7900	Number Series 0-9, 10 Spacers	10	2	$\frac{3}{4}$	1.35
7900-0 to 7900-9	Separate numbers.....	10	2	$1\frac{1}{4}$ oz.	.82
7900-S	Spacer.....	10	2	$1\frac{1}{4}$ oz.	.42

Complete units include .060" plate, rubber mat and porcelain base. Separate numbers must be specified where a complete set from 0-9 would be insufficient, e. g. No. 444. Order should specify 3 No. 7900-4. Spacers are used in pairs to center a single number in a 1-Gang Unit or 3 numbers in a 2-Gang Unit.

ARROW WIRING DEVICES

Cord Connector Bodies, Composition



No. 8221



No. 8281

15 Amp. 125 V., 10 Amp. 250 V.

PONY
PARALLEL SLOTS

List No.	Cord Hole Inches	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
8221	$\frac{5}{16}$	For RP.....	50	10	5	\$0.29
8226	$\frac{13}{32}$	For RZ.....	50	10	5	.29
8281	$\frac{5}{16}$	Armored Cord Grip, for RG.....	50	10	8	1.06

For motor plugs, the above bodies should be used with RV or RL Caps.



No. 8222



No. 8224



No. 7977

STANDARD
DOUBLE T SLOTS

8222	$\frac{13}{32}$	For RA or TA.....	50	10	9	\$0.68
8224	$\frac{13}{32}$	Armored Cord Grip, for RH or TH.....	50	10	11	1.15
8225	$\frac{1}{2}$	Armored Cord Grip, for RI or TI.....	50	10	11	1.15
7978*	$\frac{1}{2}$	Armored Locking, for RI or TI.....	50	10	12	1.20
7977	$\frac{13}{32}$	Armored Locking, for RH or TH.....	50	10	12	1.20

*Countersunk to seat $\frac{5}{8}$ " Cord.

Tandem Blade Attachment Plug Caps
Composition

TA



TH



TW



TS

TA	$\frac{13}{32}$	Standard.....	100	10	10	\$0.21
TH	$\frac{13}{32}$	Armored Cord Grip.....	50	10	7	.52
*TI	$\frac{1}{2}$	Armored Cord Grip.....	50	10	7	.52
TW	$\frac{13}{32}$	Steel Covered.....	100	10	10	.46
TS	$\frac{13}{32}$	Steel Covered, Armored Cord Grip.....	50	10	8	.70

*Countersunk to seat $\frac{5}{8}$ " Cord.



TF

Tandem Blade
Composition Adapter Cap

TF	Standard to Edison.....	50	10	8	\$0.87
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No. 8203



TA

Double T Slot
Attachment Plug
Composition

660 Watts, 250 Volts

8203	Base.....	100	10	19	\$0.42
8249	Base and TA Cap, $\frac{13}{32}$ ".....	100	10	23	.65

ARROW WIRING DEVICES

Polarized Devices

2-Wire, 10 Amperes

10 Amp. 250 Volts, 15 Amp. 125 Volts



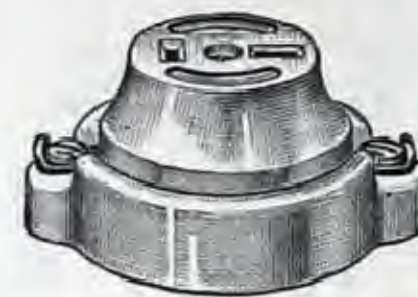
No. 7960



No. 7964



No. 7963



No. 7961



No. 7962

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
7960	Flush Receptacle.....	30	10	5	\$1.05
7964	Outlet Box Receptacle, $3\frac{1}{4}$ ".....	30	10	10	1.20
7965	Outlet Box Receptacle, 4".....	30	5	12	1.30
7963	Composition Cap, $\frac{9}{16}$ " Cord Hole.....	30	10	4	.47
7966	Armored Cord Grip Cap.....	30	10	6	1.05
7961	Cleat Base.....	30	10	11	1.05
7962	Concealed Base.....	30	10	10	1.05

Flush Receptacle No. 7960 fits standard single convenience outlet plates.

Black Japanned Covers are standard for outlet box covers.

2-Wire, 20 Amperes

20 Amperes, 250 Volts



JA



JH



JV



No. 8244



No. 8245



No. 7272



No. 8282



No. 8283

JA	Composition Cap, $\frac{9}{16}$ " Cord Hole.....	30	10	4	\$0.65
JH	Armored Cord Grip Cap, $\frac{9}{16}$ " Cord Hole.....	30	10	6	1.20
8242	Brass Covered Cap.....	30	10	7	1.15
JV	Flush Motor Plug Cap.....	30	10	8	2.30
8243	Surface Cleat Base.....	30	10	14	1.45
8244	Concealed Base, $2\frac{1}{2}$ " dia.*.....	30	10	14	1.15
8245	Flush Receptacle, 1" Deep.....	30	10	6	1.55
7272	Outlet Box Receptacle, $3\frac{1}{4}$ ".....	30	10	10	2.10
7273	Outlet Box Receptacle, 4".....	30	5	21	2.25
8282	Cord Connector Body, $\frac{9}{16}$ " Cord Hole.....	30	10	8	1.45
8283	Armored Cord Connector Body, $\frac{9}{16}$ " Cord Hole.....	30	10	11	1.85

Flush Receptacle No. 8245 takes single convenience outlet plate.

Black Japanned Covers are standard for outlet box covers.

*Screw Hole Spacing, $1\frac{1}{2}$ ".

ARROW WIRING DEVICES

Polarized Devices 2-Wire, 30 Amperes

30 Amp. 250 Volts



No. 8345



LA



LH



No. 8346

Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
A $\frac{31}{32}$ " Composition Cap*.....	30	5	19	\$1.50
H Same, with Cord Grip*.....	30	5	20	2.85
45 Flush Receptacle.....	30	10	17	2.90
46 .040" Brass Plate.....	30	10	5	.47

*Gang installations must have a blank unit between each receptacle because of outside diameter of plugs.

3-Wire, 10 Amperes

15 Amp. 125 Volts, 10 Amp. 250 Volts



SA



SH



SY-SN



SV

CAPS

A $\frac{13}{32}$ " Composition.....	50	10	7	\$0.56
H Same, Armored Cord Grip.....	50	10	10	1.10
Y $\frac{13}{32}$ " Composition Pony.....	50	10	5	.56
N $\frac{1}{4}$ " Composition Pony.....	50	10	7	.56
O $\frac{9}{32}$ " Bakelite Pony.....	50	10	6	.75
V Flush Motor Plug Cap.....	50	10	10	1.45



No. 8147



No. 7275



No. 7214



No. 7051



No. 7719

RECEPTACLES

47 Single, Flush.....	50	10	16	\$1.60
75 Single, 4" Cover.....	50	5	34	2.50
14 Round, with Ground.....	30	10	6	1.70
15 Round, without Ground.....	30	10	6	1.70
89 Single, with Ground Shunt.....	50	10	16	1.60
51 Duplex, Flush.....	30	10	12	2.35
48 Surface Con. Porcelain Base....	50	10	21	1.25
19 Switch and Receptacle with Bakelite Plate.....	10	2	7	4.80

Flush Receptacles take standard single and duplex plates. Two Pony Caps must be used for Duplex Receptacle. The diameter of the large caps is too great for two caps to fit together in the Duplex Receptacle.

ARROW WIRING DEVICES

Polarized Devices 3-Wire, 10 Amperes

15 Amp., 125 V., 10 Amp. 250 Volts



No. 8146



No. 8143

CORD CONNECTORS

List No.	Description	Std. Pkg.	Car-ton	Pkg. Wgt.	List Price
8146	Body, $\frac{13}{32}$ ".....	50	10	12	\$1.15
8143	Armored Cord Grip Body, $\frac{13}{32}$ "...	50	10	15	1.70



No. 8141



No. 7052

PLUG BASE AND ADAPTER

8141	Porcel. Plug Base, with Ground.	100	10	26	\$1.00
7052	Adapter, 2 to 3 Wire, Tandem Blades.....	30	10	6	.80

3-Wire, 20 Amperes

20 Amp. 250 Volts



KA



KH



No. 8140



No. 7277



No. 8145



No. 8142



No. 8144

KA	$\frac{5}{8}$ " Composition Cap.....	30	10	7	\$0.56
KH	$\frac{5}{8}$ " Cord Grip Cap.....	30	10	9	1.60
8140	Flush Receptacle.....	30	10	14	1.80
7277	Receptacle with 4" Cover.....	30	5	22	2.15
8145	Surface Concealed Base*.....	30	10	14	1.15
8142	$\frac{5}{8}$ " Cord Connector Body.....	30	10	13	2.40
8144	$\frac{5}{8}$ " Armored Connector Body...	30	10	16	2.90

Flush Receptacle fits Standard Plates. Gang installations must have a blank unit between each receptacle because of the outside diameter of plug caps.

*Screw Hole Spacing $1\frac{3}{4}$ ".

ARROW WIRING DEVICES

Double T Plug Caps—Polarized

15 Amp. 125 V., 10 Amp. 250 V.

Suitable for industrial use owing to the greater strength of the prongs which are secured to the cap by two eyelets.



TP

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
TP	$\frac{13}{32}$ " Armored Cord Grip.....	100	10	14	\$1.00



RF

RF Standard to Edison, Composition 50 10 8 \$0.80

All Parallel Blade Caps can be furnished with Polarity Feature (1 blade extra wide).

Caps for Double T Slot Receptacles



FA



FH

2-WIRE POLARIZED COMPOSITION

15 Amp. 125 V.
10 Amp. 250 V.

FA	$\frac{13}{32}$ " Cord Hole.....	50	10	5	\$0.43
FH	$\frac{13}{32}$ " Armored Cord Grip.....	50	10	7	.75

Locking Attachment Plugs

RH
CapNo. 7766
BaseNo. 7765
Complete

Base and Cap easily lock together and cannot pull apart until the locking ring is turned to the release position. Cap and Base are armored style, protected against breakage. The cord grip feature in the cap holds the wire tightly, taking the strain from the binding posts.

The base may be used with other standard parallel or tandem blade armored cord grip caps.

7765	Base and RH Cap, $\frac{13}{32}$ " Parallel...	100	10	34	\$1.95
7766	Double T Slot Base.....	100	10	12	1.15

Polarized Devices
3-Wire, 50 Amperes

50 Amperes, 250 Volts

RANGE OUTLET AND ACCESSORIES



No. 7950



No. 7911



No. 7951

Bakelite Range Outlet No. 7950 is designed for Straight In wiring and is equipped with solderless connections. Wires enter from the bottom or back through $\frac{3}{4}$ " and 1" knockouts. A cable clamp is built in, interchangeable for bottom or back wiring. A separate ground strap No. 7951 is available for No. 7950 when metallic cable is used.

List No.	Description	Std. Pkg.	Car- ton	Pkg. Wgt.	List Price
7950	Bakelite Range Outlet.....	10	2	12	\$3.95
7951	Ground Strap for No. 7950.....	10	2	2	.88
7911	Coupling for 3 No. 8 wires.....	10	2	4	1.30
7912	Coupling for 3 No. 6 wires.....	10	2	5	1.55

ARROW WIRING DEVICES

4-Wire, 20 Amperes

20 Amp. 250 Volts



No. 7251



No. 7250



No. 7279

7251	$\frac{3}{4}$ " Cord Grip Cap.....	20	5	5	\$2.20
7250	Flush Receptacle, Composition...	20	5	7	2.90
7279	Receptacle with 4" Box Cover....	20	5	13	3.15

Flush Receptacle fits standard single convenience outlet plates. Gang installations must have a blank unit between each receptacle because of the outside diameter of the plugs.

RADIO GALVANIZED SCREW EYE INSULATORS



No. H.P-512

List No.		List Price
H.P-512	3" length	.05
H.P-513	7" length	.10

RADIO LIGHTNING ARRESTER



No. H.P-510A

List No.		List Price
H.P-510	With Battery nut connectors	.25
H.P-510A	With Hexagon nut connectors	.25

PORCELAIN OUTLET BOX COVER



List No.	Carton Qt'y	Std. Pkg.	Wt. lbs.	Std. Pkg.	List Price
H.P-1172	For $3\frac{1}{4}$ " Outlet box	10	100	50	.05
H.P-1173	For 4" Outlet box	10	100	60	.05

WEATHERPROOF OUTDOOR SOCKET
STREAMERS



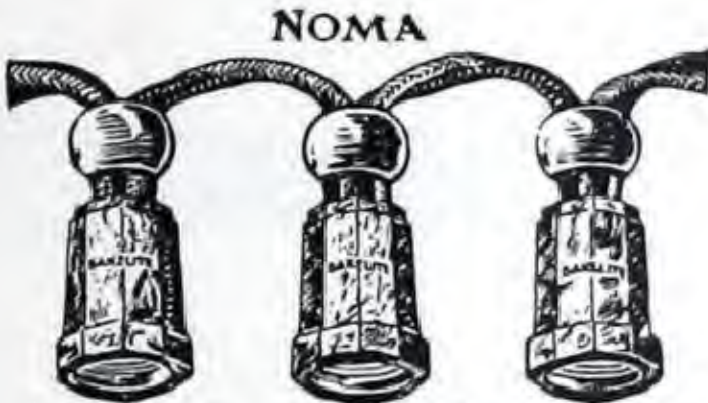
Edison Base Socket Streamer

Prices are for Streamers of 100 Standard Edison Base Sockets
in One Length

Shorter or Longer Lengths are Sold on the same Price Basis

List No.	Spacing between Sockets Inches	Size of Wire	Complete with 15 or 25 Watt Inside Colored Mazda Lamps List Price	Without Lamps List Price
1212	12	12	\$70.00	\$40.00
1812	18	12	74.50	44.50
2412	24	12	79.00	49.00
3012	30	12	83.50	53.50
3612	36	12	88.00	58.00
1214	12	14	67.00	37.00
1814	18	14	71.00	41.00
2414	24	14	75.00	45.00
3014	30	14	79.00	49.00
3614	36	14	83.00	53.00

Any other desired spacing and any number of sockets per streamer can be made.



Intermediate Base Socket Streamer

INTERMEDIATE BASE STREAMERS

Prices are per 100 Socket Lengths

List No.	Spacing between Sockets Inches	Size of Wire	Complete with 10 Watt C-9 1/4 Inside Colored Mazda Lamps List Price	Without Lamps List Price
1218	12	18	\$39.00	\$24.00
1818	18	18	42.00	27.00
2418	24	18	45.00	30.00
3018	30	18	48.00	33.00
3618	36	18	51.00	36.00

Shorter or Longer Lengths are Sold on the Same Price Basis

Intermediate Base Mazda Lamps obtainable in the following colors: Red, Green, Blue, Orange, Yellow, White.

Standard Base Mazda Lamps obtainable in the following colors: Red, Green, Blue, Orange, Yellow, White, Ivory, Rose.

SIEMON WEATHERPROOF SOCKETS

COMPOSITION HARD RUBBER



No. 43310

List No.	Description	Carton Quantity
43310	Plain Contact.....	10
60666	Plain Contact.....	10
43310	Spring Contact.....	10
60666	Spring Contact.....	10



No. 60666

List Price Each
\$0.25
.27
.27
.30

TESTED ROUND FUSE WIRE

STANDARD WINDING

1/2 amp. wire.....	2 oz. per spool in box
3/4 to 3 amp. wire.....	Two 1/2-lb. spools in can
4-50 amp. wire.....	1-lb. spool in can
55-200 amp. wire.....	
50-150 amp. ribbon.....	
175-500 amp. ribbon.....	
500-600 amp. ribbon.....	

Carrying Cap. Amps.	Std. Length in Mils.	Dia. in Mils.	Feet per lb.	List Price per lb.
1/2.....	1 1/2	10	2700	\$6.40
1.....	1 1/2	17	950	2.60
1 1/2.....	1 1/2	20	670	2.60
2.....	1 1/2	25	430	2.25
3.....	1 1/2	27	370	1.95
5.....	2	35	220	1.45
6.....	2	38	185	1.45
10.....	2	58	80	1.25
15.....	3	70	52	1.25
20.....	4	85	36	1.00
25.....	4	90	32	1.00
30.....	4	100	26	1.00
35.....	4	110	22	1.00
40.....	4	120	18	1.00
45.....	4	125	17	1.00
50.....	4	145	12.5	1.00
60.....	5	160	10.3	1.00
70.....	5	175	9	1.00
75.....	5	180	8.3	1.00
80.....	5	190	7.5	1.00
90.....	5	200	6.7	1.00
100.....	5	220	5.5	1.00

TESTED FLAT FUSE RIBBON

Carrying Cap. Amps.	Std. Length	Size in Inches	Feet per Lb.
50.....	4	.36 x .047	13
60.....	4	.44 x .047	10
70.....	4	.47 x .047	9.55
75.....	4	.50 x .047	9.1
80.....	4	.375x.078	7.1
90.....	4	.44 x .078	6.1
100.....	4	.44 x .094	5.2
115.....	4	.375x.125	4.4
125.....	4	.50 x .094	4.4
150.....	4	.57 x .094	4
175.....	4	.64 x .094	3.5
190.....	4	.75 x .094	3
200.....	4	.875x.094	2.6
225.....	4	1. x .094	2.2
250.....	4 1/2	1. x .110	1.9
275.....	4 1/2	1. x .130	1.65
300.....	4 1/2	1. x .150	1.4
350.....	4 1/2	1.94 x .075	1.43
400.....	4 1/2	1. x .20	1.1
450.....	4 1/2	1.125x.20	.97
500.....	4 1/2	1.25 x .20	.85
550.....	4 1/2	1.37 x .20	.78
600.....	4 1/2	1.50 x .20	.70
List Price per Lb., \$1.15			

UNION RENEWABLE FUSES

Approved by the Hydro Electric Power
Commission of Ontario
N.E. Code Standard



FERRULE CONTACTS

Only three simple parts, the absence of loose washers, both ends open for inspection and cleaning, and the link bent at one end which automatically adjusts it to the proper length—are features that make the new ferrule type fuse quick and easy to renew.

250 Volts		1 to 60 Amperes				
List No.	Amps.	Length Overall	Diam. Ferrule	Carton Quan.	Wt. lbs. 10 full Cart'n.	List Price Each
380-001	1	2"	$\frac{9}{16}$ "	10	6½	\$0.50
380-003	3					
380-006	6					
380-010	10					
380-015	15					
380-020	20					
380-025	25	3"	$\frac{13}{16}$ "	10	14	\$1.00
380-030	30					
380-035	35					
380-040	40					
380-045	45					
380-050	50					
380-060	60					



KNIFE-BLADE CONTACTS

Union Renewable Knife-Blade Fuses, like the ferrule types, are ruggedly constructed to withstand an exceptionally large number of blow-outs without injury to any of the parts, which means longer life and service, and reduces fuse costs.

250 Volts		61 to 600 Amperes				
List No.	Amps.	Length Overall	Blade Width	Carton Quan.	Wt. lbs. 10 full Cart'n.	List Price Each
380-070	70	5⅞"	¾"	5	19¼	\$2.00
380-080	80					
380-090	90					
380-100	100					
380-110	110	7⅞"	1⅞"	1	10	\$4.00
380-125	125					
380-150	150					
380-175	175					
380-200	200					
380-225	225	8⅝"	1⅝"	1	22	\$7.50
380-250	250					
380-300	300					
380-350	350					
380-400	400					
380-450	450	10⅜"	2"	1	35	\$11.00
380-500	500					
380-600	600					

UNION RENEWABLE FUSES

Approved by the Hydro Electric Power Commission
of Ontario

N. E. Code Standard



FERRULE CONTACTS

600 Volts		1 to 60 Amperes				
List No.	Amps.	Length Overall	Diam. Ferrule	Carton Quan.	Wt. lbs. 10 full Cart'n.	List Price Each
382-001	1	5"	$\frac{13}{16}$ "	10	18½	\$1.10
383-003	3					
383-006	6					
383-010	10					
383-015	15					
383-020	20					
383-025	25	5½"	1⅞"	10	36	\$1.25
383-030	30					
383-035	35					
383-040	40					
383-045	45					
383-050	50					
383-060	60					



KNIFE-BLADE CONTACTS

600 Volts		61 to 600 Amperes				
List No.	Amps.	Length Overall	Blade Width	Carton Quan.	Wt. lbs. 10 full Cart'n.	List Price Each
383-070	70	7⅞"	¾"	5	35	\$3.00
383-080	80					
383-090	90					
383-100	100					
383-110	110	9⅝"	1⅞"	1	14	\$5.00
383-125	125					
383-150	150					
383-175	175					
383-200	200					
383-225	225	11⅝"	1⅝"	1	35	\$11.00
383-250	250					
383-300	300					
383-350	350					
383-400	400					
383-450	450	13⅜"	2"	1	52	\$16.00
383-500	500					
383-600	600					

UNION RENEWAL LINKS

Approved by the Hydro Electric Power Commission of
Ontario

N.E. Code Standard



FERRULE TYPE

600 Volts, 1 to 60 Amperes

Amps.	Carton Quan.	Wgt. Lbs. 10 full Cartons	List Price per 100
-001.....	1	100	\$ 5.00
-003.....	3		
-006.....	6		
-010.....	10		
-015.....	15		
-020.....	20		
-025.....	25	100	6.00
-030.....	30		
-035.....	35		
-040.....	40		
-045.....	45		
-050.....	50		
-060.....	60		



KNIFE BLADE TYPE

600 Volts, 61 to 600 Amperes

Amps.	Carton Quan.	Wgt. Lbs. 10 full Cartons	List Price per 100
-070.....	70	50	\$10.00
-080.....	80		
-090.....	90		
-100.....	100		
-110.....	110	25	15.00
-125.....	125		
-150.....	150		
-175.....	175		
-200.....	200	10	30.00
-225.....	225		
-250.....	250		
-300.....	300		
-350.....	350	5	60.00
-400.....	400		
-450.....	450		
-500.....	500		
-600.....	600		

In renewing Union Renewable Fuses of 201 to 400 ampere capacity, two renewal links are required for each fuse as listed. For capacities of 401 to 600 amperes, four renewal links are necessary.

For a 225 ampere fuse use two 112½ ampere links.
For a 250 ampere fuse use two 125 ampere links.
For a 300 ampere fuse use two 150 ampere links.
For a 350 ampere fuse use two 175 ampere links.
For a 400 ampere fuse use two 200 ampere links.
For a 450 ampere fuse use four links stamped 450 amperes.
For a 500 ampere fuse use four links stamped 500 amperes.
For a 600 ampere fuse use four links stamped 600 amperes.

Do not use the standard 112½ to 150 ampere links where four links are required; two links separated by spacer washers should be placed on each side of copper blade.

UNION RENEWAL LINKS

Approved by the Hydro Electric Power Commission
of Ontario

N.E. Code Standard



FERRULE TYPE

250 Volts List No.	Amps.	Carton Quantity	Wt. lbs. 10 full Ctns.	List Price per 100
381-001	1	100	5/8	\$3.00
381-003	3			
381-006	6			
381-010	10			
381-015	15			
381-020	20			
381-025	25	100	1 9/16	\$5.00
381-030	30			
381-035	35			
381-040	40			
381-045	45			
381-050	50			
381-060	60			



KNIFE-BLADE TYPE

250 Volts List No.	Amps.	Carton Quantity	Wt. lbs. 10 full Ctns.	List Price per 100
381-070	70	50	2 3/4	\$10.00
381-080	80			
381-090	90			
381-100	100			
381-110	110	25	3 5/8	\$15.00
381-125	125			
381-150	150			
381-175	175			
381-200	200	10	1 1/2	\$30.00
381-225	225			
381-250	250			
381-300	300			
381-350	350	5	2	\$60.00
381-400	400			
381-450	450			
381-500	500			
381-600	600			

In renewing Union Renewable Fuses of 201 to 400 ampere capacity, two renewal links are required for each fuse as listed. For capacities of 401 to 600 amperes, four renewal links are necessary.

For a 225 ampere fuse use two 112½ ampere links

For a 250	"	"	"	two 125	"	"
For a 300	"	"	"	two 150	"	"
For a 350	"	"	"	two 175	"	"
For a 400	"	"	"	two 200	"	"
For a 450	"	"	"	four 112½	"	"
For a 500	"	"	"	four 125	"	"
For a 600	"	"	"	four 150	"	"

Where four links are required, two links separated by spacer washers should be placed on each side of copper blade.

ECONOMY RENEWABLE FUSES

FERRULE TYPE

N. E. Code Standard



1-60 Amperes, 600 Volts

List No.	Cap. Amp.	Inches L'gth	Diameter of Ferrule	Diameter of Tube	Car. Q'ty	Car. Lbs.	Wgt. Oz.	List Price Each
F105	1	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	\$1.10
F205	2	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F305	3	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F405	4	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F505	5	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F605	6	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F805	8	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F1005	10	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F1205	12	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F1505	15	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F2005	20	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F2505	25	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F3005	30	5	$\frac{13}{16}$	$\frac{3}{4}$	10	1	10	1.10
F3505	35	5½	1½	1	10	3	6	1.25
F4005	40	5½	1½	1	10	3	6	1.25
F4505	45	5½	1½	1	10	3	6	1.25
F5005	50	5½	1½	1	10	3	6	1.25
F5505	55	5½	1½	1	10	3	6	1.25
F6005	60	5½	1½	1	10	3	6	1.25

DROP OUT RENEWAL LINKS

FERRULE TYPE



1-60 Amperes, 600 Volts

List No.	Cap. Amps.	Car. Q'ty	Car. Lbs.	Wgt. Oz.	List Price Each
R601	1	100	9		\$0.05
R602	2	100	9		.05
R603	3	100	9		.05
R604	4	100	9		.05
R605	5	100	9		.05
R606	6	100	9		.05
R608	8	100	9		.05
R610	10	100	9		.05
R612	12	100	9		.05
R615	15	100	9		.05
R620	20	100	9		.05
R625	25	100	9		.05
R630	30	100	9		.05
R635	35	100	25		.06
R640	40	100	25		.06
R645	45	100	25		.06
R650	50	100	25		.06
R655	55	100	25		.06
R660	60	100	25		.06

ECONOMY RENEWABLE FUSES

KNIFE BLADE TYPE

N. E. Code Standard



65-600 Amperes, 600 Volts

List No.	Cap. Amp.	Length	Width of Blade	Thickness of Blade	Car. Q'ty	Car. Lbs.	Wgt. Oz.	List Price Each
F6505	65	7⅞	¾	⅛	5	3	6	\$3.00
F7005	70	7⅞	¾	⅛	5	3	6	3.00
F7505	75	7⅞	¾	⅛	5	3	6	3.00
F8005	80	7⅞	¾	⅛	5	3	6	3.00
F8505	85	7⅞	¾	⅛	5	3	6	3.00
F9005	90	7⅞	¾	⅛	5	3	6	3.00
F9505	95	7⅞	¾	⅛	5	3	6	3.00
F10005	100	7⅞	¾	⅛	5	3	6	3.00
F11005	110	9⅝	1⅛	⅜	1	1	12	5.00
F12005	120	9⅝	1⅛	⅜	1	1	12	5.00
F12505	125	9⅝	1⅛	⅜	1	1	12	5.00
F15005	150	9⅝	1⅛	⅜	1	1	12	5.00
F17505	175	9⅝	1⅛	⅜	1	1	12	5.00
F20005	200	9⅝	1⅛	⅜	1	1	12	5.00
F22505	225	11⅝	1⅝	¼	1	3	6	11.00
F25005	250	11⅝	1⅝	¼	1	3	6	11.00
F27505	275	11⅝	1⅝	¼	1	3	6	11.00
F30005	300	11⅝	1⅝	¼	1	3	6	11.00
F32505	325	11⅝	1⅝	¼	1	3	6	11.00
F35005	350	11⅝	1⅝	¼	1	3	6	11.00
F37505	375	11⅝	1⅝	¼	1	3	6	11.00
F40005	400	11⅝	1⅝	¼	1	3	6	11.00
F45005	450	13⅜	2	¼	1	5	8	16.00
F50005	500	13⅜	2	¼	1	5	8	16.00
F55005	550	13⅜	2	¼	1	5	8	16.00
F60005	600	13⅜	2	¼	1	5	8	16.00

RENEWAL LINKS

KNIFE BLADE TYPE



65-600 Amperes, 600 Volts

List No.	Cap. Amps.	Car. Q'ty	Car. Lbs.	Wgt. Oz.	List Price Each
R665	65	50	16		\$0.10
R670	70	50	16		.10
R675	75	50	16		.10
R680	80	50	16		.10
R685	85	50	16		.10
R690	90	50	16		.10
R695	95	50	16		.10
R6100	100	50	16		.10
R6110	110	25	23		.15
R6120	120	25	23		.15
R6125	125	25	23		.15
R6150	150	25	23		.15
R6175	175	25	23		.15
R6200	200	25	23		.15
R6225	225	25	47		.30
R6250	250	25	47		.30
R6275	275	25	47		.30
R6300	300	25	47		.30
R6325	325	25	47		.30
R6350	350	25	47		.30
R6375	375	25	47		.30
R6400	400	25	47		.30
R6450	450	10	30		.60
R6500	500	10	30		.60
R6550	550	10	30		.60
R6600	600	10	30		.60

ECONOMY RENEWABLE FUSES

FERRULE AND KNIFE TYPES

Economy Renewable Fuses were the first line using intensive bare renewal links for restoring blown fuses to their original efficiency to be approved in all capacities by the Underwriters' Laboratories, established and maintained by the National Board of Fire Underwriters.

Economy Fuses now bear the "Underwriter Inspected" label in all capacities from 0 to 600 amperes in both 250 and 500 volts.

Economy "drop out" renewal links are stamped with the Underwriters' approval symbol in all capacities.

In operation only the "drop out" portion of the renewal link is destroyed. This link being the least expensive part of the fuse, an annual saving of 80 per cent in fuse maintenance costs is possible, as compared with the use of one-time fuses.

Economy fuses always operate at rated capacities. The "drop out" renewal link is quickly and easily replaced and restoration of a blown economy fuse to its original efficiency is the work of a few moments only.

FERRULE TYPE



1-60 Amperes, 250 Volts

List No.	Cap. Amp.	Lgth.	Diam. of Ferrule	Diam. of Tube	Car. Qty.	Car. lbs.	Wgt. oz.	List Price Each
25	1	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	\$0.50
25	2	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
25	3	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
25	4	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
25	5	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
25	6	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
25	8	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
025	10	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
225	12	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
525	15	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
025	20	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
525	25	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
025	30	2"	$\frac{9}{16}$ "	$\frac{1}{2}$ "	10		10	.50
525	35	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00
025	40	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00
525	45	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00
025	50	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00
525	55	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00
025	60	3"	$\frac{13}{16}$ "	$\frac{3}{4}$ "	10	1	6	1.00

DROP OUT RENEWAL LINKS

FERRULE TYPE



1-60 Amperes, 250 Volts

List No.	Cap. Amps.	Car. Quantity	Car. lbs.	Wgt. oz.	List Price Each
201	1	100		3	\$0.03
202	2	100		3	.03
203	3	100		3	.03
204	4	100		3	.03
205	5	100		3	.03
206	6	100		3	.03
208	8	100		3	.03
210	10	100		3	.03
212	12	100		3	.03
215	15	100		3	.03
220	20	100		3	.03
225	25	100		3	.03
230	30	100		3	.03
235	35	100	10		.05
240	40	100	10		.05
245	45	100	10		.05
250	50	100	10		.05
255	55	100	10		.05
260	60	100	10		.05

ECONOMY RENEWABLE FUSES

KNIFE BLADE TYPE



65-600 Amperes, 250 Volts

List No.	Cap. Amp.	Lgth.	Wd. of Blade	Thick-ness of Blade	Car. Qty.	Car. lbs.	Wgt. oz.	List Price Each
F6525	65	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		\$2.00
F7025	70	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F7525	75	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F8025	80	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F8525	85	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F9025	90	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F9525	95	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F10025	100	$5\frac{7}{8}$ "	$\frac{3}{4}$ "	$\frac{1}{8}$ "	5	2		2.00
F11025	110	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F12025	120	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F12525	125	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F15025	150	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F17525	175	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F20025	200	$7\frac{1}{8}$ "	$1\frac{1}{8}$ "	$\frac{3}{16}$ "	1	1	1	4.00
F22525	225	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F25025	250	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F27525	275	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F30025	300	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F32525	325	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F35025	350	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F37525	375	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F40025	400	$8\frac{5}{8}$ "	$1\frac{5}{8}$ "	$\frac{1}{4}$ "	1	2	2	7.50
F45025	450	$10\frac{3}{8}$ "	2"	$\frac{1}{4}$ "	1	3	8	11.00
F50025	500	$10\frac{3}{8}$ "	2"	$\frac{1}{4}$ "	1	3	8	11.00
F55025	550	$10\frac{3}{8}$ "	2"	$\frac{1}{4}$ "	1	3	8	11.00
F60025	600	$10\frac{3}{8}$ "	2"	$\frac{1}{4}$ "	1	3	8	11.00

RENEWAL LINKS

Knife Blade Type



65-600 Amperes, 250 Volts

List No.	Cap. Amp.	Car. Qty.	Car. Lbs.	Wgt. Oz.	List Price Each
R265	65	50		6	\$0.10
R270	70	50		6	.10
R275	75	50		6	.10
R280	80	50		6	.10
R285	85	50		6	.10
R290	90	50		6	.10
R295	95	50		6	.10
R2100	100	50		6	.10
R2110	110	25		7	.15
R2120	120	25		7	.15
R2125	125	25		7	.15
R2150	150	25		7	.15
R2175	175	25		7	.15
R2200	200	25		7	.15
R2225	225	25		15	.30
R2250	250	25		15	.30
R2275	275	25		15	.30
R2300	300	25		15	.30
R2325	325	25		15	.30
R2350	350	25		15	.30
R2375	375	25		15	.30
R2400	400	25		15	.30
R2450	450	10		11	.60
R2500	500	10		11	.60
R2550	550	10		11	.60
R2600	600	10		11	.60

**GEM NON-INDICATING ENCLOSED
FUSES**

Approved by the Hydro Electric Power Commission of
Ontario

N.E. Code Standard

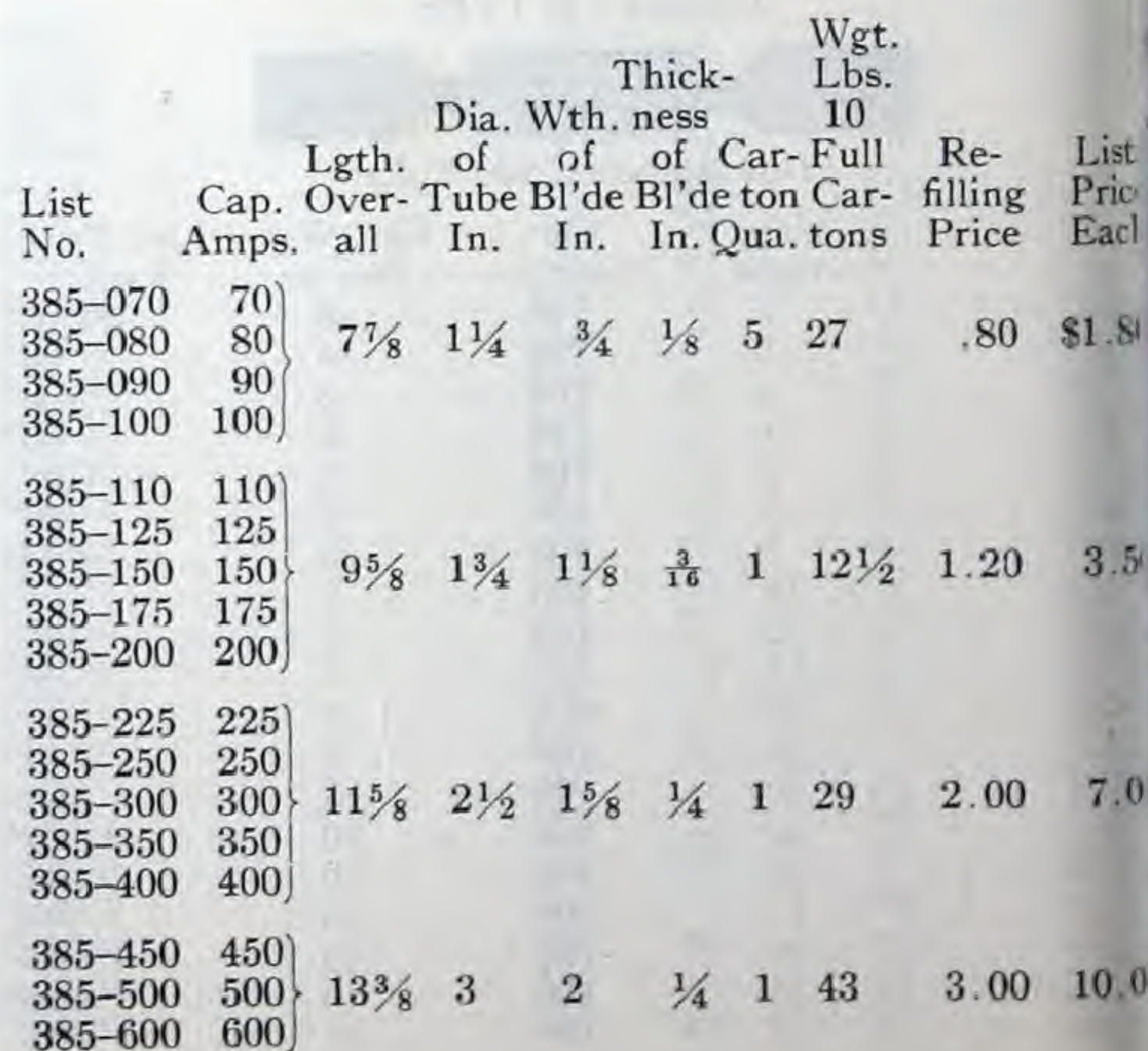
KNIFE BLADE TYPE—250 VOLTS



List No.	Cap. Amps.	Lgth. Over-all	Dia. of Tube In.	Wth. of Bl'de In.	Thick-ness of Bl'de In.	Car-tons	Full Car-tons	Wgt. Lbs. 10	Re-filling Price	List Price Each
384-070	70	57/8	1	3/4	1/8	5	15		\$0.60	\$0.90
384-080	80									
384-090	90									
384-100	100									
384-110	110	71/8	1 1/2	1 1/8	3/16	1	7 3/4		.90	2.00
384-125	125									
384-150	150									
384-175	175									
384-200	200									
384-225	225	85/8	2	1 5/8	1/4	1	17 1/4	1.50	3.60	
384-250	250									
384-300	300									
384-350	350									
384-400	400									
384-450	450	10 3/8	2 1/2	2	1/4	1	28	2.00	5.50	
384-500	500									
384-600	600									

KNIFE BLADE TYPE—600 VOLTS

FERRULE TYPE—600 VOLTS



List No.	Cap. Amps.	Length Overall	Diam. Tube	Diam. Ferrule	Carton Quan.	Wt. lbs. 10 Full Cartons	List Price Each
385-001	1	5"	$\frac{3}{4}"$	$\frac{13}{16}"$	10	$14\frac{3}{4}$	\$0.50
385-003	3						
385-006	6						
385-010	10						
385-015	15						
385-020	20						
385-025	25	$5\frac{1}{2}"$	1"	$1\frac{1}{16}"$	10	$24\frac{3}{4}$	\$0.80
385-030	30						
385-035	35						
385-040	40						
385-045	45						
385-050	50						
385-060	60						

SHAWMUT CUTOUT BASES

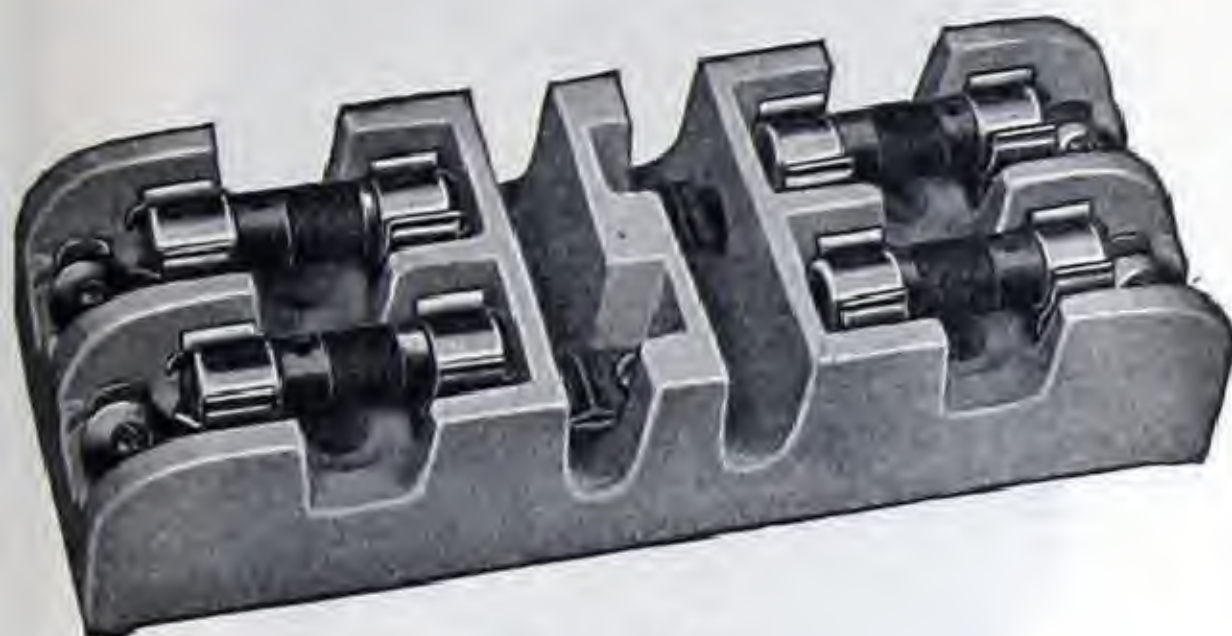


National
Electrical
Code
Standard
to 600
Amperes
Inclusive



No. 2081
Single Branch

No. 2101
Main Line



No. 2085
Double Branch



No. 2087
Double Branch

DOUBLE POLE, PORCELAIN, WITH BARRIERS 250 VOLTS

Description	Max. Cap. Amps.	Std. Pkg.	Wgt. Per 100 in lbs.	List Price Per 100
1 Main Line.....	100	1	560	\$235.78
1 Single Branch.....	30	1	110	58.94
2 Single Branch.....	60	1	286	147.36
5 Double Branch.....	30	1	224	109.48
6 Double Branch.....	60	1	584	294.74

THREE POLE PORCELAIN WITH BARRIERS 250 VOLTS

9 Main Line.....	30	5	120	\$ 67.36
0 Main Line.....	60	1	240	168.42
3 Single 3-Wire Branch	30	1	255	113.68
4 Single 3-Wire Branch	60	1	400	252.64
35 Double 3-Wire Branch.....	30	1	352	189.48
45 Double 3-Wire Branch.....	60	1	900	505.26
7 Double 2-Wire Branch.....	30	1	260	126.32
8 Double 2-Wire Branch.....	60	1	600	353.68

Prices do not include fuses

Cutout bases above 30 amperes fitted with lugs.

SHAWMUTH CUTOUT BASES—250 volts

National Electrical Code Standard to 600 Amperes, Inclusive



No. 2071

SINGLE POLE, SLATE

List No.	Cap. Max. Amps.	Length Inches	Std. Per Pkg.	Wgt. Per 100 in lbs.	List Price Per 100
2071.....	400	14¾	1	580	\$525.00

BLACK MOULDED COMPOSITION

1067.....	30	5	5	50	\$ 33.68
1068.....	60	6¼	5	64	54.74
1069.....	100	10	1	140	117.90

SHAWMUTH CUTOUT BASES—600 volts

National Electrical Code Standard to 600 Amperes, Inclusive

SINGLE POLE SLATE

List No.	Cap. Max. Amps.	Length Inches	Std. Per Pkg.	Wgt. Per 100 in lbs.	List Price Per 100
2075.....	100	12	1	250	\$ 147.36
2076.....	200	14½	1	420	230.00
2095.....	400	17¾	1	760	600.00

BLACK MOULDED COMPOSITION

1073.....	30	8¼	5	80	\$ 48.00
1074.....	60	8½	5	92	72.00

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

BULLDOG ENCLOSED SAFETY SWITCHES

Single Throw—Fusible—Type A

230 VOLTS A.C.—250 VOLTS D.C.

Quick Make and Quick Break—Safety Interlocks
For Severe Industrial Service

All switches which have horsepower ratings are "Motor Circuit Switches."

All switches 30-600 Amps., inclusive approved for full rupturing capacity under load.



No. 10323

The Bulldog "Type A" Safety Switch has many points of design and workmanship to recommend its use. The Quick Make and Quick Break Mechanism reduces arcing, and, by means of the quick make feature, ensures full contact, as well as prevents unintentional closing of the switch.

The Safety Cover Interlock is so designed as to prevent opening of the box cover when the switch

is in the "on" position. There is, however, provision so that qualified electricians may have access to the switch for inspection purposes.

These switches are supplied with sturdy Malleable Handles, so constructed that, as a final and positive guard against operation by unauthorized persons, the handle can quickly be removed as a unit.

The blade design is such that it is impossible under any condition for any one blade to remain in contact when the switch handle indicates the switch is in the "off" position. This is accomplished by using a heavy, insulated, steel crossbar, which passes through holes formed in the blades, double insulation being provided at these points with horn fibre bushings inserted in the blade holes.

Bulldog "Type A" Switch Jaws are of the machine-made, built-up type, best adapted for heavy industrial work. Clips of all switch jaws are of hard-drawn tempered material, flared at top to ensure easy entry of blades and to eliminate arcing.

2 POLE 230 VOLTS A.C.—250 VOLTS D.C.

Amp.	H.P. Rating A.C.	D.C.	List No.	List Price	Weight
*30	2	5	10221	\$16.30	15
60	5	5	10222	20.40	16
100	10	10	10223	31.20	27
200	10	20	10224	54.40	48
400			10225	135.00	74
600			10226	195.00	114

3 POLE 230 VOLTS A.C.

*30	3	10321	20.40	21
60	7½	10322	27.20	22
100	15	10323	40.80	34
200	30	10324	61.20	62
400		10325	150.00	98
600		10326	232.50	156

3 WIRE SOLID NEUTRAL

2 Blades 115-230 V. A.C.
2 Fuse Connections 250 V. D.C.

*30		12321	19.50	15
60		12322	25.00	15
100		12323	38.00	23
200		12324	58.00	44
400		12325	140.00	96
600		12326	220.00	122

4 POLE 230 VOLTS A.C.

*30	3	10421	27.00	25
60	10	10422	36.00	26
100	20	10423	60.00	59
200	30	10424	90.00	94
400		10425	195.00	116
600		10426	307.50	195

*All 30 ampere switches are "for Heavy Duty Service."

BULLDOG ENCLOSED SAFETY SWITCHES

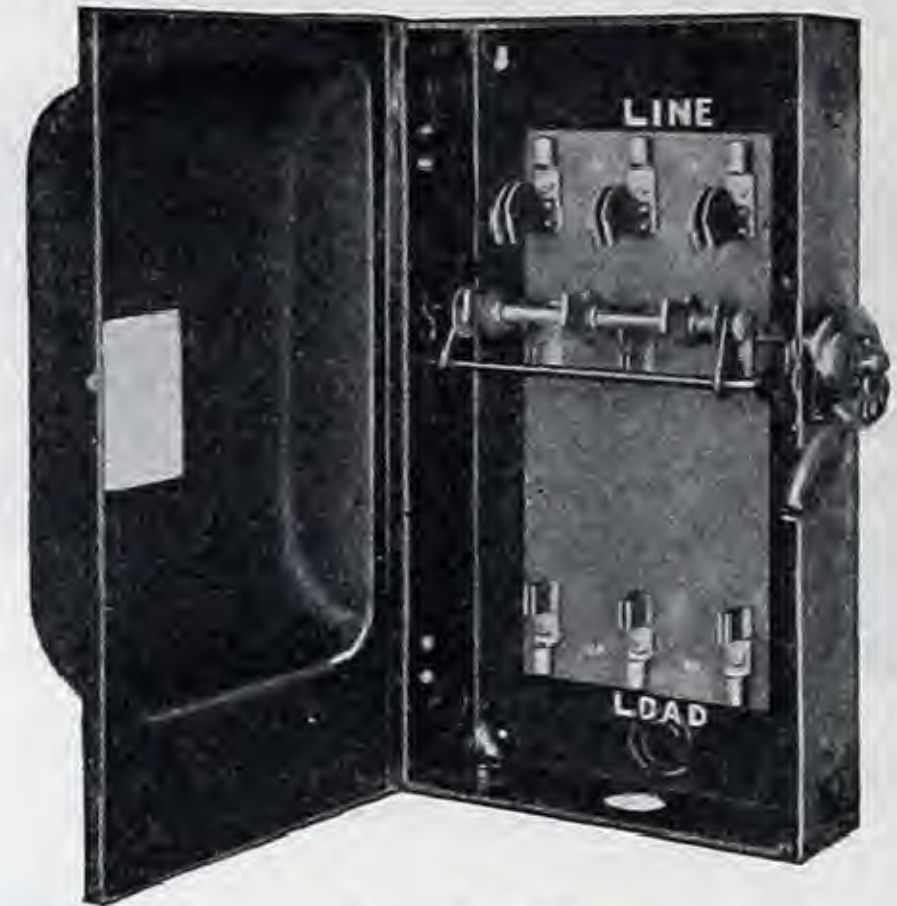
Single Throw—Fusible—Type A

575 volts A.C. or 600 volts D.C.

Quick Make and Quick Break—Safety Interlocks
For severe industrial service
Equipped with arc chokers

All switches which have horsepower ratings are "Motor Circuit Switches."

All switches 30-600 amps., inclusive approved for full rupturing capacity underload.



No. 10354

List No.	Amps.	Poles	H.P. Rating	Wgt.	List Price
2 POLE 600 VOLTS D.C.					
10261	30†	2	7½	32	\$ 24.50
10262	60	2	15	33	25.85
10263	100	2	25	52	40.80
10264	200	2	50	77	63.90
10265	400	2		128	165.00
10266	600	2		148	262.50
3 POLE 575 VOLTS A.C.					
10351	30†	3	7½	28	29.90
10352	60	3	20	29	31.30
10353	100	3	30	36	47.60
10354	200	3	50	67	78.90
10355	400	3		142	180.00
10356	600	3		159	300.00
4 POLE 575 VOLTS A.C.					
10451	30†	4	7½	34	40.50
10452	60	4	20	25	43.50
10453	100	4	30	68	69.00
10454	200	4	50	96	105.00
10455	400	4		145	240.00
10456	600	4		210	370.00

Single Throw—Unfused—Type A

Quick Make and Quick Break—Safety Interlocks

For severe industrial service
Equipped with arc chokers

All switches, which have horsepower ratings are "Motor Circuit Switches."

All switches 30-600 Amps., inclusive approved for full rupturing capacity under load. Switches 800 and 1200 Amps. may be used only as isolating switches."

List No.	Amps.	Poles	H.P. Rating	Wgt.	List Price
2 POLE 600 VOLTS D.C.					
13262	30-60*	2	15	29	\$ 20.40
13263	100	2	25	48	31.30
13264	200	2	50	58	42.15
13265	400	2		80	135.00
13266	600	2		116	195.00
13227	800†*	2		120	300.00
13228	1200†*	2		180	410.00

†230 volts A.C. or 250 volts D.C. only.

†All 30 ampere switches are for heavy duty service.

*Two lugs per pole. Single lugs can be furnished if specified. Quick break only. Not interlocking and without arc chokers. For isolating purposes only.

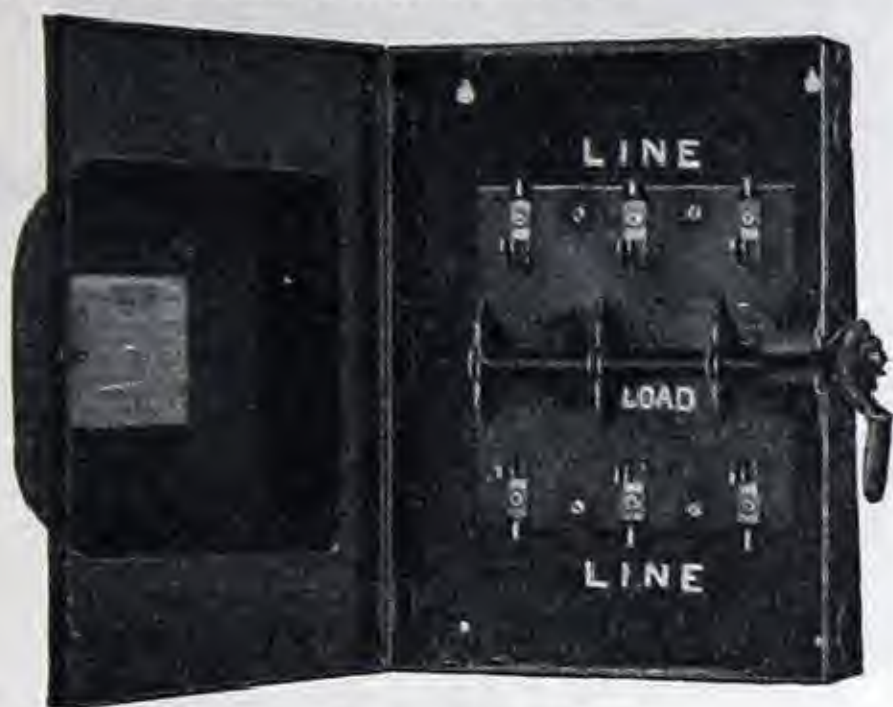
BULLDOG ENCLOSED SAFETY SWITCHES

Single Throw—Unfused Type

QUICK MAKE AND QUICK BREAK—SAFETY INTERLOCKS

severe industrial service equipped with arc chokers switches, which have horsepower ratings are "Motor Circuit Switches."

switches 30-600 amps. inclusive approved for full carrying capacity under load. Switches 800 and 1200 amps. be used only as isolating switches.



No. 23353

3 POLE 575 VOLTS A.C.

List No.	Amps.	Poles	H.P. Rating	Wght.	List Price
13352	30-60†	3	20	17	\$ 24.50
13353	100	3	30	24	36.70
13354	200	3	50	38	51.70
13355	400	3	..	74	150.00
13356	600	3	..	101	240.00
13357*	800	3	..	168	400.00
13358*	1200	3	..	254	540.00

4 POLE 575 VOLTS A.C.

List No.	Amps.	Poles	H.P. Rating	Wght.	List Price
13452	30-60†	4	20	21	36.00
13453	100	4	30	35	52.50
13454	200	4	50	68	76.50
13455	400	4	..	112	200.00
13456	600	4	..	130	310.00
13457*	800	4	..	220	520.00
13458*	1200	4	..	300	700.00

All 30 ampere switches are for heavy duty service. Two lugs per pole, single lugs can be furnished if specified. Quick break only. Not interlocking and without arc chokers. Isolating purposes only.

No Quick Make or Quick Break

FOR ISOLATING PURPOSES ONLY

List No.	Amps.	Poles	Weight	List Price
13321	30	2	14	\$19.00
13321	30	3	17	23.00
13321	30	4	19	34.00

Double Throw—Unfused—Type A

550 VOLTS A.C., 550 VOLTS D.C.

Equipped with arc chokers
For isolating purposes only

List No.	Amps.	Poles	H.P. Rating	Weight	List Price
2 Pole 550 Volts D.C.					
23262	30-60	2	5	31	\$28.50
23263	100	2	10	55	49.50
23264	200	2	10	80	70.50
23265	400	2	..	95	205.00
23266	600	2	..	100	290.00
3 Pole 550 Volts A.C.					
23352	30-60	3	7½	25	33.00
23353	100	3	15	40	60.00
23354	200	3	30	63	97.50
23355	400	3	..	105	260.00
23356	600	3	..	123	380.00
4 Pole 550 volts A.C.					
23452	30-60	4	10	26	52.50
23453	100	4	20	73	112.50
23454	200	4	30	79	160.00
23455	400	4	..	128	375.00
23456	600	4	..	188	475.00

BULLDOG ENCLOSED SAFETY SWITCHES

Single Throw—Fusible—Non-Interlocking

230 Volts A.C.—250 Volts D.C.

MOTOR CIRCUIT SWITCHES

Quick Make and Quick Break

List No.	Amps.	Volts	Poles	H.P. Rating A.C. D.C.	Wgt.	List Price
30221	30	230 A.C.-250 D.C.	2	2 2	6	\$ 5.40
30321	30	230 A.C.	3	3 ..	10	8.20
30421	30	230 A.C.	4	3 ..	13	17.70

Single Throw—Unfused—Non-Interlocking

Quick Make and Quick Break

MOTOR CIRCUIT SWITCHES

33222	30	230 A.C.-250 D.C.	2	2 5	13	15.40
33322	30	230 A.C.	3	3 ..	16	18.20
33422	30	230 A.C.	4	3 ..	21	27.00

Weatherproof and Dust-tight Switches

MOTOR CIRCUIT SWITCHES

"Type A" construction, quick make and quick break with interlocked covers.

List No.	Amps.	Poles	H.P. Rating A.C. D.C.	List Price
Fusible—2 Pole 230 Volts A.C.—250 Volts D.C.				
10221-W	†30	2	2 5	\$ 31.00
10222-W	60	2	5 5	34.00
10223-W	100	2	10 15	55.00
10224-W	200	2	10 20	106.00
10225-W	400	2	.. ..	200.00

*Fusible 3 Pole 230 Volts A.C.

10321-W	†30	3	3 ..	38.00
10322-W	60	3	7½ ..	47.50
10323-W	100	3	15 ..	83.80
10324-W	200	3	30 ..	140.00
10325-W	400	3	.. ..	265.00

3 POLE 550 VOLTS A.C.

Fusible

10351-W	†30	3	.. ..	65.00
10352-W	60	3	.. ..	68.75
10353-W	100	3	.. ..	106.00
10354-W	200	3	.. ..	175.00
10355-W	400	3	.. ..	375.00

2 POLE 600 VOLTS D.C.

Unfused

13262-W	† 30-60	2	15 ..	45.00
13263-W	100	2	25 ..	62.00
13264-W	200	2	50 ..	85.00
13265-W	400	2	.. ..	190.00

3 POLE 550 VOLTS A.C.

13352-W	† 30-60	3	20 ..	50.00
13353-W	100	3	30 ..	70.00
13354-W	200	3	50 ..	120.00
13355-W	400	3	.. ..	260.00

†These 30 ampere switches are "for heavy duty service."

*Solid Neutral or Switched Neutral Fusible Switches (12000 or 11000 series) furnished at same price. Change second figure of List No. to 1 or 2, according to type desired. For example, 12321W Solid Neutral; 11321W Switched Neutral.

BULLDOG ENCLOSED SAFETY SWITCHES

Service Entrance Switches

General Use Switches

QUICK BREAK ONLY—NON-INTERLOCKING
NON-METERING TYPE

No. 100311

No. 52323

115 VOLTS-A.C.—PLUG FUSES

Amps.	Poles	Fuses	List No.	List Price	Weight
30	2	2	100211	\$ 2.10	5
30	3	3	100311	4.50	6

SOLID NEUTRAL—PLUG FUSES

115-230 Volts A.C.

Amps.	Poles	Fuses	List No.	List Price	Weight
30	2	1	102211	\$2.10	5
30	3	2	102311	2.20	6

SOLID NEUTRAL—CARTRIDGE FUSES

115-230 Volts A.C.

Amps.	Poles	Fuses	List No.	List Price	Weight
30	3	2	102321	\$ 4.20	10
60	3	2	52322	5.50	12
100	3	2	52323	11.00	22
200	3	2	52324	27.00	43
400	3	2	52325	75.00	95
600	3	2	52326	158.00	120

3 PHASE 4 WIRE—CARTRIDGE FUSES

120-208 Volts A.C.

Amps.	Poles	Fuses	List No.	List Price	Weight
30	4	3	52421	\$ 9.20	12
60	4	3	52422	15.00	23
100	4	3	52423	28.50	56
200	4	3	52424	45.00	88
400	4	3	52425	132.00	120
600	4	3	52426	240.00	200

STANDARDIZED METER SERVICE SWITCHES

115-230 Volts A.C.

Blank shutter at top for enclosing all connections between switch and meter.

Amps.	Poles	Fuses	List No.	List Price	Weight
30	2	1 plug	*102211-MC	\$2.50	7
30	3	2 plug	*102311-MC	2.60	9
30	3	2 cartridge	*102321-MC	5.20	9
60	3	2 cartridge	52322-M	7.00	16
60	3	2 cartridge	*52322-MC	9.00	13
100	3	2 cartridge	52323-M	14.00	25
200	3	2 cartridge	52324-M	33.00	36

*Provision for three C.G.E. No. 2000 or three Smith & Stone No. 1219, or three Square D No. 1021 Cutouts (Cutouts not supplied).

SERVICE ENTRANCE SWITCHES FOR
UNDERGROUND SERVICE ONLY115-230 Volts D.C.
(Province of Quebec)

Amps.	Poles	Fuses	List No.	List Price	Weight
60	3	2 cartridge	52322-U	\$ 14.00	18
100	3	2 cartridge	52323-U	25.00	24
200	3	2 cartridge	52324-U	38.00	33

Note:—All above 30-Amp. switches without quick breaks.
For 30 ampere switches for Heavy Duty Service see previous listings.

BULLDOG ENCLOSED SAFETY SWITCHES

Single Throw—Fusible—Type C

2 POLE 230 VOLTS A.C.

All switches which have H.P. ratings are motor circuit switches.

Quick Break—For Industrial Service



No. 100321

The "Type C" Bulldog Safety Switch meets the demand for a lower-priced switch where the safety interlocking feature is not desired.

These switches are of the same high standard of design materials and workmanship as is to be found in all Bulldog Products. Quick Break feature is of rugged construction serving to interrupt the current quickly, thereby protecting the blades and jaws against "burning." The same heavy insulated steel crossbar construction is used as in Bulldog "Type A" Switches. All copper parts have large contact surfaces, and are so made that good contact is maintained after long use.

Amps.	Poles	H.P. Rating	List No.	List Price	Weight
30	2	2	*100221	\$ 4.00	6
30	3	3	*100321	6.10	10
30	4	3	*50421	19.50	13
60	2	5	50222	13.60	14
60	3	7½	50322	14.95	20
60	4	10	50422	22.50	25
100	2	10	50223	21.75	25
100	3	15	50323	27.20	31
100	4	20	50423	45.00	58
200	2	10	50224	29.90	48
200	3	30	50324	39.45	65
200	4	30	50424	72.00	90
400	2		50225	96.00	74
400	3		50325	111.00	97
400	4		50425	157.50	124
600	3		50326	172.50	160

* Without quick break. With porcelain base for A.C. only.

Single Throw—Fusible—Type C

575 VOLTS A.C.

For Isolating Purposes Only

EQUIPPED WITH ARC CHOKERS

Amps.	Poles	H.P. Rating	List No.	List Price	Weight
30	3		†90351	\$ 16.30	12
30	4		50451	30.00	32
60	3		50352	20.40	27
60	4		50452	33.00	33
100	3		50353	38.10	39
100	4		50453	60.00	68
200	3		50354	57.10	68
200	4		50454	85.50	96
400	3		50355	132.50	142
600	3		50356	200.00	170

†Front operated type.

For 30 ampere switches "for Heavy Duty Service" previous listings.

BULLDOG ENCLOSED SAFETY SWITCHES

Combination Service Equipment

115-230 Volts A.C.

Cabinet Contains:

125-250 Volt, 3 Wire, 2 Fuse Entrance Switch.
Provision for two 30 Amp. Single Pole Switches for Flat
te and Booster Water Heater (Switches not supplied).
Lighting Panelboard with Single Fuse Circuits as listed.
60 Amp. Dead Front Range Circuit.

	Switch Capacity	No. Single Fuse Circuits	List Price	Weight
04	60	4	\$15.00	25
06	60	6	16.50	25
08	100	8	26.00	50
10	100	10	28.50	50

Splitter Boxes

These Splitter Boxes consist of a "Type E" Box con-
taining three insulated terminal blocks, each having one
in lug and two branch feeder lugs. Conduit knockouts
provided in sides and back for main and branch feeder
cables.

	Mains Amps.	Branch Terminals	Box Size	List Price	Wgt.
01	125	2- 70-Amp.	14"x12 ¹ / ₈ "x4 ¹ / ₄ "	\$6.50	18
02	225	2-125-Amp.	16"x14 ¹ / ₈ "x4 ⁵ / ₈ "	9.00	25

Single Throw—Unfused

Type C—250 to 230 Volts, A.C.

Without Quick Break

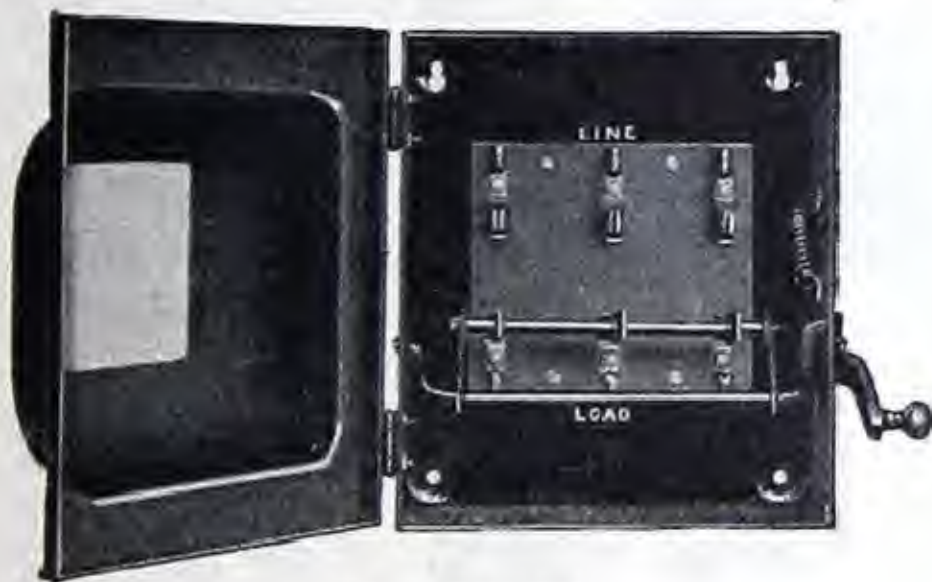
GENERAL USE SWITCH

Amps.	Poles	List No.	List Price	Weight
0	2	103221	\$4.90	5

Single Throw—Unfused

Type C—3 and 4 Pole 550 Volts A.C.—2 Pole 550 Volts D.C.
For isolating purposes only at 575 Volts A.C.—600 Volts
C.—Motor circuit switches at 230 Volts A.C. only.

Quick Break—With Arc Chokers



No. 53352

Amps.	Poles	230 Volts A.C. H.P. Rating	List No.	List Price	Weight
0	3	3	†93351	\$ 11.00	6
60	2	7 ¹ / ₂	*53222	14.30	13
60	3	15	53352	16.30	16
60	4	10	53452	30.00	21
0	2	10	*53223	26.30	17
0	3	15	53353	29.90	23
0	4	20	53453	46.50	34
0	2	10	*53224	38.25	31
0	3	30	53354	43.50	38
0	4	30	53454	70.50	50
0	2		*53225	62.00	61
0	3		53355	80.00	80
0	4		53455	112.00	110
0	3		53356	133.00	100

Front operated type.
250 Volts A.C. or D.C. without Arc Chokers.
For 30 ampere switches "for Heavy Duty Service" see
previous listings.

BULLDOG ENCLOSED SAFETY SWITCHES

Industrial Metering Trough

Two Meter Openings—Hinged Front

List No.	Size	Meter Opening	List Price
8503	3 ³ / ₄ "x4"x23 ¹ / ₄ "	2 ⁵ / ₈ "x7"	\$6.00

Connecting Troughs

List No.	Length	List Price Each
8504	3 ¹ / ₂ inches long	\$0.60
8505	8 ¹ / ₂ inches long	1.40

THREE NORTHERN ELECTRIC
RULES THAT INSURE
PROFIT

1. Know your overhead. All operating expenses, rent, bad accounts, clerical salaries—everything except time and material is overhead. Divide this expense by the amount of business you do and you have your overhead percentage.
2. Get your materials from Northern Electric.
3. Use the table below to figure your prices.

Per Cent of Net Profit	Per Cent of Overhead Expense Desired	15	20	25	30	35	40	45
5	25	33	43	54	67	82	100	122
10	33	43	54	67	82	100	122	150
15	43	54	67	82	100	122	150	185
20	54	67	82	100	122	150	185	233
25	67	82	100	122	150	185	233	

Example:—

Your overhead is 30% and you wish to make 10% net on this job. 67 is the factor shown by the intersection of these two lines and you, therefore, add 67% to your estimated prime cost (time and material). This establishes your selling price and brings you the profit you desire.

Northern Electric

A National Electrical Service

BULLDOG STEEL CABINETS

"Type E"

(SIZES CARRIED IN STOCK)

Width	Length	Depth	List Price	Width	Length	Depth	List Price
6	6	3	\$1.00	6	8	4	\$1.50
6	8	3	1.25	8	8	4	1.70
8	8	3	1.50	8	10	4	2.00
8	10	3	1.80	10	10	4	2.50
10	10	3	1.95	10	12	4	2.65
10	12	3	2.25	12	12	4	2.80
12	12	3	2.50	12	16	4	3.45

"Type C"

Wide	Long	3" Deep	4" Deep	5" Deep	6" Deep	7" Deep	8" Deep	9" Deep	10" Deep	11" Deep	12" Deep	Gauge U.S.S.
6	6	\$ 1.70	\$ 1.90	\$ 2.10	\$ 2.90	.....	.....	.....	.....	.....	.....	16
6	8	1.90	2.10	2.30	3.10	.....	.....	.....	.....	.....	.....	16
6	10	2.10	2.30	2.50	3.30	.....	.....	.....	.....	.....	.....	16
6	12	2.30	2.50	2.70	3.50	.....	.....	.....	.....	.....	.....	16
6	14	2.50	2.70	2.90	3.70	.....	.....	.....	.....	.....	.....	16
6	16	2.70	2.90	3.10	3.90	.....	.....	.....	.....	.....	.....	16
8	8	2.00	2.20	2.40	3.20	\$4.20	\$5.20	.....	.....	.....	.....	16
8	10	2.20	2.40	2.60	3.40	4.40	5.40	.....	.....	.....	.....	16
8	12	2.40	2.60	2.80	3.60	4.60	5.60	.....	.....	.....	.....	16
8	14	2.60	2.80	3.00	3.80	4.80	5.80	.....	.....	.....	.....	16
8	16	2.80	3.00	3.20	4.00	5.00	6.00	.....	.....	.....	.....	16
8	18	3.00	3.20	3.40	4.20	5.40	6.60	.....	.....	.....	.....	16
8	20	3.20	3.40	3.60	4.40	5.60	6.80	.....	.....	.....	.....	16
8	24	3.40	3.60	3.80	4.60	5.80	7.00	.....	.....	.....	.....	16
8	26	4.20	4.40	4.80	5.60	6.80	7.80	.....	.....	.....	.....	14
10	10	3.60	3.90	4.20	5.40	6.90	8.40	\$ 9.90	\$11.40	\$12.90	\$14.40	16
10	12	3.90	4.20	4.50	5.70	7.20	8.70	10.20	11.70	13.20	14.70	16
10	14	4.20	4.50	4.80	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16
10	16	4.50	4.80	5.10	6.30	7.80	9.30	10.80	12.30	13.80	15.30	16
10	18	4.80	5.10	5.40	6.60	8.40	10.20	12.00	13.80	14.50	17.40	16
10	20	5.10	5.40	5.70	6.90	8.70	10.50	12.30	14.10	15.90	17.70	16
10	24	5.40	6.00	6.30	7.50	9.00	10.80	12.60	14.70	16.20	18.00	16
10	26	7.50	8.40	9.30	10.50	13.50	13.80	17.10	18.90	20.70	23.40	14
10	28	9.00	9.90	10.80	11.70	14.70	16.50	18.30	20.10	21.90	23.70	14
10	30	10.80	11.70	12.60	13.50	16.50	18.30	20.10	21.90	23.70	25.50	14
12	12	4.20	4.50	4.80	6.00	7.50	9.00	10.50	12.00	13.50	15.00	16
12	14	4.50	4.80	5.10	6.30	7.80	9.30	10.80	12.30	13.80	15.30	16
12	16	4.80	5.10	5.40	6.60	8.10	9.60	11.10	12.60	14.40	15.90	16
12	18	5.10	5.40	5.70	6.90	8.70	10.50	12.30	14.10	15.90	17.70	16
12	20	5.40	5.70	6.00	7.20	9.00	10.80	12.60	14.40	16.20	18.15	16
12	24	6.00	6.30	6.60	7.80	9.60	11.40	12.90	15.00	16.80	18.45	16
12	26	9.00	9.90	10.80	11.70	14.70	16.50	18.30	20.10	21.90	23.70	14
12	28	10.80	11.70	12.60	13.50	16.50	18.30	20.10	21.90	23.70	25.59	14
12	30	12.60	13.50	14.40	15.30	18.30	20.10	21.90	23.70	25.50	27.30	14
12	36	18.00	18.90	19.80	20.70	23.70	25.50	27.30	29.10	30.90	32.70	14
12	40	23.40	24.30	25.20	26.10	29.10	30.90	32.70	34.50	36.30	38.10	14
16	16	5.40	5.70	6.00	7.20	8.70	10.20	11.70	12.90	14.70	16.20	16
16	18	5.70	6.00	6.30	7.50	9.00	10.80	12.60	14.70	16.20	18.00	16
16	24	8.70	9.45	10.20	10.95	13.95	15.75	17.55	19.35	21.15	22.95	14
16	26	10.20	10.95	11.70	12.45	15.45	17.25	19.05	20.85	22.65	25.45	14
16	28	12.00	12.90	13.80	14.70	17.70	19.50	21.30	23.10	24.90	26.70	14
16	30	13.80	14.70	15.60	16.50	19.50	21.30	23.10	24.90	26.70	28.50	14
16	34	17.40	18.30	19.20	20.10	23.10	24.90	26.70	28.50	30.30	32.10	14
16	36	19.20	20.10	21.00	21.90	24.90	26.70	28.50	30.30	32.10	33.90	14
16	40	24.60	25.50	26.40	27.10	30.30	32.10	33.90	34.50	37.50	39.30	14
18	18	6.75	7.50	8.25	9.00	12.00	13.50	15.00	16.50	18.00	19.50	16
18	20	7.50	8.25	9.00	9.75	12.75	14.25	15.75	17.25	18.75	20.25	16
18	24	9.90	10.65	11.40	12.15	18.15	19.65	21.15	22.65	24.15	25.65	14
18	26	11.40	12.15	12.90	13.65	19.65	21.15	22.65	24.15	25.65	27.15	14
18	28	12.90	13.65	14.40	15.15	21.12	22.65	24.15	25.65	27.15	28.65	14
18	30	14.70	15.45	16.20	16.95	22.95	24.75	26.55	28.35	30.15	31.95	14
18	34	18.30	19.05	19.80	20.55	26.55	28.35	30.15	31.95	33.75	35.55	14
18	36	20.10	20.85	21.60	22.35	28.35	30.15	31.95	33.75	35.55	37.35	14
18	40	25.50	26.25	27.00	27.75	33.75	35.55	37.35	39.15	40.95	42.75	14
21	20	11.85	12.60	13.35	13.95	19.95	21.45	22.95	24.45	25.95	27.45	14
21	24	14.85	15.60	16.35	17.10	23.10	24.60	26.10	27.60	29.10	30.60	14
21	28	17.85	18.75	19.35	20.10	26.10	27.60	29.10	30.60	32.10	33.60	14
21	30	19.35	20.10	20.55	21.15	27.60	29.10	30.60	32.10	33.60	35.10	14
21	34	22.95	23.85	24.75	25.65	31.60	33.45	35.35	37.05	38.85	40.65	14
21	36	24.75	25.65	26.55	31.95	33.45	35.25	37.05	38.85	40.65	42.45	14
21	40	30.15	31.05	31.95	32.70	38.85	40.65	42.45	44.25	46.05	47.85	14

Cabinets are made for surface work only.

These Cabinets are made of one piece, formed up. Door hinged with butt hinges, and fastened with vault handle and catch. Cabinets are supplied with a generous number of knockouts, including $\frac{1}{2}$ " and $\frac{3}{4}$ " combination knockouts. Knockouts other than standard, supplied at increased prices.

Larger size Cabinets than listed, price on application.

Finish—Black Baked Enamel.

BULL DOG KBL-DUCT AND FITTINGS

KBL-DUCT



Approved for use under
Canadian Electrical Code

Bull Dog Kbl-Duct is formed of heavy steel, made by dies uniform in size, provided with flanged ends so that sections may be bolted together, thereby forming a continuous wiring trough for distributing wires. The cover is hinged to the trough and is provided with spring latches for holding in closed position. Duct may be mounted with cover at top, bottom or side. Knockouts for 1/2", 3/4", 1" and 1 1/4" conduit are provided in the three standard lengths.

NIPPLES

For 4" x 4" Kbl-Duct

Lgth	List No.	List Price	Wgt. lbs.
6"	40N6	\$1.50	2 1/4
3"	40N3	1.25	1 1/2
2"	40N2	1.00	1 1/4
3/4"	40N07	.90	1 1/4
1/2"	40N05	.70	1
1/8"	40N01	.30	1/4

These Kbl-Duct Nipples are short lengths of Duct which may be inserted between the standard lengths so as to secure any dimensional length of Duct required.

SLIDE NIPPLE

For 4" x 4" Kbl-Duct

A convenient Adjustable Fitting for "taking up the slack" where there are variations in lengths of runs. After length is established, both sliding sections may be bonded together for permanent mounting; screws for same are provided.



Min. length	Max. Extension	List No.	List Price	Wgt. lbs.
8"	13"	40SN	\$2.80	5

END FLANGE

For 4" x 4" Kbl-Duct

This Fitting is the regular reinforced Flange End of our Kbl-Duct and is supplied separately for welding or bolting onto a section of Duct where it may have been necessary to cut a standard section.

List No.	List Price	Wgt. lbs.
40F	\$0.40	1/4

END PLATES

For 4" x 4" Kbl-Duct

These End Plates, provided with knockouts, are used for closing the end of a Duct section or openings in a wall box.

List No.	List Price	Wgt. lbs.
40EP	\$0.40	1/4



BULL DOG KBL-DUCT AND FITTINGS

4" x 4" Kbl-DUCT WIRING TROUGH CROSS SECTIONAL AREA 16"

This new Bull Dog Kbl-Duct has adaptable features whereby it can be connected to any type 4" x 4" duct. Use the adapter (List No. 40A35) for connecting to existing installations of 3 1/2" x 3 1/2" Duct.

4" x 4" Kbl-Duct

Length	List No.	List Price	Weight lbs.
5 ft.	40D5	\$5.00	18
2 ft.	40D2	3.00	8
1 ft.	40D1	2.30	5

HANGERS

For 4" x 4" Kbl-Duct

Hangers for suspending Kbl-Duct are provided, as shown in cut at left. Where necessary, Hanger can be bent at right angles in a vise, as shown in cut. Any number of these Hangers may be bolted together to secure any length Hanger desired in 1/2-inch multiple adjustments.



Length	List No.	List Price	Weight lbs.
7"	40H7	\$0.30	1 1/2

22 1/2°—45°—90° ELBOWS

For 4" x 4" Kbl-Duct

These elbows are provided with flanges, so they can be bolted on the end of a Kbl-Duct section. They are made with special dies and formed circular and smooth, so that wires may be readily pulled through them.



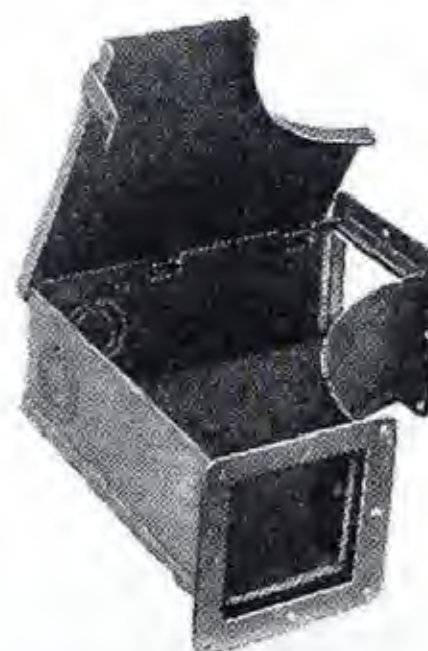
Degrees	List No.	List Price	Weight lbs.
22 1/2	40L22	\$3.00	1 1/2
45	40L45	3.00	2 1/2
90	40L90	4.00	4

90° CORNER ELBOW and PULL BOX

For 4" x 4" Kbl-Duct

A combination Pull Box and Elbow, provided with hinged cover and spring catch. K.O.'s are provided for convenient conduit outlets.

List No.	List Price	Weight lbs.
40CL9	\$6.00	5 1/2



TEE

For 4" x 4" Kbl-Duct

This Tee has hinged cover provided with catch. K.O.'s are provided. This fitting recommended for use at every building column or point where light and power cabinets are (or may be later) located.

List No.	List Price	Weight lbs.
40T	\$7.00	7 1/4



BULL DOG KBL-DUCT AND FITTINGS

CROSS

For 4" x 4" Kbl-Duct



This Cross is provided with double hinged doors, so it may be used as a pull box, greatly increasing the flexibility of the Duct system.

List No.	List Price	Wgt. lbs.
40X	\$10.00	9 1/4

4" SQUARE, JUNCTION BOX

For 4" x 4" Kbl-Duct



This 4" Square, Junction Box may sometimes be used in place of the more expensive Tees and Ells. It has removable sides provided with K.O.'s, so that junction with sections of Kbl-Duct or conduit can be readily effected.

List No.	List Price	Wgt. lbs.
40B40	\$2.00	1 3/4

7 1/2" SQUARE JUNCTION and PULL BOX

For 4" x 4" Kbl-Duct



This is a 7 1/2" Square, combined Junction and Pull Box, designed for use where space limitations or requirements preclude the use of the larger pull box. Closing plates for unused openings (No. 40EP) are extra. Kbl-Duct Bushings (No. 40DB) should be ordered and inserted in the used openings.

List No.	List Price	Wgt. lbs.
40B7	\$5.00	4

12 1/2" SQUARE PULL BOX

For 4" x 4" Kbl-Duct



This 12 1/2" Square Box provides a more ample Pull Box and may also be used as a Junction Box for double runs of Kbl-Duct. Closing Plates for unused openings (No. 40EP) are extra. Kbl-Duct Bushings (No. 4DB) should be ordered for insertion in the used openings.

List No.	List Price	Wgt. lbs.
40B12	\$12.00	9 1/2

BULL DOG KBL-DUCT AND FITTINGS

PULL BOX BUSHINGS

For 4" x 4" Kbl-Duct



Kbl-Duct Bushings have round edge bead to protect and facilitate the work of pulling through the wires, and the should be ordered for insertion in the used openings of the pull boxes.

List No.	List Price	Weight lbs.
40DB	\$0.30	1/4

BRANCH-OFF COUPLING

For 4" x 4" Kbl-Duct



List No.	List Price	Weight lbs.
40DC	\$3.00	3

This Branch-Off Coupling (of which 2 views are shown) may be used as a convenient or emergency Tee to start a branch run of Kbl-Duct from any point of an existing installation. All that is necessary is to knock out the K. O. in the Duct, or if a larger opening is desired, cut out a section of the Duct, bolt this fitting onto the Duct and continue with the Branch run in the direction desired.

ADAPTER

For 4" x 4" Kbl-Duct



The Adapter is for use in connecting new runs of 4" x 4" Kbl-Duct to existing installations of 3 1/2" x 3 1/2" Duct.

List No.	List Price	Weight lbs.
40A35	\$2.00	2 1/2

CONDUIT COUPLINGS

For 4" x 4" Kbl-Duct



Conduit Couplings are castings provided with threads in conduit and flange for bolting on the Kbl-Duct or Fitting.

Duct	Conduit	List No.	List Price	Weight lbs.
4" to 2 1/2"		40C25	\$3.00	1 3/4
4" to 3"		40C30	3.00	1 3/4
4" to 3 1/2"		40C35	3.00	1 3/4

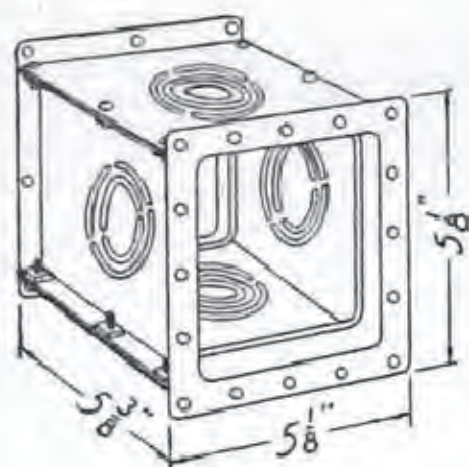
BULL DOG KBL-DUCT AND FITTINGS

Dimensions for 4" x 4" Kbl-Duct and Fittings

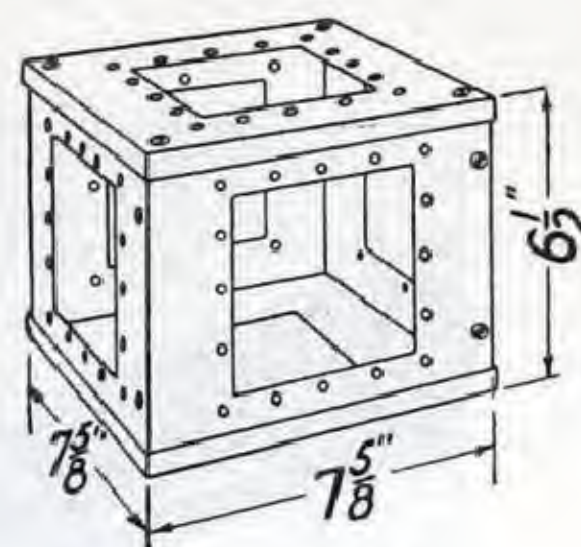
The Collar Dimensions of all 4" x 4" Kbl-Duct and Fittings is $5\frac{1}{8}"$ x $5\frac{1}{8}"$ as shown for List No. 40B40.



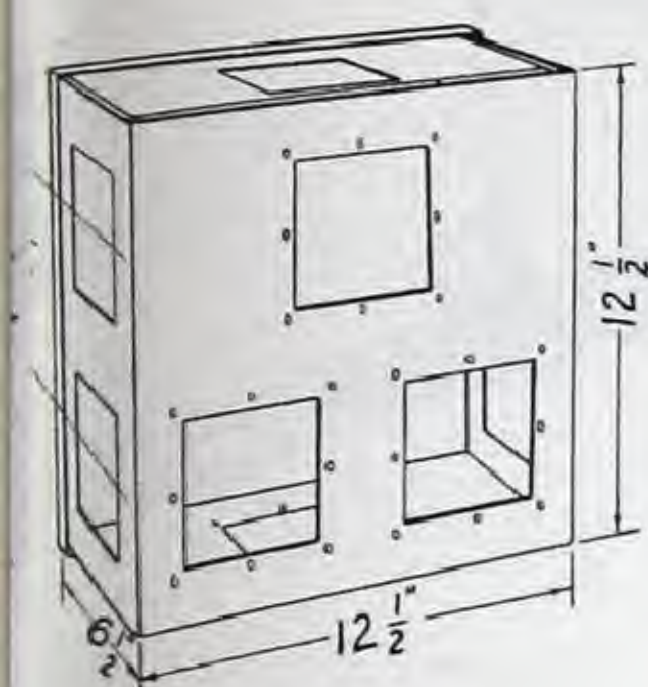
List No. 40H7



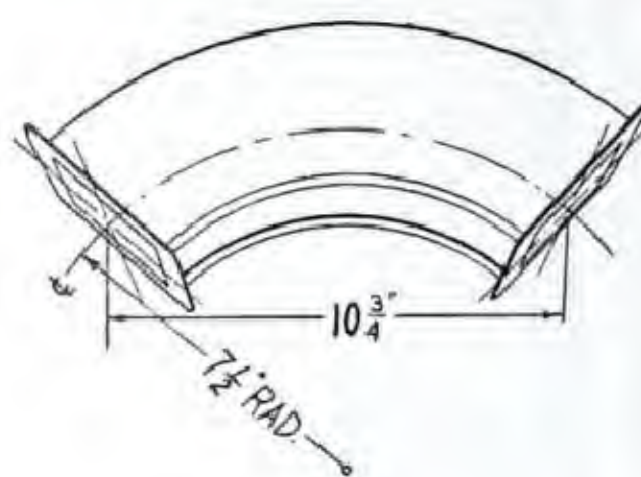
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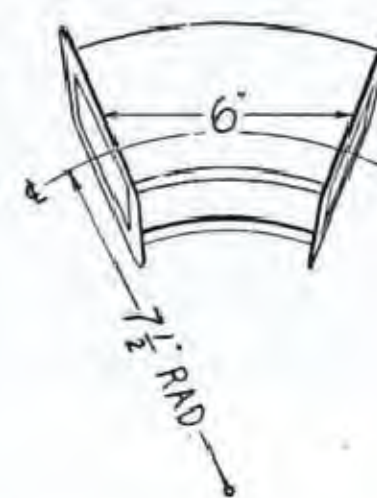
List No. 40B7



List No. 40B12



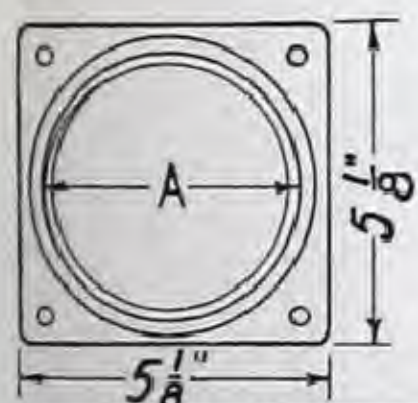
List No. 40L90



List No. 40L45

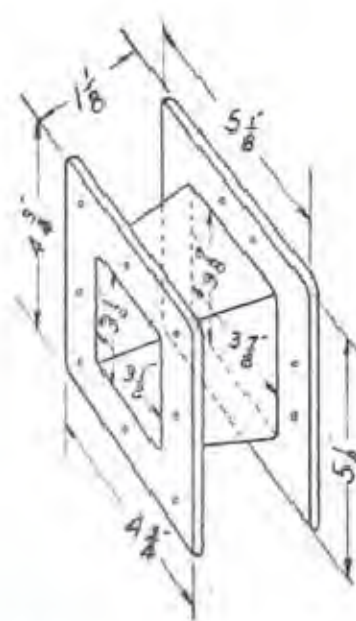


List No. 40L22

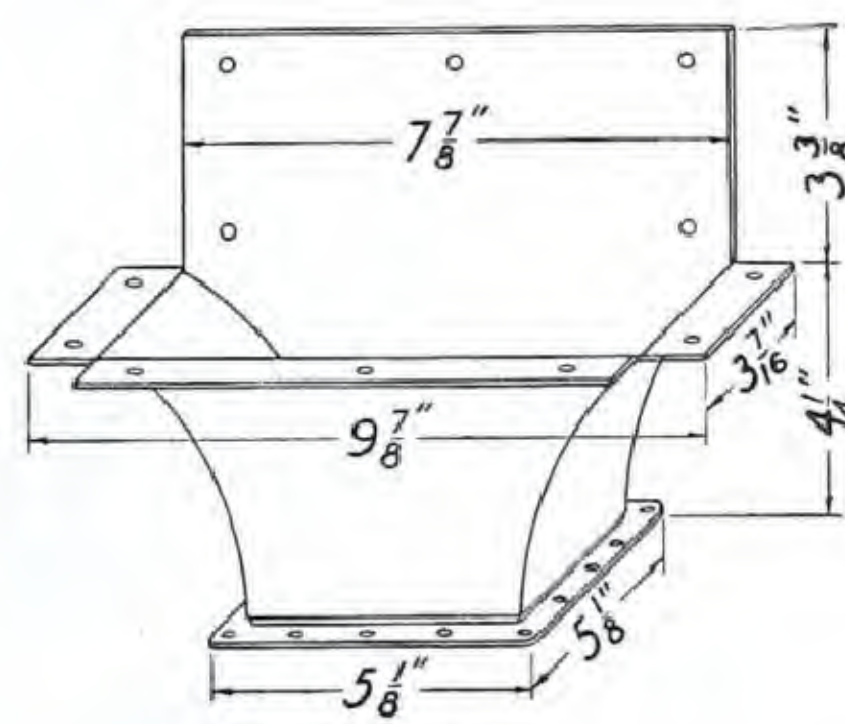


A PIPE SIZE	CAT. NO.
2 1/2"	40 C 25
3"	40 C 30
3 1/2"	40 C 35

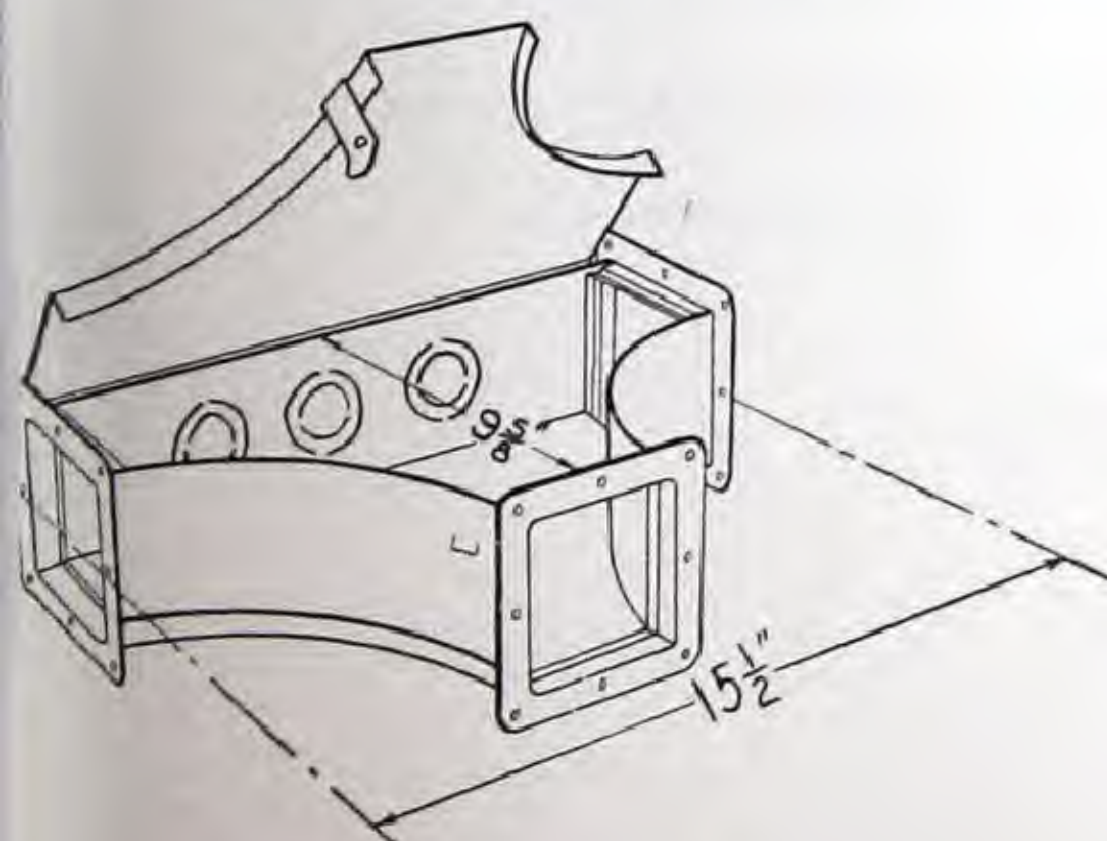
List Nos. 40C25-40C30-40C35



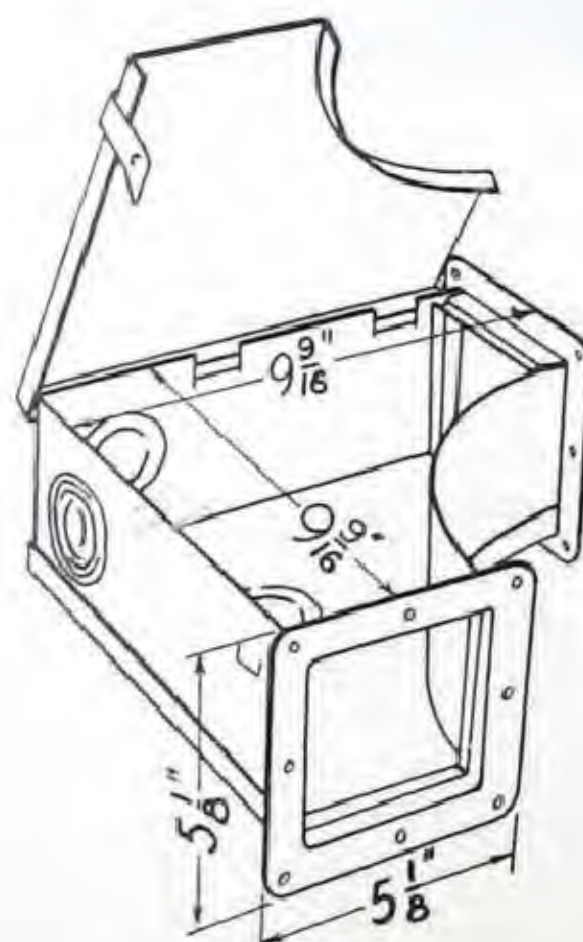
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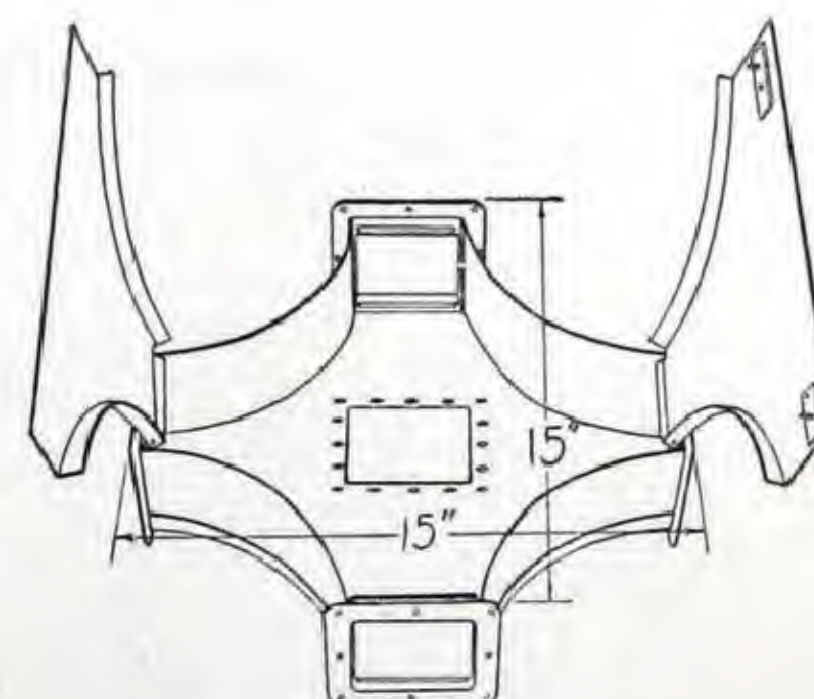
List No. 40DC



List No. 40T



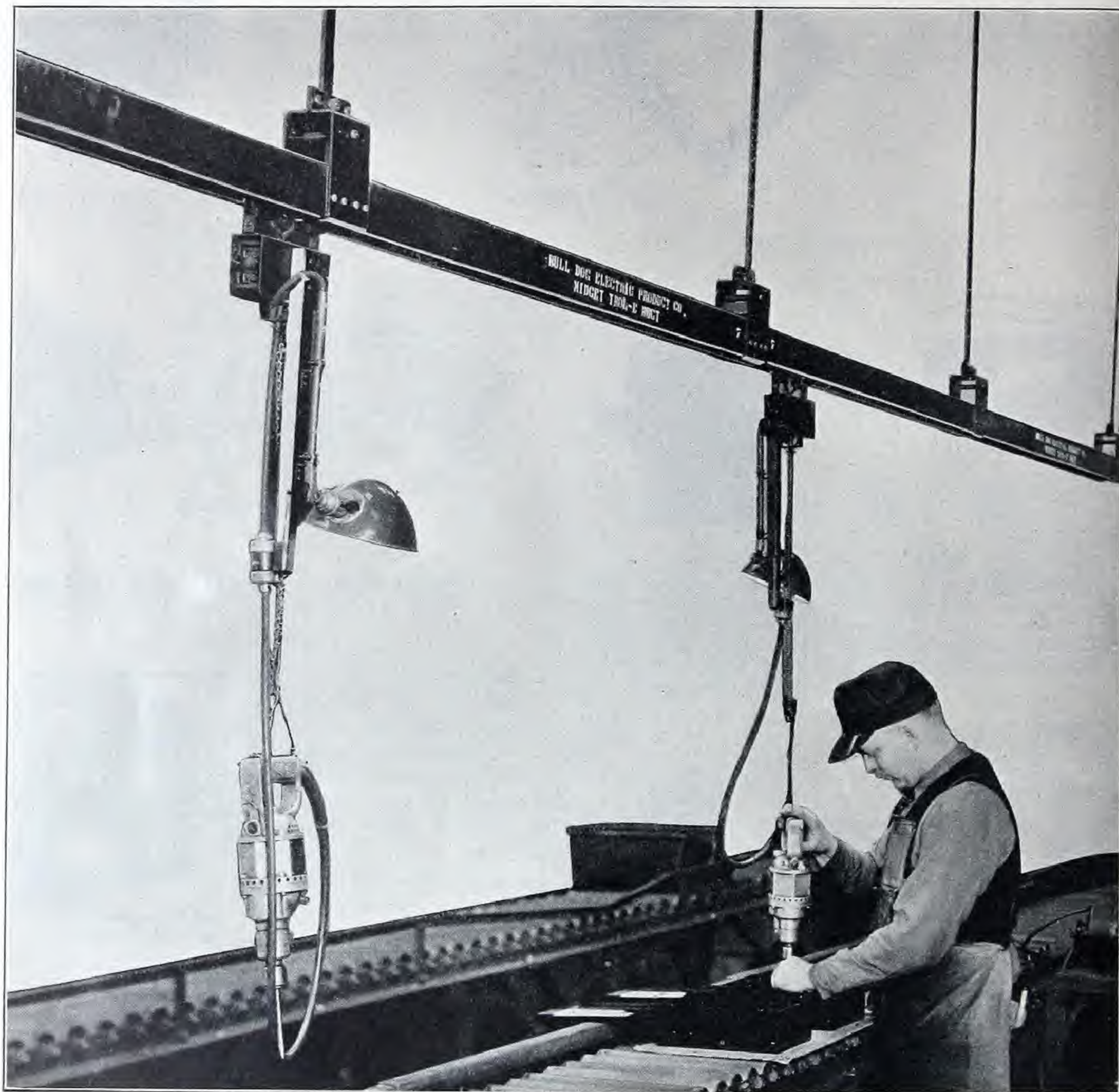
List No. 40CL9



List No. 40X

BULL DOG TROL-E-DUCT SYSTEMS

For Polyphase, Single Phase and Direct Current



A Mobile Trolley System for conveying current to moving or portable electric tools or devices.

Discards the tangled mess of extension cords used with older inefficient methods.

WRITE FOR COMPLETE DETAILS.

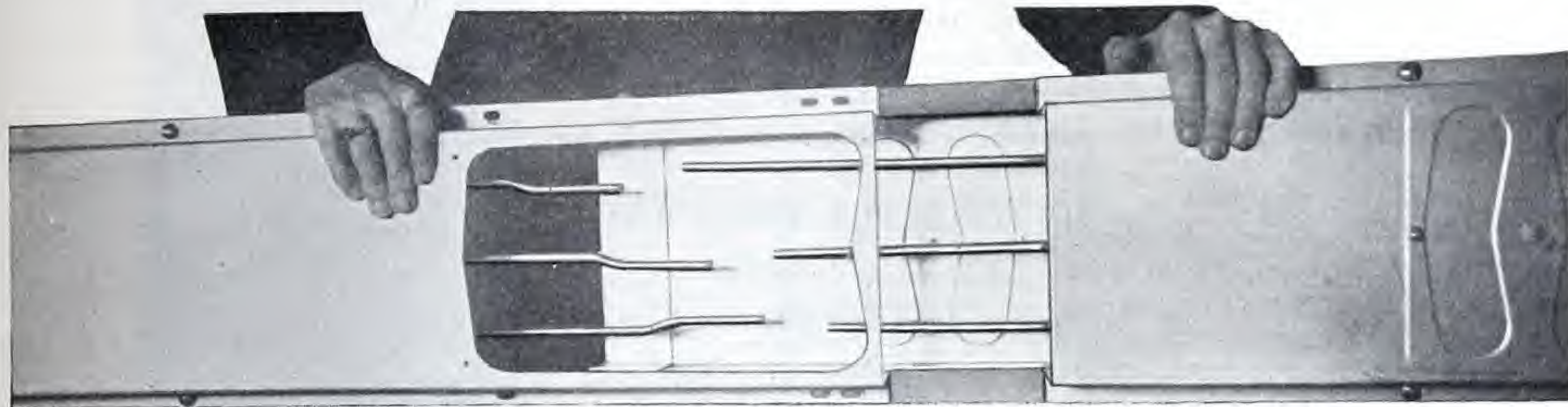
BULL DOG ELECTRO BUS-TRIBUTION SYSTEMS

A Busbar System of Distribution, consisting of standard-length sections of steel duct containing Busbars.

Offers a complete flexible System, including Main and Branch Feeder runs, with provisions in the latter for inserting current take off or Plug-in devices which may be of the fusible switch or circuit breaker type. From these Plug-in Devices,

flexible or rigid conductors may then be run direct to motors or other "load."

The standardized sectional construction and plug-in provisions make this system very flexible to meet changes in factory layouts or changes in machinery and motor locations. And by the same token the salvage value is practically 100% as compared with old type distribution methods.



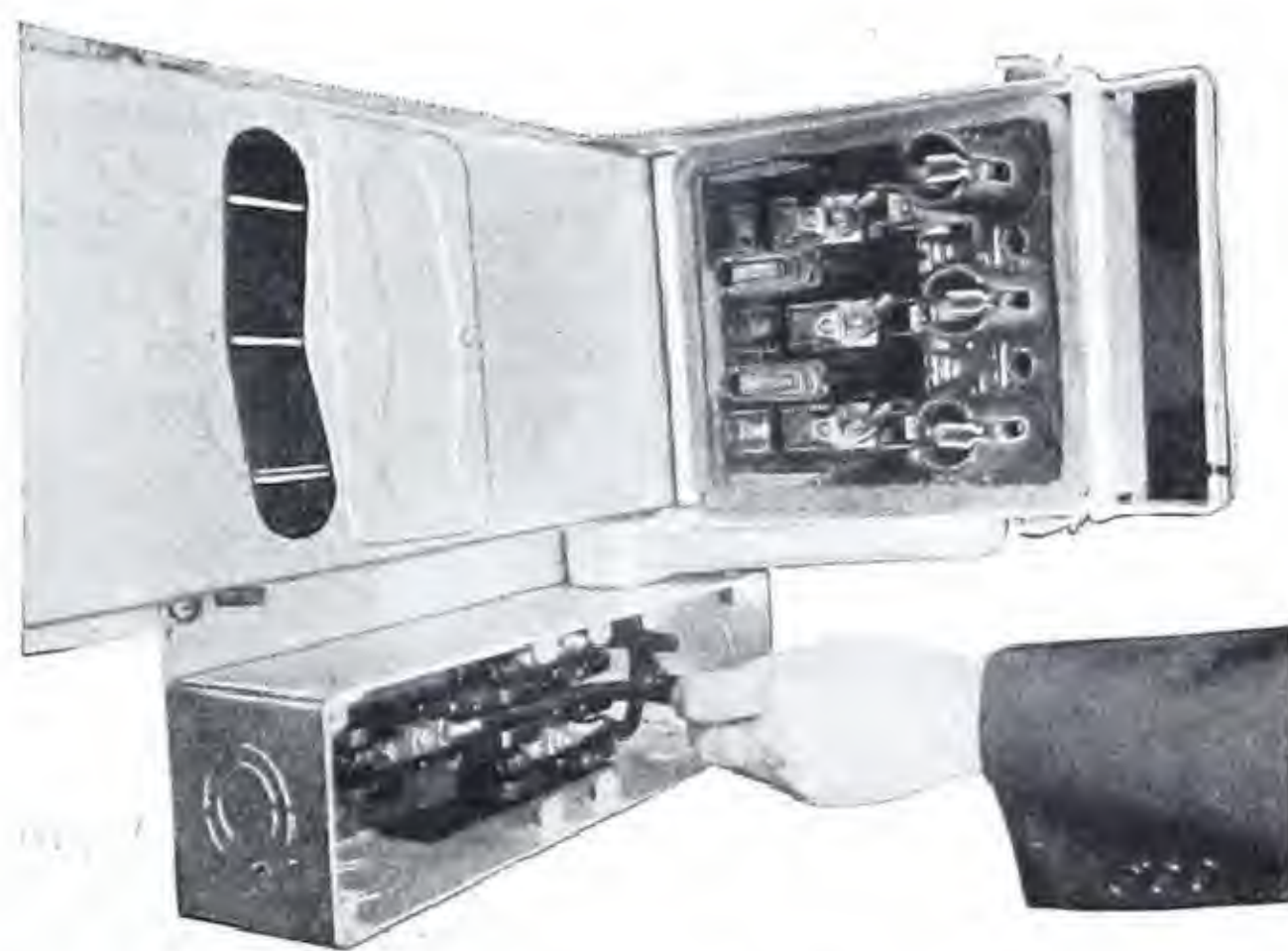
This illustrates the joining of 2 standard lengths of Bus-DUCT. After the Busbars of adjacent lengths are bolted together, the opening is closed with a neat hand hole cover.

Note, to the right, the crescent-shaped piece which can be swung open to permit the attachment of plug-in devices, illustrated in the cuts below.



Section of Bus-DUCT with a hinged fusible Bus-Plug attached in "On" position with all current-carrying parts safely enclosed. The Bus-Plug may be attached with the connection block housing mounted above the Duct (as illustrated here) or below, as shown in opposite cut.

Write for Complete Details.



Fusible Plug in "Off" position with fuses accessible and "dead." Note the contact jaws which engage the Busbars through the crescent-shaped opening. These openings are spaced at 20" intervals. A flexible cable runs from the "load" side of the Fusible Plug to a connection block in the steel housing below, from which point rigid conduit is run to the motor or other load.

AMALGAMATED ELECTRIC NOFUZ BREAKERS**Industrial Type ABI "De-ion" Circuit Breakers**

230 V.A.C.—125/250 V.D.C.—600 V.A.C.

QUICK MAKE AND QUICK BREAK

LIST PRICE ADDITIONS

Table II

Additions for solid neutral enclosures with flush or surface separable covers.

230 Volts A.C., 125/250 Volts D.C. 2 or 3 Pole, 3 or 4-Wire SN.

Make additions to list prices in Table I to obtain complete price. Specify enclosure and cover from Table IV.

Frame Size Amp.	3-Wire SN Add to 2-Pole List Price	4-Wire SN Add to 3-Pole List Price
50.....	\$2.50	\$2.50
100.....	3.00	3.00
225.....	4.00	4.00
600.....	4.50	4.50

Special enclosures for 2 or multiples of 2 circuit breakers can be supplied on order. Prices on request.

ADDITIONS FOR NEON PILOT LIGHTS

Table III

Applying to 2 or 3-Pole Enclosures shown in Table I.

Frame Size Amp.	Add to List Price
50	\$3.90
100	3.95
225	4.00
600	4.05

Table IV

Solid neutral enclosures and flush or surface covers.

230 Volts A.C., 125/250 Volts D.C. 2 or 3 Pole, 3 or 4-Wire SN.

Enclosure with bare neutral lugs.

Frame Size Amp.	Approx. Ship. Wgt. Each	Style No.	List Price
50	7	782119	\$5.00
100	14	782120	8.00
225	21	782121	10.00
600	75	782545*	30.00

Frame Size Amp.	Approx. Ship. Wgt. Lbs., Each	Cover Style No. Surface	Style No. Flush	List Price Surface or Flush
15-50	2	782096	782097	\$2.50
50-100	4	782098	782099	3.00
50-225	6	782100	782101	4.00

*This Enclosure supplied only with hinged surface cover. Price includes cover.

Table V

Additions for cadmium plated enclosures and covers any voltage.

50-ampere frame size—Add	\$1.50
100-ampere frame size—Add	2.50
225-ampere frame size—Add	4.00
600-ampere frame size—Add	9.00

Ordering Information.

When ordering specify: (1) Style No. circuit breaker, (2) Style No. enclosure, (3) Style No. cover if separable, (4) with or without solid neutral, (5) amperage, (6) voltage, (7) frame size.

AMALGAMATED ELECTRIC NOFUZ DISTRIBUTION SWITCHBOARDS

Using
Type AB "De-ion" Circuit Breakers



Front View of Nofuz Switchboard

An entirely new type of standardized switchboard is now offered by the Amalgamated Electric Corporation. A particular accomplishment of this design is the replacement of knife switches and fuses in switchboard practice by the newly developed line of Type AB "De-ion" circuit breakers. All desirable features of best modern switchboard practice are retained and to these are added many important advantages which have just become available.

The "De-ion" circuit breakers have been developed not only to replace knife switches and fuses, but also to take care of many applications previously handled through the use of carbon circuit breakers up to and including 600 amperes. Their design is such as to enable a compact and efficient switchboard construction.

CONSTRUCTION

The usual compactness of the "De-ion" circuit breakers enables the concentration of a great deal of breaker capacity within a relatively limited amount of space.

AMALGAMATED ELECTRIC NOFUZ DISTRIBUTION SWITCHBOARDS

Using
Type AB "De-ion" Circuit Breakers
(Continued)

One standardized arrangement provides for fixed mounting of the breakers and the breakers are accessible from the front for inspection or maintenance. The construction consists of a unit frame built up of structural steel vertical members with cross members welded in place. These cross members are formed and located properly to support the removable front panel sections.

The breakers are supported at each end by additional cross members bolted to the frame. When rear connected breakers are used, these cross pieces are of Micarta plate to furnish the necessary insulation. When front connected breakers are employed, the supporting straps will be of steel.

Although the breakers do not require the influence of gravity in operating, they are mounted in the standardized switchboard with the pole units in a vertical position and with the contacts uppermost.

Connections to the breakers from the bus and the outgoing circuit leads are arranged in conventional form. The construction provides for location of buses at either the top or bottom of the panel and the outgoing cables may also be taken away at either top or bottom of the switchboard.

Pull boxes can be supplied at either top or bottom of the switchboard. When pull boxes are employed, it is recommended that cables be extended from the pull box directly to the breaker terminals. However, additional connections and risers can be provided if desired to terminate near the bottom of the pull box, at which point connection to the cables is made.

There is a method of mounting the breakers directly on the back of the standard switchboard steel panel, but the breakers are not as readily available for inspection as it is necessary to remove the connections from the bus to the breaker and also the outgoing leads.

The breaker can then be removed from the panel by removing the nuts from the screws which fasten it to the panel.

These screws which pass through the panel have flattened heads and are knurled, to prevent turning when the nuts are removed preparatory to removing the breaker from the panel.

The advantage of this method consists in the fact a standard steel switchboard panel can be used without any auxiliary supporting framework.

Another type of Nofuz switchboard which can be supplied is the disconnecting type with each breaker mounted directly on a hinged panel. By means of a mechanical interlock the hinged panel cannot be opened unless the breaker is in the open position, the panel can then be swung open entirely disconnecting the breaker from the bus. Any necessary repairs or recalibration changes can be made or a new breaker substituted with no interruption to service except the circuit affected. This arrangement is especially recommended where interruption to service must be a minimum.

A.B. breaker 2 or 3 poles above 15 amperes, 250 or 600 volts are arranged for either front or rear connections. For installations where the disconnecting type are not required good results are obtained by using the rear connected breaker and mounting directly on the front of the board. This method of mounting can be used especially where other apparatus is mounted in the same panel.

The general appearance of the switch is such that a pleasing effect is obtained when mounted with other apparatus.

AMALGAMATED ELECTRIC NOFUZ BREAKERS

Industrial Type AB-I "De-ion" Circuit Breakers

230 V.A.C.—125/250 V.D.C.—600 V.A.C.

QUICK MAKE AND QUICK BREAK

General Description

The Industrial Type AB-I "De-ion" circuit breaker, steel enclosed, was developed to provide thermal inverse time element protection for main services, light and power tapered feeder wiring systems, and a protection that would require no elements to renew after circuit interruption, and that could be quickly reset to restore service. They will replace fuses, fused switches, small carbon breakers and other similar circuit protectors.

This steel enclosed breaker is for wall, column or machine mounting. The ratings range from 15 to 50 amperes, 50 to 100 amperes, 50 to 225 amperes, and 225 to 600 amperes, 230 volts A.C., 125/250 volts D.C., 600 volts A.C., 250 volts D.C. The maximum rating of each frame size indicates the maximum continuous current carrying capacity of that frame. On all frames except the 15 to 50 ampere size, the thermal and magnetic trip is built into a separate unit so that the breaker rating can be changed by changing the trip unit. Within the capacity limitations of the various frames, trip units are available in ratings corresponding to standard wire and cable sizes.

The trip unit consists of a magnetic trip (above 50 amperes) and a specially designed and heat treated bimetal which will not change its calibration under any short circuit within the listed rupturing capacity of the breaker.

The heat in this bimetal on overcurrent, causes it to deflect and trip a latch which opens the breaker. The thermal trip operates with enough time delay to allow heavy momentary over-currents but will trip in ample time to protect conductors and control on sustained overloads.

Type AB-I breakers are reset by moving the handle to the extreme off position and then throwing on.

Exceptional long life of the contacts can be expected as they consist of non-brazing and non-corrodible metals. No electroplated contacts are used.

High rupturing ability is obtained through the application of the "De-ion" arc quencher and the "De-ion" arc spinner principle.

Type AB-I Industrial Breakers are listed by the H.E.P.C. of Ontario Laboratories.

Distinctive Features

Steel Enclosure. The steel enclosures provide proper mounting for the Industrial Type AB-I Breakers. A box is available for the 15 to 50-ampere frame that will take either 2 or 3-pole breakers. A second box is available for the 50 to 100-ampere frame that will take either 2 or 3-pole breakers. A third box will take the 50 to 225-ampere frame, either 2 or 3-pole, and either 230 volts A.C. 125/250 volts D.C., or 250 volts D.C., 600 volts A.C. All boxes have felt strips on the inside cover at the top to reduce the amount of dust that can sift into the box.

Ample knockouts are provided that are planished to prevent the filtration of dust into the box. The main cover can be padlocked with two locks.

AMALGAMATED ELECTRIC NOFUZ BREAKERS

Industrial Type AB-I "De-ion" Circuit Breakers

230 V.A.C.—125/250 V.D.C.—600 V.A.C.

QUICK MAKE AND QUICK BREAK

With Black Finished Steel Enclosures

2 and 3-Pole Enclosures with Hinged Surface Covers. For flush mounting use Solid Neutral Enclosures.

—230 Volts A.C. — —600 Volts A.C.—
125/250 Volts D.C. 250 Volts D.C.

Poles	Amp.	Wgt. lbs. Compl.	List Price			
			Style No.	Compl.	Style No.	Compl.
			Breaker (No. 683812 Enclos.)	Breaker and Enclo- sure	Breaker (No. 782482 Enclos.)	Breaker and Enclo- sure
50-Ampere Frame						
2	15	13.	545333	\$23.00	545380	\$43.00
2	20	13.	545334	23.00	545381	43.00
2	25	13.	545335	23.00	545382	43.00
2	35	13.	545336	25.00	545383	44.00
2	50	13.	545337	25.00	545384	44.00
3	15	15.	545369	29.00	545389	54.00
3	20	15.	545343	29.00	545390	54.00
3	25	15.	545344	29.00	545391	54.00
3	35	15.	545345	31.00	545392	56.00
3	50	15.	545346	31.00	545393	56.00

100-Ampere Frame						
			(No. 683813 Enclos.)		(No. 782483 Enclos.)	
2	50	25.....	545367	48.00	545385	71.00
2	70	25.....	545338	49.00	545386	73.00
2	90	25.....	545339	51.00	545387	75.00
2	100	25.....	545340	53.00	545388	76.00
3	50	29.....	545368	60.00	545394	94.00
3	70	29.....	544347	63.00	545395	95.00
3	90	29.....	545348	65.00	545396	98.00
3	100	29.....	545349	68.00	545397	100.00

225-Ampere Frame						
			(No. 683814 Enclos.)		(No. 781816 Enclos.)	
2	50	40.....	807263	111.00	807264	130.00
2	70	40.....	807265	111.00	807266	130.00
2	90	40.....	807267	111.00	807268	130.00
2	100	40.....	807269	111.00	807270	130.00
2	125	40.....	807271	114.00	807272	131.00
2	150	40.....	807273	116.00	807274	134.00
2	175	40.....	807275	118.00	807276	136.00
2	200	40.....	807327	120.00	807328	138.00
2	225	40.....	807277	123.00	807278	140.00
3	50	50.....	807279	136.00	807280	164.00
3	70	50.....	807281	136.00	807282	164.00
3	90	50.....	807283	136.00	807284	164.00
3	100	50.....	807285	136.00	807286	164.00
3	125	50.....	807287	140.00	807288	166.00
3	150	50.....	807289	143.00	807290	169.00
3	175	50.....	807291	145.00	807292	173.00
3	200	50.....	807329	149.00	807330	175.00
3	225	50.....	807293	152.00	807294	179.00

600-Ampere Frame Prices and data on application

Solid neutral listing, prices on application.

2 and 3-Pole Boxes are for surface mounting only. For 2 and 3-Pole Flush Mounting specify Solid Neutral Boxes and Covers.

No deduction allowed for Neutral. Available for 230 volts A.C., 125/250 volts D.C. Circuit Breakers only.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ CONVERTIBLE DISTRIBUTION PANELBOARDS

(Continued)

List Price Additions for Special Features

Addition for Solid Neutral Bar

Cap. of Neutral Bus Amperes	List Price Additions
200.....	\$16.00
400.....	22.00
600.....	27.00
800.....	38.00
1000.....	48.00

List Price includes neutral bar, main lug, lug for each branch circuit, and portion of back plate, box and trim.

For Feed Through Lugs at Both Ends*

Add to List Price

Main Amperes	2 Bus Bars	3 Bus Bars
225.....	\$11.00	\$14.00
400.....	15.00	18.00
600.....	22.00	30.00
800.....	30.00	38.00
1000.....	38.00	46.00

*Box dimensions for lugs at both ends must be obtained from factory.

Special Knockouts

Knockouts will be furnished in ends of boxes at no additional charge, if drilling template accompanies order. Knockouts in ends of boxes require special boxes but will be furnished at an addition of \$0.50 list price per knockout.

AMALGAMATED ELECTRIC NOFUZ METER SERVICE BREAKERS

Quick Make and Quick Break

WK-50 METER SERVICE BREAKER

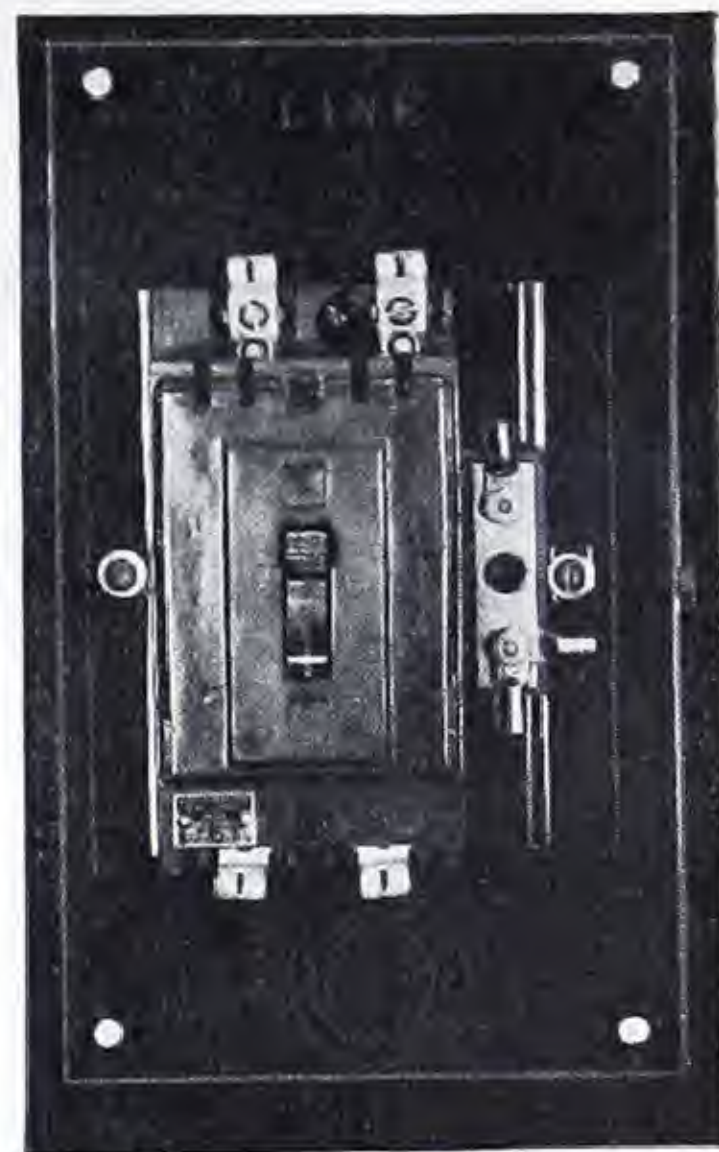
Single Phase or Direct
Current Service

Quick-Make and
Quick-Break

The WK-50 Meter Service Breaker is designed to eliminate fuses and the troubles fuses present. The breaker answers all requirements for sealed main fuses, accessible fuses; interlocking doors and many other features of meter service switches. The breaker is front operated. Disconnecting the line or resetting the breaker is no more difficult than operating the ordinary toggle switch.

The 3-pole breaker consists of a two-pole breaker and a solid neutral strap.

The breaker has a longer time element than fuses, withstanding temporary overloads but opening the line before any damage can be done, and fast enough to protect rubber covered wire of the same capacity as the breaker under all overload conditions. On short circuit it will open the line in 1/100 second without excessive flame or noise. The special non-brazing contacts, non-corrosive shoulder pins and moving parts assure positive operation under the most severe conditions.



Double Pole—Open Box

2 and 3-Pole—Solid Neutral—125, 125/250 Volts

Breaker Without End Wall

Amps.	Poles	Volts	List No.	List Price Each
15	2 PSN	125	502703	\$10.30
25	2 PSN	125	502704	10.30
35	2 PSN	125	502715	10.90
25	3 PSN	125/250	502718	16.30
35	3 PSN	125/250	502702	17.50
50	3 PSN	125/250	502721	19.60

Breaker with Shutter Type Trim K-59431

15	2 PSN	125	502713	\$10.80
25	2 PSN	125	502714	10.80
35	2 PSN	125	502717	11.40
25	3 PSN	125/250	502720	16.80
35	3 PSN	125/250	502712	18.00
50	3 PSN	125/250	502723	20.00

Breaker with One-Piece Trim K-62675

15	2 PSN	125	502708	\$10.80
25	2 PSN	125	502709	10.80
35	2 PSN	125	502716	11.40
25	3 PSN	125/250	502719	16.80
35	3 PSN	125/250	502707	18.00
50	3 PSN	125/250	502722	20.00

METER SERVICE BREAKER WK-100

For Services—70, 90 and 100 Amperes

Nos. 3370, 3390 and 3300 are 3-pole 4-wire and are for use on 3 phase 4-wire grounded neutral systems.

List No.	Poles	Amps.	List Price
2370.....	3 PSN	70	\$62.00
2390.....	3 PSN	90	65.50
2300.....	3 PSN	100	67.50
3370.....	4 PSN	70	77.50
3390.....	4 PSN	90	82.50
3300.....	4 PSN	100	86.00

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ CONVERTIBLE DISTRIBUTION
PANELBOARDS—(Continued)

250 Volts, A-C. or 125 Volts D-C. Service

†Base List Price

Box Width Inches	Box Depth Inches	Gutter Width Inches	—MAIN CAPACITY—				
			225- Amp.	400- Amp.	600- Amp.	800- Amp.	1000- Amp.
For 225-Amp. Circuit and Under							
30	8	5	\$38.00	\$43.00	\$54.00	\$67.00	\$81.00
For 400-Amp. Circuit and Under							
35	10	6½	...	54.00	67.00	81.00	95.00
For 600-Amp. Circuit and Under							
40	10	9	...	...	81.00	95.00	110.00

†Base price includes main lugs (either 2, 3 or 4-wire), top and bottom gutter, with respective sections of bus, box and front to circuit edge. Remaining equipment for complete panelboard included in circuit list prices.

Circuit List Price

Breaker Frame Sizes	Ampere Cap.	Number Poles	List Price	Space Only List Price†
50-Ampere, 2-Pole (2X)	15	2	\$25.50	\$5.00
50-Ampere, 2-Pole (2X)	20	2	25.50	5.00
50-Ampere, 2-Pole (2X)	25	2	25.50	5.00
50-Ampere, 2-Pole (2X)	35	2	27.50	5.00
50-Ampere, 2-Pole (2X)	50	2	27.50	5.00
50-Ampere, 3-Pole (3X)	15	3	33.50	7.00
50-Ampere, 3-Pole (3X)	20	3	33.50	7.00
50-Ampere, 3-Pole (3X)	25	3	33.50	7.00
50-Ampere, 3-Pole (3X)	35	3	36.50	7.00
50-Ampere, 3-Pole (3X)	50	3	36.50	7.00
100-Ampere, 2-Pole (4X)	50*	2	54.00	8.00
100-Ampere, 2-Pole (4X)	70	2	55.00	8.00
100-Ampere, 2-Pole (4X)	90	2	57.50	8.00
100-Ampere, 2-Pole (4X)	100	2	59.00	8.00
100-Ampere, 3-Pole (6X)	50*	3	70.00	11.00
100-Ampere, 3-Pole (6X)	70	3	73.00	11.00
100-Ampere, 3-Pole (6X)	90	3	75.50	11.00
100-Ampere, 3-Pole (6X)	100	3	78.50	11.00
225-Ampere, 2-Pole (8X)	70**	2	127.00	14.00
225-Ampere, 2-Pole (8X)	90**	2	127.00	14.00
225-Ampere, 2-Pole (8X)	100**	2	127.00	14.00
225-Ampere, 2-Pole (8X)	125	2	130.00	14.00
225-Ampere, 2-Pole (8X)	150	2	132.00	14.00
225-Ampere, 2-Pole (8X)	175	2	135.00	14.00
225-Ampere, 2-Pole (8X)	200	2	137.50	14.00
225-Ampere, 2-Pole (8X)	225	2	140.50	14.00
225-Ampere, 3-Pole (12X)	70**	3	161.00	19.00
225-Ampere, 3-Pole (12X)	90**	3	161.00	19.00
225-Ampere, 3-Pole (12X)	100**	3	161.00	19.00
225-Ampere, 3-Pole (12X)	125	3	164.50	19.00
225-Ampere, 3-Pole (12X)	150	3	167.00	19.00
225-Ampere, 3-Pole (12X)	175	3	170.00	19.00
225-Ampere, 3-Pole (12X)	200	3	173.00	19.00
225-Ampere, 3-Pole (12X)	225	3	175.00	19.00
400-Ampere, 2-Pole (12X)	225***	2	337.00	27.00
400-Ampere, 2-Pole (12X)	250	2	350.00	27.00
400-Ampere, 2-Pole (12X)	325	2	363.00	27.00
400-Ampere, 2-Pole (12X)	400	2	375.00	27.00
400-Ampere, 3-Pole (12X)	225***	3	400.00	34.00
400-Ampere, 3-Pole (12X)	250	3	415.00	34.00
400-Ampere, 3-Pole (12X)	325	3	430.00	34.00
400-Ampere, 3-Pole (12X)	400	3	450.00	34.00
600-Ampere, 2-Pole (12X)	450	2	390.00	27.00
600-Ampere, 2-Pole (12X)	500	2	400.00	37.00
600-Ampere, 2-Pole (12X)	550	2	415.00	27.00
600-Ampere, 2-Pole (12X)	600	2	430.00	27.00
600-Ampere, 3-Pole (12X)	450	3	460.00	34.00
600-Ampere, 3-Pole (12X)	500	3	480.00	34.00
600-Ampere, 3-Pole (12X)	550	3	495.00	34.00
600-Ampere, 3-Pole (12X)	600	3	510.00	34.00

*This rating to be used only when circuit is later to be changed to either 70, 90, or 100 amperes.

**These ratings to be used only when circuit is later to be changed to a rating of 125 to 225 amperes.

***This rating to be used only when circuit is later to be changed to a rating of 250 to 600 amperes.

†Space only List Price is to be used when circuits do not evenly balance and also when space is to be left for future.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ CONVERTIBLE DISTRIBUTION
PANELBOARDS—(Continued)

600 Volts, A-C. or 250 Volts D-C. Service

†Base List Price

Box Width Inches	Box Depth Inches	Gutter Width Inches	—MAIN CAPACITY—				
			225- Amp.	400- Amp.	600- Amp.	800- Amp.	1000- Amp.
			For 225-Amp. Circuit and Under				
30	8	5	\$38.00	\$43.00	\$54.00	\$67.00	\$81.00
			For 400-Amp. Circuit and Under				
35	10	6½	...	54.00	67.00	81.00	95.00
			For 600-Amp. Circuit and Under				
40	10	9	...	...	81.00	95.00	110.00

†Base price includes main lugs (either 2, 3 or 4-wire), top and bottom gutter, with respective sections of bus, box and front to circuit edge. Remaining equipment for complete panelboard included in circuit list prices.

Circuit List Price

Breaker Frame Sizes	Ampere Cap.	Number Poles	List Price	Space Only List Price†
50-Ampere, 2-Pole (2X)	15	2	\$46.00	\$5.00
50-Ampere, 2-Pole (2X)	20	2	46.00	5.00
50-Ampere, 2-Pole (2X)	25	2	46.00	5.00
50-Ampere, 2-Pole (2X)	35	2	48.00	5.00
50-Ampere, 2-Pole (2X)	50	2	48.00	5.00
50-Ampere, 3-Pole (3X)	15	3	60.50	7.00
50-Ampere, 3-Pole (3X)	20	3	60.50	7.00
50-Ampere, 3-Pole (3X)	25	3	60.50	7.00
50-Ampere, 3-Pole (3X)	35	3	63.50	7.00
50-Ampere, 3-Pole (3X)	50	3	63.50	7.00
100-Ampere, 2-Pole (4X)	50*	2	80.00	8.00
100-Ampere, 2-Pole (4X)	70	2	81.50	8.00
100-Ampere, 2-Pole (4X)	90	2	83.50	8.00
100-Ampere, 2-Pole (4X)	100	2	84.00	8.00
100-Ampere, 3-Pole (6X)	50*	3	105.00	11.00
100-Ampere, 3-Pole (6X)	70	3	108.00	11.00
100-Ampere, 3-Pole (6X)	90	3	111.00	11.00
100-Ampere, 3-Pole (6X)	100	3	113.50	11.00
225-Ampere, 2-Pole (8X)	70**	2	146.00	14.00
225-Ampere, 2-Pole (8X)	90**	2	146.00	14.00
225-Ampere, 2-Pole (8X)	100**	2	146.00	14.00
225-Ampere, 2-Pole (8X)	125	2	148.00	14.00
225-Ampere, 2-Pole (8X)	150	2	151.00	14.00
225-Ampere, 2-Pole (8X)	175	2	154.00	14.00
225-Ampere, 2-Pole (8X)	200	2	156.50	14.00
225-Ampere, 2-Pole (8X)	225	2	159.00	14.00
225-Ampere, 3-Pole (12X)	70**	3	190.00	19.00
225-Ampere, 3-Pole (12X)	90**	3	190.00	19.00
225-Ampere, 3-Pole (12X)	100**	3	190.00	19.00
225-Ampere, 3-Pole (12X)	125	3	195.00	19.00
225-Ampere, 3-Pole (12X)	150	3	197.00	19.00
225-Ampere, 3-Pole (12X)	175	3	200.00	19.00
225-Ampere, 3-Pole (12X)	200	3	202.00	19.00
225-Ampere, 3-Pole (12X)	225	3	205.00	19.00
400-Ampere, 2-Pole (12X)	225***	2	360.00	27.00
400-Ampere, 2-Pole (12X)	250	2	372.00	27.00
400-Ampere, 2-Pole (12X)	325	2	384.00	27.00
400-Ampere, 2-Pole (12X)	400	2	395.00	27.00
400-Ampere, 3-Pole (12X)	225***	3	432.00	34.00
400-Ampere, 3-Pole (12X)	250	3	446.00	34.00
400-Ampere, 3-Pole (12X)	325	3	465.00	34.00
400-Ampere, 3-Pole (12X)	400	3	482.00	34.00
600-Ampere, 2-Pole (12X)	450	2	408.00	27.00
600-Ampere, 2-Pole (12X)	500	2	420.00	27.00
600-Ampere, 2-Pole (12X)	550	2	432.00	27.00
600-Ampere, 2-Pole (12X)	600	2	445.00	27.00
600-Ampere, 3-Pole (12X)	450	3	495.00	34.00
600-Ampere, 3-Pole (12X)	500	3	525.00	34.00
600-Ampere, 3-Pole (12X)	550	3	530.00	34.00
600-Ampere, 3-Pole (12X)	600	3	543.00	34.00

*This rating to be used only when circuit is later to be changed to either 70, 90, or 100 amperes.

**These ratings to be used only when circuit is later to be changed to a rating of 125 to 225 amperes.

***This rating to be used only when circuit is later to be changed to a rating of 250 to 600 amperes.

†Space only List Price is to be used when circuits do not evenly balance and also when space is to be left for future.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ CONVERTIBLE DISTRIBUTION PANELBOARDS

The Nofuz convertible distribution panelboard is designed to eliminate switches and fuses in capacities from 15 to 600 amperes inclusive. In addition to the general advantages of "De-ion" breakers the design of this panelboard incorporates the following important features, as follows:

1. Narrow type construction with full operating and protective features. In a panel 20 inches wide it is possible to provide circuit capacities from 15 to 600 amperes in 2 and 3 pole combinations which can be fully operated under load with perfect safety.
2. Convertibility—Uniform pole spacings and dimensions with standardized bus arrangement and interchangeable trip elements allow the maximum convertibility between different frame sizes and ampere combinations.

Construction

Breakers from 15 to 600 amperes are mounted on a panel 20 inches wide. 15 to 225-ampere capacities have a 5-inch gutter on the sides and 6½ inches at the end opposite main bus (usually top). Thus the cabinet width is only 30 inches. Allowing a generous gutter for the larger wires, the cabinet width for panelboards with 400-ampere breaker is slightly increased—the standard width being 35 inches. Similarly, panelboards with 600-ampere units have a standard cabinet width of 40 inches giving 9-inch gutter minimum.

The panel construction is of the sectionalized type. Thus it is possible to provide space in the cabinet for future additional circuits. These circuits can be easily added and connected in place without removing the panel from the cabinet. Also, since 100, 225, 400 and 600-ampere frames are equipped with removable trip units, desired changes in capacities on these frame sizes may be made without removing the unit.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ CONVERTIBLE DISTRIBUTION PANELBOARDS

The 50-ampere frames are furnished complete with either 15, 20, 25, 35 or 50-ampere calibrations. In addition, because of standardized breaker dimensions it is possible to interchange units of different poles or capacities.

There is a definite relationship between pole spacings and space requirements of the various ampere capacity breakers, as well as the neutral and main lug sections of the panel. Considering two and three-pole breakers, there are ten frame sizes, five for 2-pole breakers and five for 3-pole breakers. The 50 and 100-ampere frame sizes, either 2 or 3-pole, occupy only one-half the width of the panel, thus lending themselves to double branch construction, whereas the 225, 400 and 600-ampere frame sizes occupy the full width of the panel per breaker.

All breakers of the 50 and 100-ampere frame sizes readily lend themselves to interchangeability without the need for any change in bus connections. However, if a 225, 400 or 600-ampere frame is to be substituted for any 50 or 100-ampere frames, some minor bus changes are required.



Fig. 4—Panelboard Complete

Cabinets—Boxes, unless otherwise specified, will be furnished with blank end sections which can be drilled by the purchaser to meet his requirements. Fronts are fastened to the boxes by means of adjustable indicating trim clamps.

Before laying out a panel, all circuit capacities must be carefully checked for the following three requirements:

1. If circuits are to feed motors, the proper rating of branch circuit breaker should be selected from a motor application table.

2. For all circuits other than motor circuits, it is essential that the branch circuit wire size be known so that a breaker of the proper capacity is used and not one of a capacity larger than the wire size it is protecting.

3. The actual load on the circuit should be given full consideration, so that in case an extra heavy wire is being used to avoid voltage drop, a breaker larger than necessary to carry the load is not used. For instance, a No. 00 (150 amperes) wire might be used to avoid voltage drop when under ordinary circumstances a No. 1 wire would be satisfactory, since the actual load being carried is not over 100 amperes. In this case a 100-ampere breaker would be satisfactory as it would afford full protection to the wire being used, and at the same time be able to carry the load.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

LIGHTING PANELBOARDS AND CABINETS

Mains—125/250 volt, 3-wire solid neutral.

Branches—125-volt, 2-wire with *15-ampere; 125-volt, single-pole Nofuz circuit breakers.

Boxes—Code gauge galvanized sheet steel 4 inch gutters. All boxes are 20 inches wide, 5½ inches deep, inside dimensions (I.D.).

Fronts—Code gauge, full-finish, sheet steel, black finish, flush or surface type.



NAB-3-L



NAB-3-MB

Panel, Box, and Front				Box Only		
No.	Main	Wgt.,	List No.	List Price*	Style No.	Hght I.D., Inches
Cir.	Amp.	Lb.				
Safety Type NAB-3-L Single-Pole—Solid Neutral Main Lugs only						
4	50	75	NAB-304-L050	\$60.00	K-74550	17
6	50	86	NAB-306-L050	77.00	K-74551	20
8	50	95	NAB-308-L050	92.00	K-74551	20
10	50	101	NAB-310-L050	107.00	K-74552	23
12	100	105	NAB-312-L100	122.00	K-74552	23
14	100	112	NAB-314-L100	140.00	K-74553	26
16	100	120	NAB-316-L100	156.00	K-74553	26
18	100	127	NAB-318-L100	172.00	K-74554	29
20	100	135	NAB-320-L100	188.00	K-74554	29
22	100	142	NAB-322-L100	205.00	K-74555	32
24	100	150	NAB-324-L100	222.00	K-74555	32
26	100	155	NAB-326-L100	240.00	K-74556	35
28	100	160	NAB-328-L100	258.00	K-74556	35
30	100	179	NAB-330-L100	274.00	K-74557	38
32	100	180	NAB-332-L100	290.00	K-74557	38
34	200	200	NAB-334-L200	310.00	K-74559	44
36	200	215	NAB-336-L200	326.00	K-74559	44
38	200	222	NAB-338-L200	342.00	K-74560	47
40	200	230	NAB-340-L200	358.00	K-74560	47

*List Prices are based on supplying 15-ampere breakers. 20, 25 and 35-ampere breakers can be supplied at the same price except increased main busbar capacity may be required and should be added. Cost is extra.

For list price additions for special Features, see listing.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

LIST PRICE ADDITIONS TYPE NAB

List Price Additions for Increased Main Bus Capacity

(A) FOR LUGS ONLY IN THE MAINS

Type of Panelboard	50 Amp. to 100 Amp.	Inc. to Box Hgt.	50 Amp. to 200 Amp.	Inc. to Box Hgt.	100 Amp. to 200 Amp.	Inc. to Box Hgt.
NAB-3-L	\$4.00	None	\$8.00	None	\$5.00	None

(B) FOR CIRCUIT BREAKER IN MAINS

Type of Panelboard	50 Amp. to 100 Amp.	Inc. to Box Hgt.	50 Amp. to 200 Amp.	Inc. to Box Hgt.	100 Amp. to 200 Amp.	Inc. to Box Hgt.
NAB-3-MB	\$37.50	None	\$100.00	6	\$64.00	6

TYPE NAB

List Price Additions for Sub-Feeder Connections

(A) FOR FEED THROUGH LUG CONNECTIONS

Ampere Capacity	Two (2) Pole	Increase Panel Height	Three (3) Pole	Increase Box Height
50	\$2.00	None	\$3.00	None
100	3.00	None	4.00	None
200	4.00	None	6.00	None

When solid neutral type panelboards require feed through connections, double lugs will be furnished at main feed end.

(B) FOR NOFUZ AUTOMATIC CIRCUIT BREAKER SUB-FEEDS

Ampere Capacity	Two (2) Pole	Increase Panel Height
50	\$39.00	
100	72.00	Refer to Factory
200	132.00	

For 70 and 90-ampere capacities use 100-ampere price.

For 125, 150 and 175-ampere capacities use 200-ampere price.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

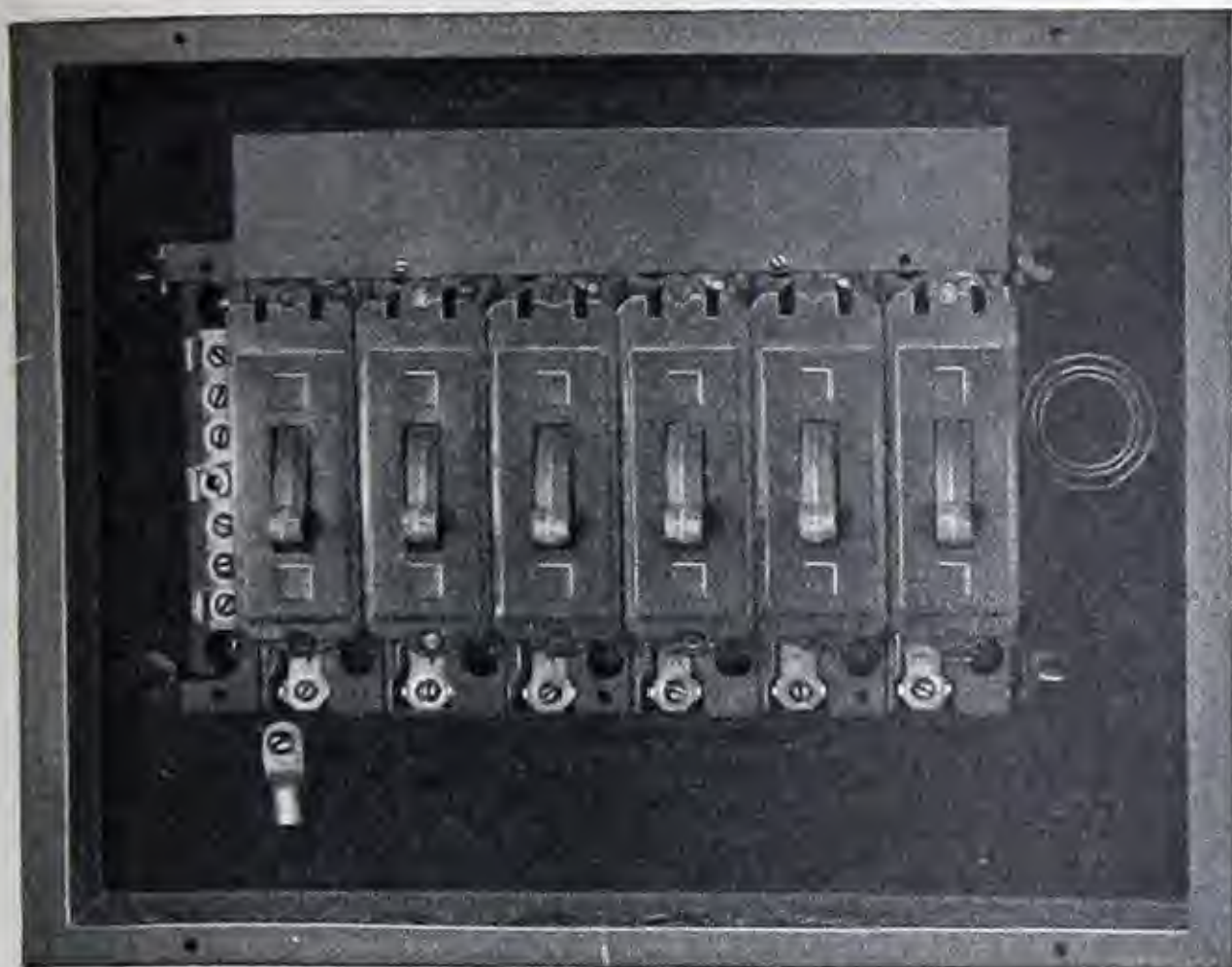
You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-Ion" Circuit Breaker Type

NOFUZ LOAD CENTRE



Pole Nofuz Load Centre, Cover Plate Removed—Bus Cover in Place

Box—The Nofuz Load Centre Box is of standard four-inch depth for mounting between ordinary house studding to come flush with the plaster. Ample knockouts for wiring and mounting are provided in all four sides and the back. The box size allows a generous wiring space all around the Flipons. The box has a baked black Japan finish.

Pan—The breaker pan or frame on to which the Flipons are mounted is held in position by four wing nuts, thus permitting the removal of the gang as a unit for use in wiring and allowing for alignment when being installed.

Bus and Insulating Cover—The line side bus is solid copper and to which is rivetted branch connectors. These connectors are securely fastened to the terminals by large washer head screws. On each line bus is attached a copper lug into which the line wires are soldered. The insulating cover is a piece of angle micarta which completely covers the bus and terminals.

Distinctive Features

Flipons can be reclosed by anyone as easily as a wall switch.

Quick make and quick break operation of Flipons eliminates trouble from improper opening or closing.

Time lag characteristics prevent unnecessary opening of the circuit.

The contacts cannot be held closed against an abnormal overload because the automatic mechanism operates independently of the handle.

The operating characteristics of the Flipon cannot be altered or the Flipon action blocked so as to prevent its opening when the wiring is endangered.

Nofuz Load Centres can be supplied for either two or three wire service.

Nofuz Load Centres can be mounted in the kitchen, the most convenient place in the home, to affect lower wiring costs through the saving in other materials and labor. Also, because they can be so conveniently located, restoration of service is more quickly accomplished.

	Flush		Surface		Box Dimensions		
	List	List	List	List	Wide	High	Deep
	Prefix No.	Price	Prefix No.				
2 Pole	20	\$22.50	21		8 $\frac{1}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
3 Pole	30	29.00	31		11 $\frac{1}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
4 Pole	40	36.00	41		11 $\frac{1}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
5 Pole	50	44.00	51		14 $\frac{1}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
6 Pole	60	51.00	61		14 $\frac{1}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
7 Pole	70	59.00	70		17 $\frac{7}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
8 Pole	80	66.50	80		17 $\frac{5}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$
10 Pole	100	87.00	100		20 $\frac{7}{8}$	11 $\frac{1}{4}$	4 $\frac{1}{16}$

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ LOAD CENTRE—Ordering Information—Example

To select a Nofuz Load Centre for an installation comprising the following circuits. Service 3 wire 125-250 volts A.C.

Circuit No. 1—

Electric Range 2 (WKL-50-SP) 50 Amperes No. 6 Wire

Circuit No. 2

Electric Water

Heater..... 2 (WKL-35-SP) 35 Amperes No. 8 Wire

Circuit No. 3—

Medium Duty

Appliances..... 1 (WKL-25-SP) 25 Amperes No. 10 Wire

Circuit No. 4—

Lighting..... 1 (WKL-15-SP) 15 Amperes No. 14 Wire

Total Poles 6

Under 6 Pole Combinations the above is found to be List No. 60-11 if flush type, or List No. 61-11 if surface type.

6 Pole List Price \$51.00

LOAD CENTRE COMBINATIONS		List		List	
Comb. No.	Breakers		Wire	Flush	Surface
	3 Pole				
1	Electric Range..... 2 (WKL-50-SP)	6	30-1	31-1	
	Lighting..... 1 (WKL-15-SP)	14			
2	Electric Range..... 2 (WKL-35-SP)	8	30-2	31-2	
	Lighting..... 1 (WKL-15-SP)	14			
3	Lighting..... 3 (WKL-15-SP)	14	30-3	31-3	
	4 Pole				
4	Range..... 2 (WKL-50-SP)	6	40-4	41-4	
	Grate, 110v..... 1 (WKL-25-SP)	10			
	Lighting..... 1 (WKL-15-SP)	14			
5	Range..... 2 (WKL-35-SP)	8	40-5	41-5	
	Grate, 110v..... 1 (WKL-25-SP)	10			
	Lighting..... 1 (WKL-15-SP)	14			
6	Grate, 220v..... 2 (WKL-25-SP)	10	40-6	41-6	
	Lighting..... 2 (WKL-15-SP)	14			
7	Lighting..... 4 (WKL-15-SP)	14	40-7	41-7	
	5 Pole				
8	Range..... 2 (WKL-50-SP)	6	50-8	51-8	
	Grate, 110v..... 1 (WKL-25-SP)	10			
	Lighting..... 1 (WKL-15-SP)	14			
9	Range..... 2 (WKL-35-SP)	8	50-9	51-9	
	Lighting..... 3 (WKL-15-SP)	14			
10	Lighting..... 5 (WKL-15-SP)	14	50-10	51-10	
	6 Pole				
11	Range..... 2 (WKL-50-SP)	6	60-11	61-11	
	Water Heater..... 2 (WKL-35-SP)	8			
	Grate, 110v..... 1 (WKL-25-SP)	10			
	Lighting..... 1 (WKL-15-SP)	14			
12	Range..... 2 (WKL-50-SP)	6	60-12	61-12	
	Grate, 220v..... 2 (WKL-25-SP)	10			
	Lighting..... 2 (WKL-15-SP)	14			
13	Range..... 2 (WKL-50-SP)	6	60-13	61-13	
	Lighting..... 4 (WKL-15-SP)	14			
14	Range..... 2 (WKL-35-SP)	8	60-14	61-14	
	Lighting..... 4 (WKL-15-SP)	14			
15	Lighting..... 6 (WKL-15-SP)	14	60-15	61-15	
	7 Pole				
16	Range..... 2 (WKL-50-SP)	6	70-16	71-16	
	Grate, 220v..... 2 (WKL-25-SP)	10			
	Lighting..... 3 (WKL-15-SP)	14			
17	Range..... 2 (WKL-35-SP)	8	70-17	71-17	
	Grate, 220v..... 2 (WKL-25-SP)	10			
	Lighting..... 3 (WKL-15-SP)	14			
18	Range..... 2 (WKL-35-SP)	8	70-18	70-18	
	Ironer..... 1 (WKL-25-SP)	10			
	Lighting..... 4 (WKL-15-SP)	14			
19	Lighting..... 7 (WKL-15-SP)	14	70-19	71-19	
	8 Pole				
20	Range..... 2 (WKL-50-SP)	6	80-20	81-20	
	Water Heater..... 2 (WKL-35-SP)	8			
	Grate, 220v..... 2 (WKL-25-SP)	10			
	Lighting..... 2 (WKL-15-SP)	14			
21	Range..... 2 (WKL-35-SP)	8	80-21	81-21	
	Grate, 220v..... 2 (WKL-25-SP)	10			
	Lighting..... 4 (WKL-15-SP)	14			
22	Lighting..... 8 (WKL-15-SP)	14	80-22	81-22	

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

Design Features—Continued

The main contacts in this 225-ampere, 600-volt frame size are of pure silver. There are also provided additional arcing contacts of silver-tungsten. This is a Tungsten alloy with distinctive arc-resisting and non-welding characteristics.

The movable contact arm is of rigid channel construction. The current is carried through a flexible shunt in the channel. On heavy over-current the one turn magnet, formed by the shunt and contact arm, increases the pressure on the contacts. This magnetic field maintains contact pressure and minimizes the tendency to force the main contacts apart. This also insures that when the breaker trips due to heavy loads the contacts will commence separation at or near zero frequency.

A top view shows the three terminal lugs in the square holes for front connection or box mounting. When rear connected these terminals are removed and the square openings closed by sliding fitted shutters into slots arranged for the purpose on the inside edges of the base. Threaded studs are then screwed into the inserts, moulded in the recessed base and provide rear-connection studs similar to those used on air circuit breakers. The inserts are recessed making it possible to bolt the breaker against a flat surface even though it is a conductor. They are threaded all the way through, either to receive the bolt on the inside which holds the tube terminal or the stud from the bottom. Removal of the terminal bolt allows the stud for rear connection to be screwed all the way in to the breaker bus. Four mounting bolt holes are provided at both top and bottom.

The 225-ampere trip unit is the same in principle as the 100-ampere trip unit, except that an auxiliary heater is used to heat the bimetal.

The 225-ampere frame is common for all applications. The frames are of the same size for both 230 volts a-c. 125/250 volts d-c. and 600 volts a-c. The only difference in the frames for these voltages is that the 230-volt frame employs the same type of arc quencher as used in the smaller frames, whereas the 600-volt frame has the Cold Cathode type of arc quencher.

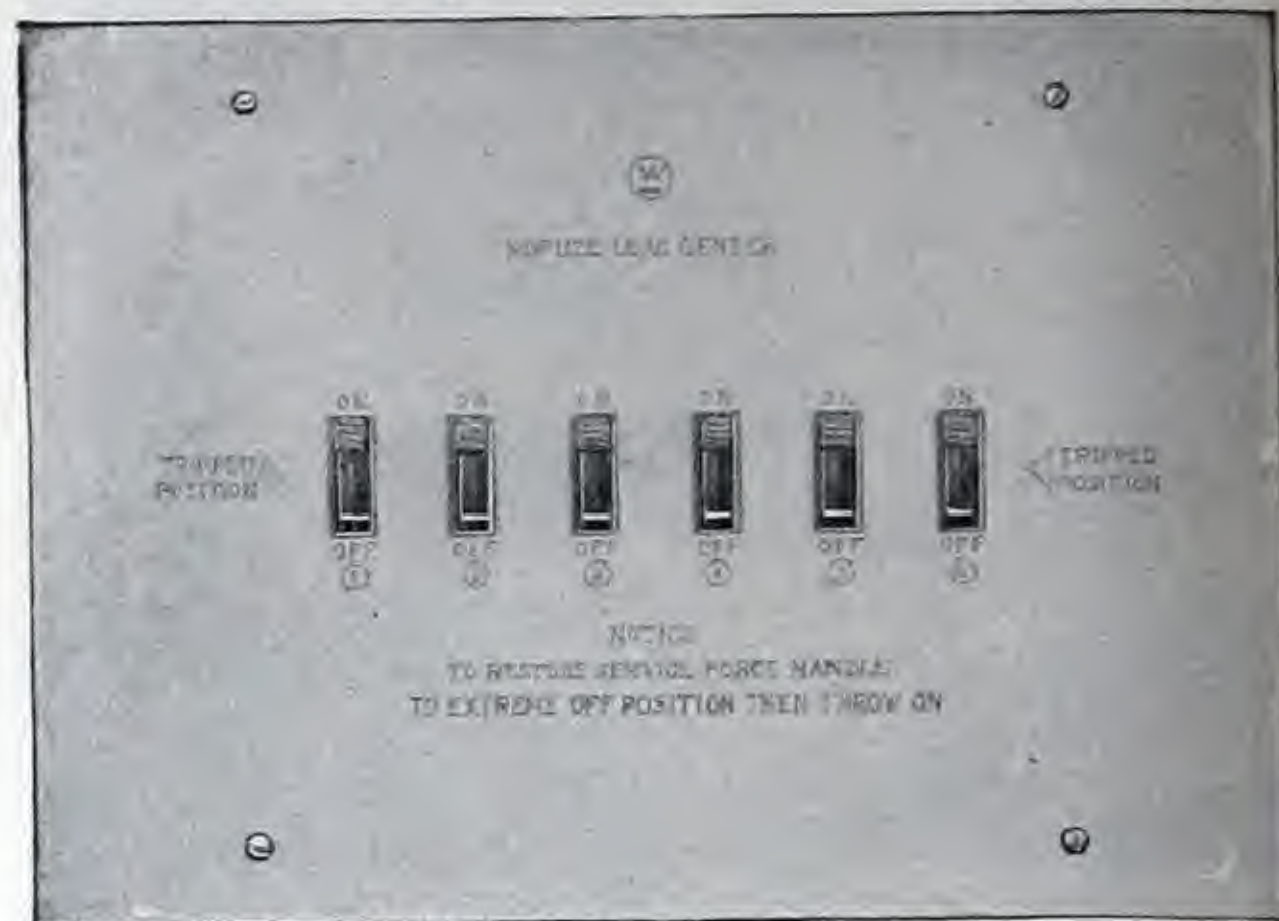
600-volt "De-ion" arc quenchers are used in the 225 and 600-ampere frames. For 600 volts a principle known as the Cold Cathode has been introduced. The "V" shaped conductor shown at the extreme left is insulated and arranged so that the power flowing through the arc from the stationary arcing tip must also pass up around and down through the centre of the plates, through the stud and out to the line.

The magnetic field set up in the chamber draws the arc into the centre where it rotates at high speed, the single arc being broken up by the plates into a series of short arcs. When the current passes through zero the arc does not re-establish.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

NOFUZ LOAD CENTRE

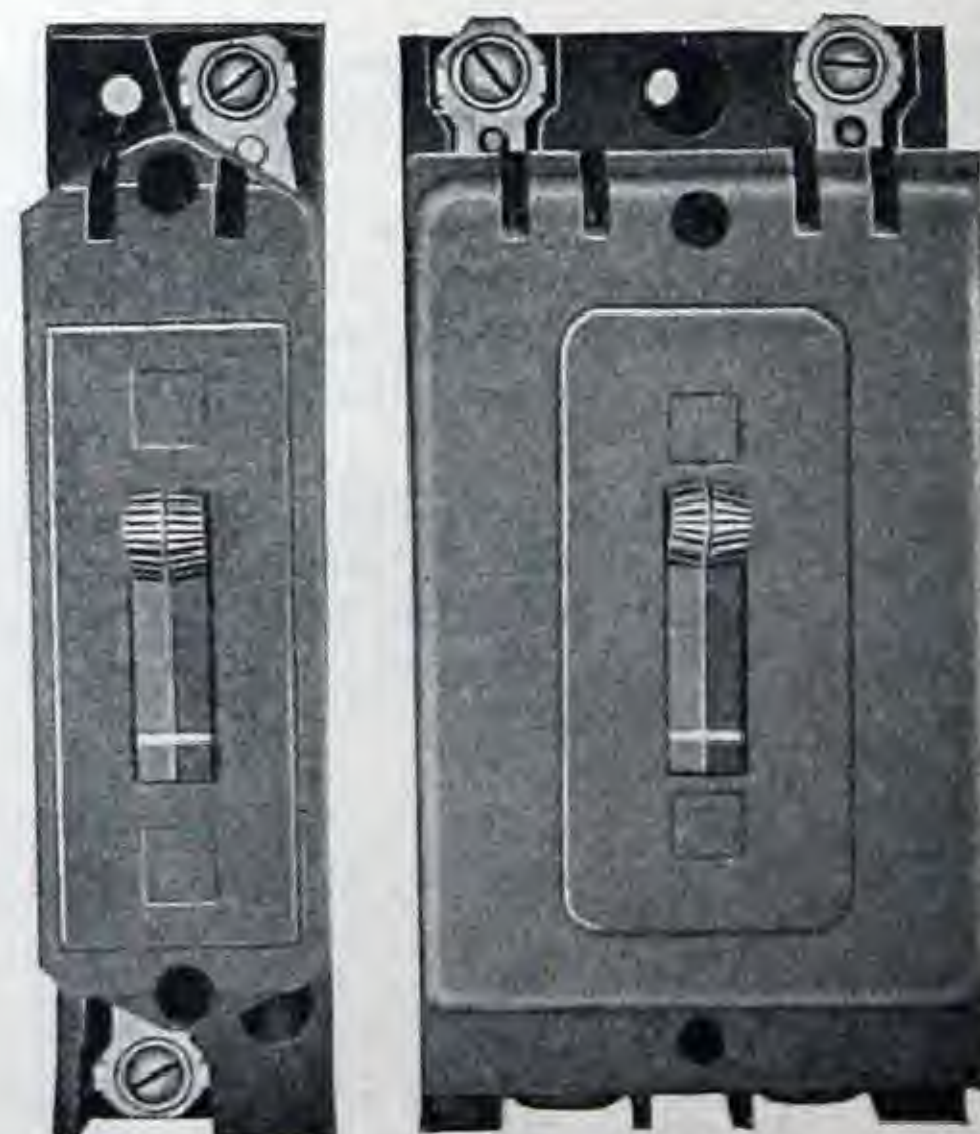


6-Pole Flush Type Nofuz Load Centre

The Nofuz Load Centre is a combination of a number of Circuit protection devices called "Flipons"—a flip of the button restores the circuit. "Flipons" are constructed to safely carry 15, 20, 25, 30, 35, 50 amperes of current. Their physical dimensions are the same and, in combination, a neat, compact arrangement is effected.

The Flipon

A low voltage branch circuit breaker for use in place of fuses, combines a switch and circuit protector, which can be operated as an ordinary "on" and "off" switch to control the circuit. In addition, there is built into it a trip mechanism which causes the switch to open if the current exceeds the maximum for which it has been set. As the current increases, the time of operation of the trip decreases, always protecting the wire with an adequate margin of safety. A short circuit causes it to open immediately. The breaker trips free of the handle, making it impossible to hold contacts in against an overload. If reclosed on a short circuit, the "Flipon" opens instantaneously without flame or excessive noise, and with perfect safety to the operator. High rupturing ability is secured through application of the "De-ion" Arc Quencher, built around the contacts.



Single Pole
Flipon

Double Pole
Flipon

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

DESIGN FEATURES—Continued

"De-Ion" Circuit Breakers

The double-pole "De-ion" breaker is manufactured in the same ratings as the single-pole, all dimensions being identical except that the width is twice as great, namely 3 inches in order to accommodate 2 poles. This breaker has a single handle and common trip. In other words the handle opens and closes both contacts simultaneously. The two bimetals, which in this design are placed at right angles to the bimetals in the single-pole are at the bottom of the base. An overload on either bimetal causes it to deflect as in the single-pole, but it operates through an intermediate latch so that overload on either bimetal will trip out both contacts through common trip.

The 50-ampere frame industrial breaker has the same operating mechanism as the lighting panelboard and Flipon breakers. However, its bimetals are arranged differently since they must be adaptable to two and three-pole mechanisms. The operating handles are larger since this design will be used primarily for individual operation.

These 50-ampere frame circuit breakers are completely enclosed and sealed so that changes in calibration can only be made by changing the entire breaker.

In the previous breakers the bimetal and contacts were both housed in the same housing. In the 100-ampere frame, and other sizes, the contacts are enclosed in a separate compartment from the bimetals. The bimetals, with their separate base and cover comprise a removable trip unit, and may be interchanged with trip units of other calibration within the limits of this frame size which are 50, 70, 90 and 100 amperes.

A feature incorporated in this and the larger size trip units is an instantaneous magnetic trip which does not come into play unless the overcurrent is from eight to ten times the rated capacity.

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AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

DESIGN FEATURES—Continued

This magnetic trip unit is energized by the current flowing through the bimetal, and acts as a one turn magnet. The magnetic force developed attracts an auxiliary tripping bar which operates on the same latch as the common bar of the bimetals.

Aside from the difference in the trip elements, the general operating features of the 100-ampere frame are the same as the 50-ampere frame.

Studs added to the industrial front connected breakers make them suitable for rear-connected switchboard and other like applications.

Quick-Make and Quick-Break Toggle—The quick-make and quick-break mechanism is the toggle type which exerts heavy over centre "force" pressure on the contacts when closed and affords high speed operation "on" and "off." The moving contacts are provided with spring shock reducers and are self aligning. When the mechanism is automatically opened on overload the contacts immediately start to open as the latch releases, thus simultaneously creating arc voltage and decreasing the opening time.

"De-ion" Arc Quencher—In the 230-volt a-c. 125/250-volt d-c. frames, high rupturing ability is secured by application of a "De-ion" Arc Quencher. It consists of a series of slotted steel plates mounted between supports of insulating material and is so placed that the slots in the steel plates are directly above the contacts. Therefore, the moving contact must pass through the slotted quencher plates as it leaves the lower or fixed contact. As this action takes place the arc formed is cooled and de-ionized by the successive plates and the air gaps between the plates. The arc to be dissipated is drawn out into an insulated expansion chamber formed by the base and cover which entirely isolates it from the contacts and mechanism. There is therefore no disturbance in the breaker proper. In quickly absorbing and dissipating the arcing heat the "De-ion" Arc Quencher adds greatly to the life of the contacts.

Contacts—The contacts are all non-welding, non-corrodible metals. On the 15 to 50 and 50 to 100-ampere frames, fixed contacts consist of special homogeneous mass of silver-graphite, the same metals that have been used successfully with Flipons and Panelboard breakers for the past several years. All contacts are butt type. Tests prove that the contact resistance of this construction decreases with use because of the gradual meshing of surface irregularities due to heavy pressure and quick make. The graphite ingredient acts as an anti-fluxing agent to prevent welding.

PANELBOARDS

General

PANELBOARDS (Lighting)

Amalgamated Electric Type ANTP.
 Amalgamated Electric Type ANP.
 Amalgamated Electric Type AP.
 Amalgamated Electric NOFUZ Load Centres.
 Amalgamated Electric NOFUZ Lighting Panelboards.
 Amalgamated Electric UTIL.
 Frank Adam (Various Types).
 Bull Dog (Various Types).

PANELBOARDS—Distribution (Power and Light)

Amalgamated Electric DISTRIBUFUZ.
 Amalgamated Electric NOFUZ.
 Amalgamated Electric PULFUZ.
 Bull Dog Electric SAFtoFUSE.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

DISTINCTIVE FEATURES

1. The inverse-time-limit feature of the bimetallic trip elements prevents unnecessary tripping on momentary overloads, but provides instantaneous tripping on short circuits.
2. The device is entirely enclosed so as to be easily and safely operated by anyone.
3. The circuit breaker mechanism is independent of the influence of gravity and will operate in any position.
4. The operating toggle mechanism is quick-make and quick-break.
5. The contacts are non-welding under any and all conditions.
6. It is impossible to hold the circuit breaker closed against abnormal overload or short circuit—it is trip-free of the handle.
8. It is impossible to block the mechanism to prevent it from opening on overloads.
8. The tripping mechanisms are protected and sealed to prevent unauthorized changing of calibration.
9. The ampere ratings and calibrations conform to commercial wire sizes.
10. The circuit breakers employ the "DE-ION" principle of arc extinction.
11. Automatic operation of the circuit breaker is distinguished from the manual operation by the position of the handle. Upon automatic tripping, the handle assumes a position midway between the manual "on" and "off" positions. Resetting of the breaker is quickly accomplished by moving the handle to the extreme off position. It is then ready for immediate closing.
12. Multi-pole circuit breakers are provided with a common trip to prevent single phase operation in connected motors. Accordingly, the overloading of any one pole will trip all poles.
13. Space requirements are kept to a minimum. The circuit breakers occupy a space in no case greater than the past equivalent capacity switch and fuse and, in most cases, considerably less.
14. Uniformity of pole spacings and over-all dimensions permit flexibility and interchangeability between different capacities.
15. The devices will open a short circuit without undue flash or noise.
16. The breakers are corrosion resisting.
17. The "DE-ION" circuit breakers are approved and listed by the Hydro Electric Power Commission of Ontario, Canadian Engineering Standards Association, and meet the requirements of, and are listed by the Underwriters' Laboratories.

AMALGAMATED ELECTRIC NOFUZ PANELBOARDS

"De-ion" Circuit Breaker Type

DESIGN FEATURES

"DE-ION" Circuit Breakers



Fig. 1—Single-Pole
NAB Breaker for
Lighting Panels



Fig. 2—Double-Pole
NAB Breaker for
Lighting Panels

The single-pole "De-ion" circuit breaker represents the first unit which was developed. The basic feature of the design is manual operation as a quick-make and quick-break toggle switch combined with automatic overload protection, accomplished by means of a bimetal in series with the contacts. This deflects away from the latch on over-current, thus tripping the breaker. The release of this latch automatically causes the contact to assume the "off" position and this contact as it opens passes through the de-ionizing plates just above the fixed contact.

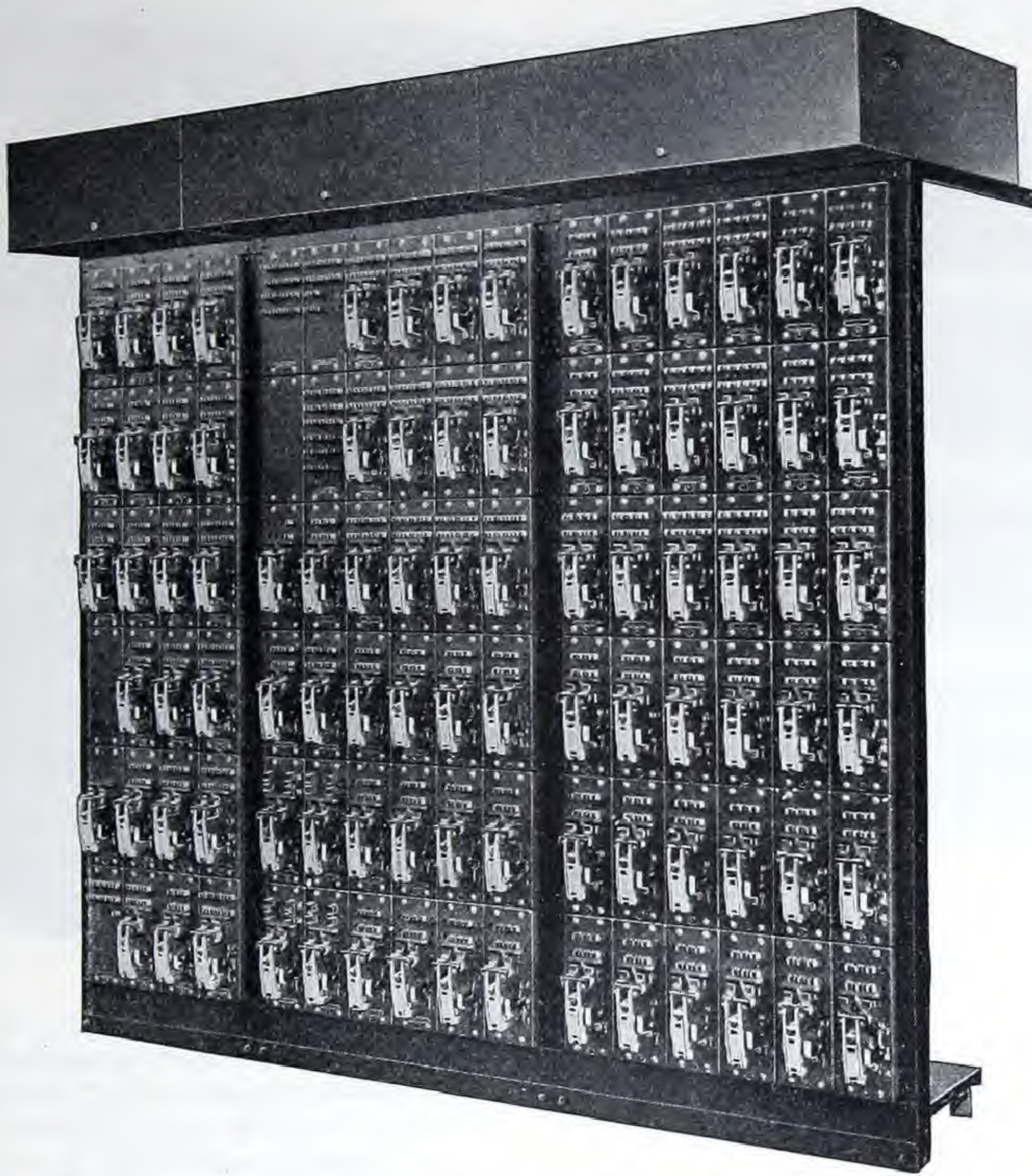
After this action occurs, the handle assumes an intermediate tripped position giving visual indication of the condition of circuit affected. If the handle is then carried to the extreme "off" position the bimetal will re-engage the latch and the circuit may be restored by moving the handle to the "on" position. If overcurrent persists, the breaker will trip out, even though the handle be held in the "on" position.

The contacts are of a special silver composition which has proved to be non-welding at all current values. All metal parts are corrosion resisting. The cover encloses both the mechanism and the bimetal. The two screws holding this cover to the base are deeply recessed and waxed in, making it impossible to tamper with the mechanism without visible evidence.

These are 15 to 50 amp. breakers 230 volt A.C.

FRANK ADAM—MAJOR SWITCHBOARDS

REMOTE CONTROLLED SWITCHBOARD



The Remote Controlled Switch

A Typical Remote Controlled Switchboard of the Major System

The general design of the remote controlled switchboard of the Major System is illustrated on this page. The general practice is to subdivide the switchboard into several panels of remote controlled switches, each panel having six horizontal rows of switches and not more than six vertical rows.

The framework of the remote controlled switchboard is constructed of heavy upright and horizontal angle irons securely riveted, welded or bolted together, and supported on the floor by channel or angle iron base.

REMOTE CONTROLLED SWITCH

The remote controlled switch was specially designed to meet the peculiar requirements of the Major System, because in the last few years we have had an ever-increasing demand for a greater number of subdivisions in the control of the illumination and special effects for both the stage and the auditorium.

The switch is mounted on a moulded asbestos base. It has a magnet specially designed with tremendous magnetic force and very little current consumption. The magnetic pole pieces are flexible and make a perfect contact, which eliminates the greater part of the noise usually associated with electromagnetic contactor type switches.

The main current contacts are double break, with moulded carriers between the pole pieces, and auxiliary make and

break carbon contacts. The main contacts are flexible and have a long wiping and cleaning movement that assures good contact, and eliminates burning and heating.

The contactor arm is balanced to always remain open when the coil is not energized. All parts are interchangeable and readily accessible for maintenance or replacement.

Each switch is furnished with a 30-ampere single pole disconnecting knife switch and a 30-ampere fuse terminal connection for protecting the coil.

Two to five 30-ampere fuse terminal connections are provided at the top of the switch, depending upon the number of branch circuits. One fuse is used for the pilot light circuit, and the others for the branch circuits.

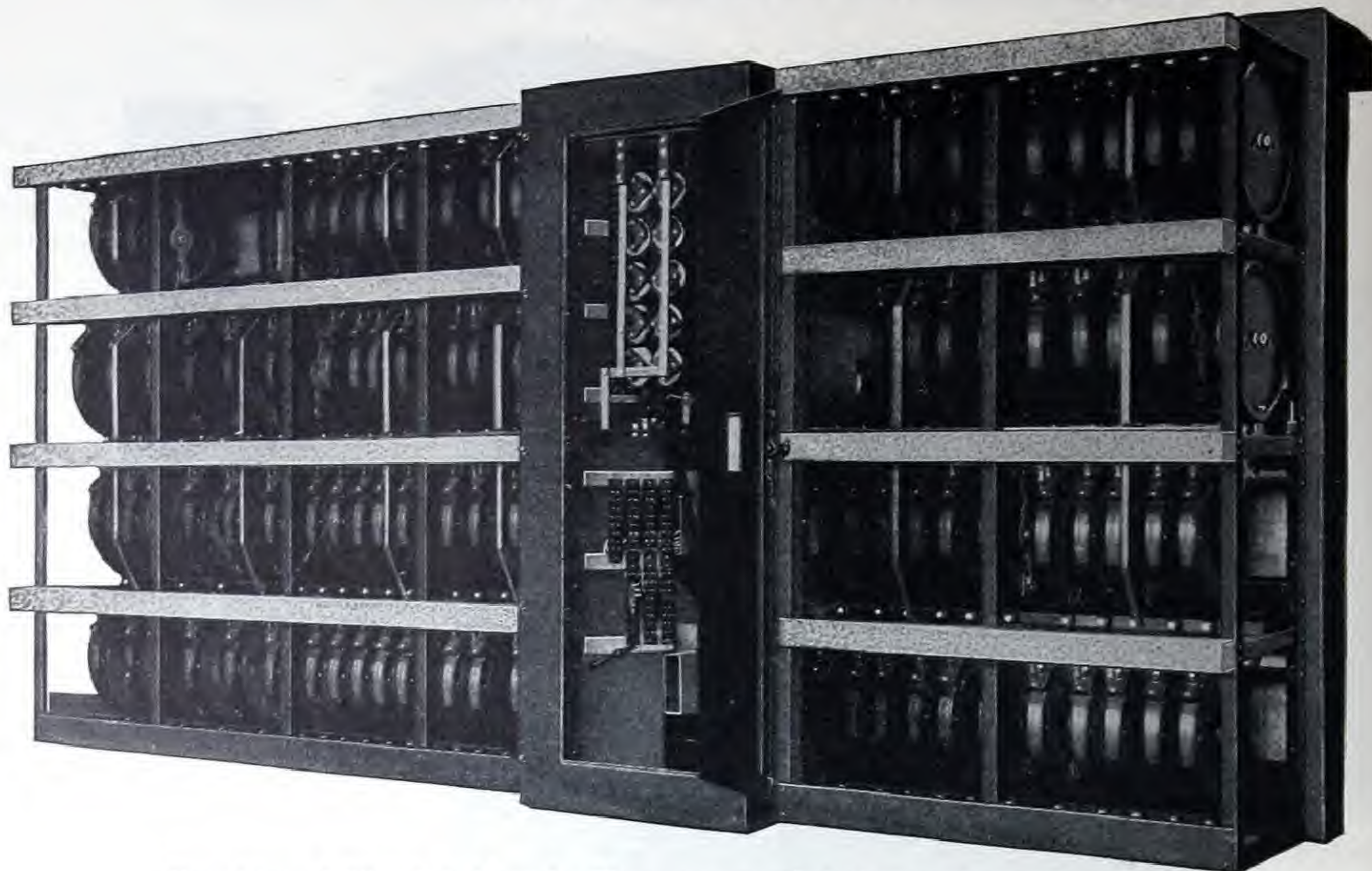
A second remote controlled switch is used when the control unit capacity exceeds the capacity of a single dimmer plate. Each switch is connected to a separate polarity of the feeder system.

When the control unit requires more than nine branch circuits the fuse terminal connections are omitted from the switch base and are mounted on a separate base alongside of the switch.

The remote controlled switch is listed as 100 ampere capacity at 125 volts D. C. or A. C. in the list of approved fittings, by the Underwriters' Laboratories.

FRANK ADAM—MAJOR SWITCHBOARDS

STAGE PILOT SWITCHBOARD



Rear View of Pilot Switchboard. The arrangement of dimmer plates, wire channels and terminals in rear of Master Control Section are shown.

The switch control plate is equipped with a jeweled pilot lamp at the top and a name plate at the bottom, and switches in accordance with particular type of control specified.

The rehearsal switch handles, pilot switch handles, circuit switch handles and handles of the dimmer levers are all finished in Duco colour corresponding with the colour row of the control unit.

In every case the dimmer control is directly under the switch control and is furnished with a special designed handle and a slot closing device which closes the opening necessary for operating the dimmer lever. This greatly improves the appearance of the front of the switchboard.

MASTER CONTROL SECTION

The Master Control Section brings all of the master switching and dimming controls within the reach of one stage electrician standing at one position.

INTERNAL WIRING

All of the internal wiring of the stage switchboard is done with high-grade fireproof wire. This includes the wiring between the pre-selective and All-Master switches, and also from the pilot lamp and the switch of each control unit to their respective wire terminal connections.

DIMMERS

The Major System is designed to furnish Cutler-Hammer make of dimmer plates.

These dimmer plates are supported in the dimmer bank at three points, only one of which is bolted, thus making them readily removable in case of change of capacity, or for repairs.

The Control Unit dimmer lever is equipped with a slot closer and has a special designed handle, which, by sight and touch, immediately indicates to the operator whether the dimmer can be controlled individually, or is interlocked for colour master control. The dimmer lever mechanism is specially designed so the lever handle need only be turned to engage it in either the individual control or the interlocked control position. It is not necessary to pull on the dimmer handle.

Dimmer controls are designed for efficient operation and can be interlocked for colour master or slow motion wheel drive control. The colour master levers are counter-balanced. Dimmer shaft bearings are designed to require no oiling.

A special clutch attachment can be furnished between the slow motion wheel drive and the stage or house colour master dimmer controls. This feature permits any one of the colour master dimmer levers to be used as a master to operate more than one colour when faster changes are required than can be had with the wheel drive.

The stage dimmer section can also be equipped for cross control of dimming in the same colour (two shaft drive) at an additional price.

The wire terminal connections are in a readily accessible position so the contractor's workmen can bring the house wires from either top or bottom to the proper terminal connection on the wire terminal strips.

Wire terminal connections are provided for all pilot light wires, pilot switch wires and the toggle switch wires.

The space behind the master control section is entirely enclosed and the contractor should either tape or lace up the wires into cables and arrange them in a workmanlike manner behind the wire terminal strips.

FRANK ADAM—MAJOR SWITCHBOARDS

FRANK ADAM—MAJOR SWITCHBOARDS

STAGE PILOT SWITCHBOARD



The Control Unit of the DeLuxe Type Show Control

A typical Master Control Section

Location

The stage switchboard should always be placed at what known as the "Prompt" side of the stage, that is, where the stage Manager holds his position, and, as a rule, where the scenery rigging controls are placed. The "Prompt" side in the majority of installations is the right side of the proscenium arch when facing the auditorium from the stage. It may also be on the left side, depending upon the stage design.

Sections

The fundamental design of the stage switchboard for a Major System provides a separate section for the stage, another section for the master controls for both switching and dimming, and a third section for the house (auditorium). This arrangement, however, can be varied to meet the particular requirements of the specification.

The usual practice is to put the stage section of the switchboard at the point nearest to the stage opening, next the master control section and then the house section at the other end. The master control section thus may be at considerable distance from the proscenium opening.

It is an acknowledged fact that the stage electrician should be as near as possible to the proscenium opening to follow the action on the stage. We have designed and furnished a number of stage switchboards with the Master Control section at the end of the switchboard nearest the proscenium opening. This feature is a big advantage at very small additional cost.

Control Unit

The Control Unit as recognized in the Major System represents a subdivision of the illumination for either the house (auditorium) or the stage.

The Control Unit of the Major System Stage Switchboard consists of two 4 x 10½ inch rust-proofed, beveled steel plates with egg shell finish black Duco, or any other finish specified. The upper plate is used for the switch control and the lower plate for the dimmer control.

Electrically operated, remote control switching provides unlimited control of switching and insures quick and positive action for make and break of the circuits.

Compact Design

The Major System Stage Switchboard and Dimmer Bank are designed as one compact, composite piece of apparatus containing both the switching and dimming apparatus in one complete unit. It is built complete in our factory and shipped as one complete piece of apparatus to the location on the stage for which it is designed.

The Major System of Pre-Selective Remote Control is of necessity built in two complete switchboard units, one being the Stage Switchboard, which is a pilot switching control in combination with the dimmer bank, and the other is the Remote Controlled Switchboard, which actually controls the illumination by electrically operated remote controlled switches.

The stage switchboard should be placed on the stage level, and the remote controlled switchboard should be placed as nearly as possible directly under the stage pilot switchboard.

Types of Control

The Major System is made in several types of control to meet the varying demand of the small school, theatre or fraternal building or the de luxe type of photoplay and production theatre, and the extreme capacities required in municipal convention auditoriums.

The De Luxe Type is a Duplex control with Ten All-Master Show Control switches which will take care of as many as 55 changes in show illumination, and also a Rehearsal Control Switch feature. This type—after the pre-selection of the illumination required—can be operated for an entire show continuously from beginning to end for days, weeks and months without additional pre-selecting of any switches. With the rehearsal control switch, rehearsal and special illumination can be taken care of without changing the pre-selective switches for the show control.

This Duplex control is non-interfering, that is, regardless of whether the pre-selective switches are in the "off" or "on" position, the rehearsal switch control can be operated.

The Five All-Master Type is also Duplex control with rehearsal control switch. This can be used for pre-selecting a show that does not require more than fifteen changes of illumination, with the rehearsal switch control for rehearsals and special demand.

When more than fifteen separate changes are necessary for the show control, the illumination can be pre-selected for five scenes on the five All-Master switches. The rehearsal switch control can then be used for the simpler show controls or in combination with the five All-Master switches which are used for the scenes with the most complicated illumination.

The All-Master Type can also be modified to include three or four All-Master switches.

The Full Remote Control Type has each Control Unit equipped with a pilot switch controlling a remote controlled switch. Any or all Control Units can be accumulated and be set up onto color master pilot switches, and then the color masters, in turn, set up on stage and house masters. This type, however, is only recommended for dance halls, and for the auditorium of a small or medium sized theatre.

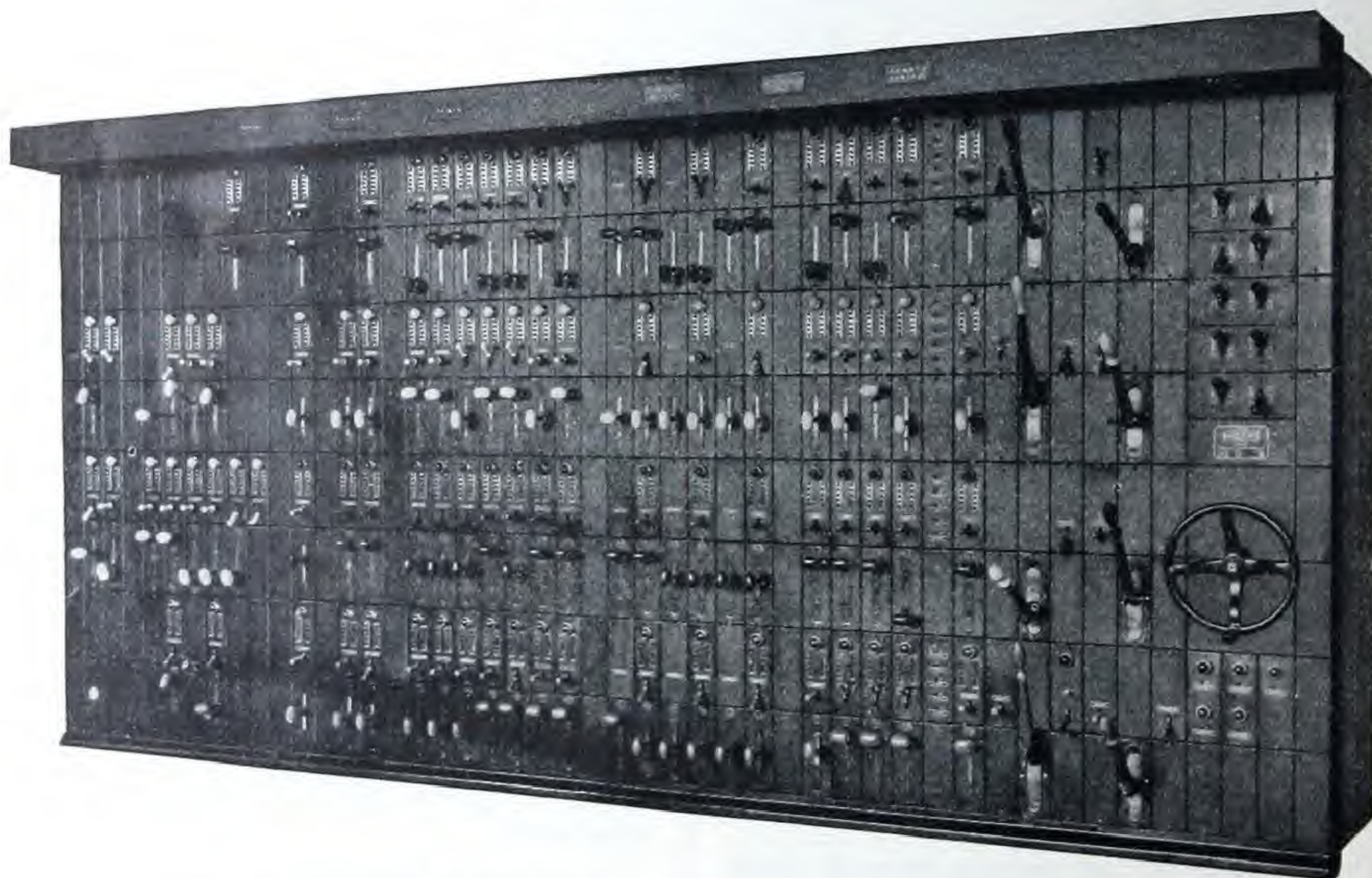
The Modified Type is intended only for small schools and theatres, where the majority of Control Units have a demand of less than 30-ampere capacity. This permits the pre-selection of any Control Unit in each colour or a combination of colours on stage or house master. It is also equipped with an auxiliary control which can control any Control Unit not already set up on the regular colour master control.

FRANK ADAM — MAJOR SWITCHBOARDS

MAJOR F A SYSTEM
OF LIGHTING CONTROL

The principle of remote control of switching had been employed to a limited extent for the control of theatre lighting several years prior to the installation of the first Major stage switchboard. This type of control was only used where the space on the stage was entirely too small for a manually operated switchboard. About ten years ago Mr. Roscoe E. Major, a lighting engineer with practical experience as a theatre electrician, developed "Pre-Selective" remote control. This is the fundamental principle of the Major System to-day.

With the aid of the engineering staff and the manufacturing facilities of the Frank Adam Electric Company, the Major idea of pre-selective remote control was developed to its present-day pre-eminence in the field of stage lighting control apparatus. It is the De Luxe type of stage switchboard control apparatus.



A Pilot Switchboard of a De Luxe Type Major Show Control System. The Master Control Section is at the right end of the Pilot Switchboard.

Advantages of Remote Control

With remote control of switching, not only is the fire hazard which accompanies arcing and burning of contacts of large capacity switches removed from the stage, but also the running of the large conductors required for the heavy currents.

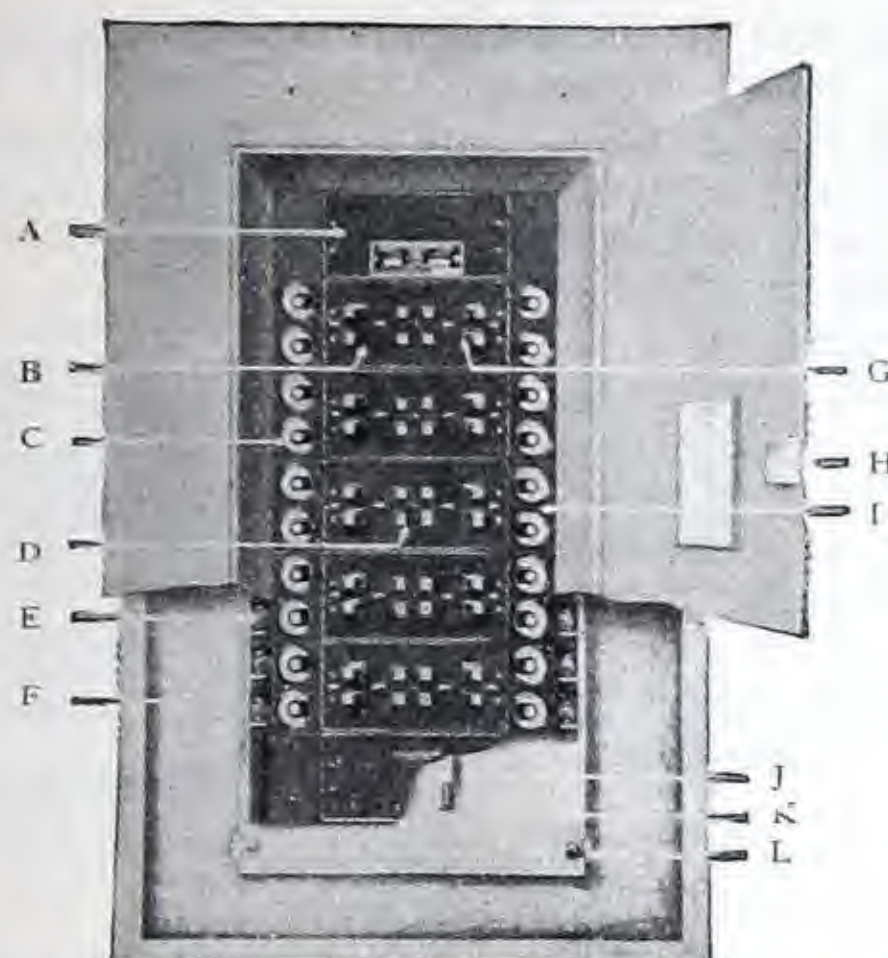
The volume of electric current used in the modern up-to-date theatre (enough to supply a small town with light), and the required number of sub-divisions of control (Control Units) make it impossible to build a manually operated stage switchboard to fit the limited space available for it on the stage.

AMALGAMATED ELECTRIC PANELBOARDS

Type ANTP

100% Canadian Made

FEATURES



Sectional View

- A—Removable Bakelite Plate Over Neutral Terminals.
- B—Amalgamated Electric 30 Amp., 250 Volt S.P. Tumbler Switch with Bakelite Handle.
- C—Plug Fuse Receptacle with slot for testing.
- D—Branch Circuit Number.
- E—Branch Circuit Wire Terminal.
- F—Four-inch Wiring Gutter at sides, top and bottom.
- G—Bakelite Switch Cover Plate.
- H—Lever Type Lock.
- I—Bakelite Switch and Plug Fuse Receptacle Base.
- J—Main Busbar and Terminal Lug.
- K—One-piece Galvanized steel mounting back.
- L—Four mounting slots to facilitate installation.

AMALGAMATED ELECTRIC PANELBOARDS

Type ANTP

100% Canadian Made

In the development of the Amalgamated Electric ANTP Panelboard careful and extended thought has been given by designers and factory men of long and varied experience in this class of work, who are familiar with the user's and installer's actual requirements.

The ANTP Panelboard has been ruggedly designed for long and reliable service under severe conditions, and is an entirely Made in Canada product.

Applications

The ANTP Panelboard is a double-branch panelboard, designed for the control and protection of 2 wire single fuse 125 volt lighting circuits where the system feeding the panelboard is either single phase 3 wire grounded neutral or 3 phase 4 wire grounded neutral.

Branch circuit protection is the single plug fuse type and branch circuit control the single pole 30 ampere 250 volt heavy duty tumbler switch.

Prices on ANTP Panelboards for 3 phase 4 wire grounded neutral systems can be obtained on application.

Where branch circuits require two fuse protection, or cartridge fuses, etc., are required in the branch circuits, refer to other types shown on the following pages.

Panelboard Sections

The sections of the ANTP Panelboard are made of brown Bakelite and are the narrow type, thereby making it possible to use narrow width cabinets. There are a minimum number of parts, yet all parts can be replaced from the front of the panelboard. Notches are moulded in the Bakelite for the testing of each plug fuse.

The Bakelite switch cover plate has a stippled finish face, which gives the assembled panelboard an attractive appearance. Switch cover plates are readily removed for replacing branch circuit switches. The branch circuit numbers, which are black letters on a white field, are protected by a fully transparent material and are mounted opposite each switch behind openings in the switch cover plate.

Branch Circuit Switches

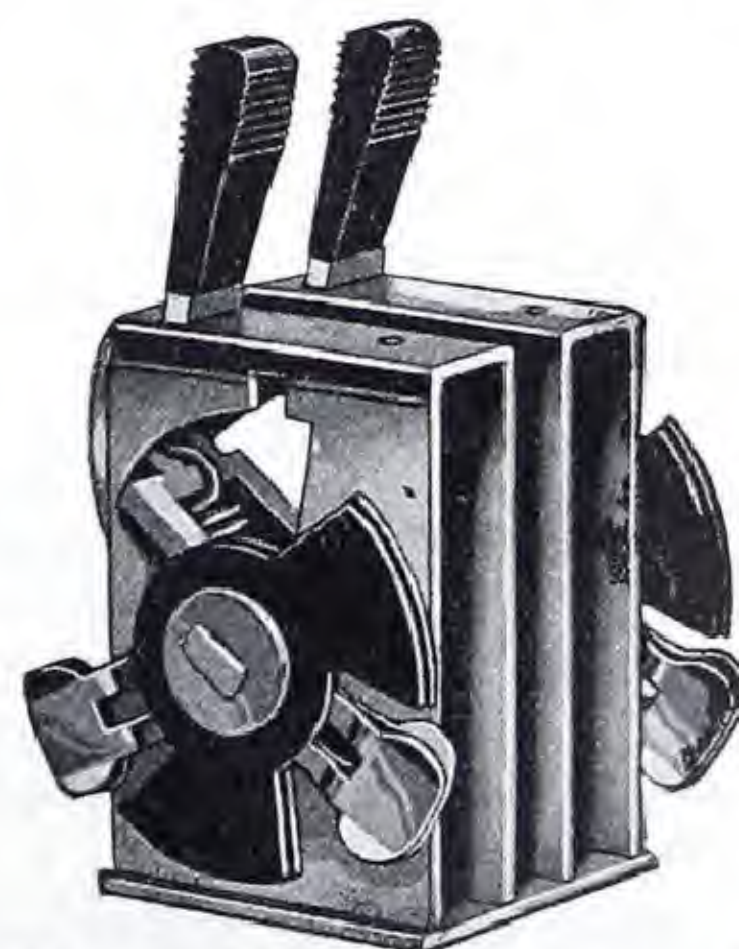
The branch circuit switches are the single pole tumbler type, of full 30 ampere 250 volt capacity, and are of our own manufacture. They are assembled in units of two.

The switch frames are grounded to the panel mounting back by the two screws which hold the two branch circuit switches to the combination switch and fuse receptacle unit.

These tumbler switches are of the quick make and quick double break type. The switches, which are of heavy construction, can be operated with ease, and consist of a very small number of parts, thereby assuring uninterrupted service.

The switch blades are the laminated type, made of phosphor spring bronze and have asbestos base Bakelite arc snuffers. Each switch has a moulded Bakelite handle and has all steel parts rust-proofed.

The main busbars are fastened directly to the stationary switch contacts on the line side of each switch unit, but these contacts can be removed for replacement if found necessary. Likewise, the stationary switch contacts on the load side of each switch unit are fastened directly to the centre contacts of the fuse receptacles, and these switch contacts can be removed for replacement if found necessary.



30 amp., 250 volt Amalgamated Electric Tumbler Switches used in ANTP Panelboards

AMALGAMATED ELECTRIC PANELBOARDS

Type ANTP

100% Canadian Made

Copper Parts

All current carrying parts are made of 98 per cent pure hard drawn copper, and branch circuit parts are of such section as to give not less than 30 ampere capacity. Good contact between the various copper parts is assured by large contact surfaces and by the parts being rigidly held in place in such a manner as to prevent turning.

Neutral Connections

A marked advancement has been made in the accessibility of the neutral terminal connection bar. The neutral terminal connection bar in the ANTP Panelboard is located under a removable Bakelite plate similar to the switch cover plates. This cover plate can be readily taken off for testing purposes without removing the cabinet trim.

The terminal bar is designed so that connections can be easily made to it, so that there is no crowding of branch circuit wires and so that the branch circuit numbers can be readily seen after all the connections are made.

Mounting Back

The ANTP Panelboard sections are mounted on one-piece galvanized steel mounting backs, which extend the full width of the sections. Four mounting slots are provided in each mounting back to permit them being readily fitted over the support studs in the cabinet tubs without removing the nuts and washers on both sides of the panelboard from these studs. These slots are of such size as to allow for plumbing of the panelboard, should the tub or box be installed out of alignment.

Panelboard and Cabinet

Because of their narrow width, ANTP Panelboards can be mounted in locations where space is at a premium, such as on columns. Their narrow width, together with their high-grade design, material and workmanship, makes them unobtrusive in any surroundings. The tub or box is 19 inches wide inside and approximately 19½ inches wide outside. The flush type trim is 20¾ inches wide, and the surface type trim is 19½ inches wide.

Three types of main connections are provided, namely, main cable lugs only, "main fuse connection" and main fusible Brush Contact Switch. These different types of main connections are ordinarily provided at the bottom of panelboards, but will be supplied at the top of panelboards on request.

In the main cable lugs only type, the lugs are mounted under a removable Bakelite cover plate at the bottom of the panelboard, the neutral terminal connection bar being similarly mounted at the top of the panelboard.

The "main fuse connection" is a fuse disconnecting device and is of the dead front safety type. It is a combination switch and fuse unit and the fuses are disconnected for replacement.

The main fusible Brush Contact Switch is a safety type double break, quick break brush contact type of switch with the main fuses located under a separate door, so interlocked with the switch operating handle that it can only be opened when the switch is in the "off" position.

ANTP Panelboards can be supplied with "through-feed" mains or can be supplied with "subfeeder" circuits having Safety Fuse units or fusible Brush Contact Switches. See listing hereinafter.

AMALGAMATED ELECTRIC PANELBOARDS

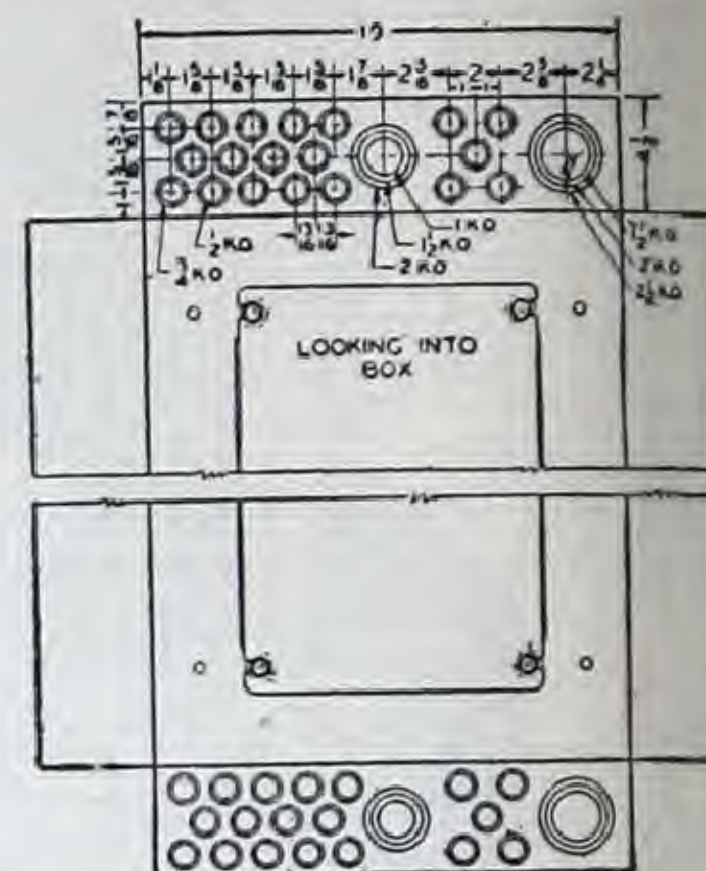
Type ANTP

100% Canadian Made

Tubs or Boxes

Tubs or boxes are of code gauge galvanized steel with 4 inch wiring gutters. For increased wiring gutters over 4 inches an additional charge will be made.

The illustration at the right gives the arrangement, sizes and number of knockouts provided in ANTP Panelboard tubs. There is a sufficient number and proper layout of knockouts for the average installation. By the use of tubs with this standard layout of knockouts the electrical contractor will be saved the time and expense of making up special drilling templates for each tub. We carry a stock of these tubs with this standard layout of knockouts in our various warehouses throughout Canada ready for immediate shipment.



Standard Knockouts in ANTP
Panelboard Boxes.

Each tub has provided in it four heavy support studs, upon which the panelboard is mounted. These support studs are provided with nuts and washers for fastening purposes, as well as with special adjusting nuts for leveling the panelboard in the tub.

Trims

The steel trims are made from a single piece of code gauge, cold rolled, full pickled sheet steel. They are supplied in either the "single-door" type or the "door-in-door" type.

The "single-door" type is entirely dead front and has no live metal parts exposed. The "door-in-door" type should be used where the switches are required accessible for operation, while it is desired to have the fuses under lock and key to prevent theft or misplacement.

Doors up to and including 48 inches in height are provided with a lever type lock with two keys. Doors over 48 inches in height are provided with a vault handle, shoot bolts and a lever lock with two keys. Locks are mounted on subplates attached to the inside of the doors so that they can be removed for replacement.

Trims are fastened to the tubs or boxes with adjustable trim clamps so as to provide for centering and plumbing the trim in case the tub is installed out of alignment.

Trims are furnished in flush or surface types. The type of trim should be specified when ordering. If type of trim is not specified, flush type trims will be supplied.

The standard finish of the steel trims for ANTP Panelboards is one coat of filler and one coat of grey lacquer. Other colours of lacquer will be furnished when specified on order.

Single Branch Panelboards

Where panelboards of the ANTP type are required for mounting in extremely narrow locations, we are in a position to supply SANTP Panelboards, which are the single branch type and possess the same features as the ANTP Panelboards described in this bulletin. The SANTP Panelboards have much narrower cabinets. Prices and dimension data will be furnished on request.

AMALGAMATED ELECTRIC PANELBOARDS

100% Canadian Made

ONE FUSE

ANTP3 Safety Type Panelboards and Cabinets.
Panel—Made of sections of brown Bakelite.
Branches—30 Amp., 250-V. S.P. Tumbler Switches with N.E.C. Plug Fuse Connection.
Box—Code Thickness Galvanized Steel, 4-inch Gutter Type.
Front—Code Thickness Steel, Grey Lacquer Finish. Flush or Surface.

Width 19½"

Combination of Panelboard,
Box and Front

Branches	Mains	Height	List Number	Price	Approx. Weight
Main Cable Lugs Only (ANTP3L)					
Depth 4½"					
4	30	16	ANTP304L	\$ 34.00	37
8	60	19	ANTP308L	40.00	44
12	60	22	ANTP312L	50.00	51
16	100	28	ANTP316L	74.00	65
20	100	31	ANTP320L	84.00	72
24	100	34	ANTP324L	94.00	79
28	100	40	ANTP328L	104.00	94
32	100	43	ANTP332L	114.00	100
36	200	46	ANTP336L	140.00	170
40	200	49	ANTP340L	150.00	180

Main Fuse Connections, Solid Neutral (ANTP3F)

* 4	30	22	ANTP304F	\$ 46.00	70
* 8	60	25	ANTP308F	58.00	80
* 12	60	28	ANTP312F	70.00	90
†16	100	40	ANTP316F	90.00	115
†20	100	43	ANTP320F	102.00	125
†24	100	46	ANTP324F	114.00	160
†28	100	52	ANTP328F	126.00	185
†32	100	55	ANTP332F	138.00	197
†36	200	61	ANTP336F	166.00	225
†40	200	64	ANTP340F	178.00	255

Brush Type Fusible Main Switch,
Solid Neutral (ANTP3BSF)

Depth 4½"					
4	30	31	ANTP304BSF	\$64.00	93
8	60	34	ANTP308BSF	74.00	103
12	60	37	ANTP312BSF	86.00	113
16	100	43	ANTP316BSF	110.00	160
20	100	46	ANTP320BSF	122.00	172
24	100	49	ANTP324BSF	134.00	183
28	100	55	ANTP328BSF	146.00	207
32	100	58	ANTP332BSF	158.00	220
36	200	67	ANTP336BSF	206.00	283
40	200	70	ANTP340BSF	218.00	297

Dimensions given are for outside of box.

ANTP4 Panelboards with 3 phase 4 wire mains—prices, dimensions and weights on request.

ANTP3D Safety Type Panelboards and Cabinets.

Main Cable Lugs Only (ANTP3LD)

Depth 4½"					
4	30	19	ANTP304LD	\$ 50.00	42
8	60	22	ANTP308LD	60.00	50
12	60	25	ANTP312LD	70.00	57
16	100	28	ANTP316LD	86.00	65
20	100	31	ANTP320LD	96.00	72
24	100	34	ANTP324LD	106.00	79
28	100	40	ANTP328LD	116.00	94
32	100	43	ANTP332LD	126.00	100
36	200	46	ANTP336LD	152.00	170
40	200	49	ANTP340LD	162.00	180

Main Fuse Connections, Solid Neutral (ANTP3FD)

* 4	30	22	ANTP304FD	\$ 62.00	70
* 8	60	25	ANTP308FD	74.00	80
* 12	60	28	ANTP312FD	86.00	90
†16	100	40	ANTP316FD	102.00	115
†20	100	43	ANTP320FD	114.00	125
†24	100	46	ANTP324FD	126.00	160
†28	100	52	ANTP328FD	138.00	185
†32	100	55	ANTP332FD	150.00	197
†36	200	61	ANTP336FD	178.00	225
†40	200	64	ANTP340FD	190.00	255

Brush Type Fusible Main Switch,
Solid Neutral (ANTP3BSFD)

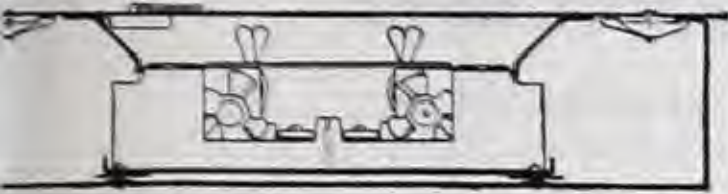
Depth 4½"					
4	30	31	ANTP304BSFD	\$ 80.00	93
8	60	34	ANTP308BSFD	90.00	103
12	60	37	ANTP312BSFD	102.00	113
16	100	43	ANTP316BSFD	122.00	160
20	100	46	ANTP320BSFD	134.00	172
24	100	49	ANTP324BSFD	146.00	183
28	100	55	ANTP328BSFD	158.00	207
32	100	58	ANTP332BSFD	170.00	220
36	200	67	ANTP336BSFD	218.00	283
40	200	70	ANTP340BSFD	230.00	297

Dimensions given are for outside of box.

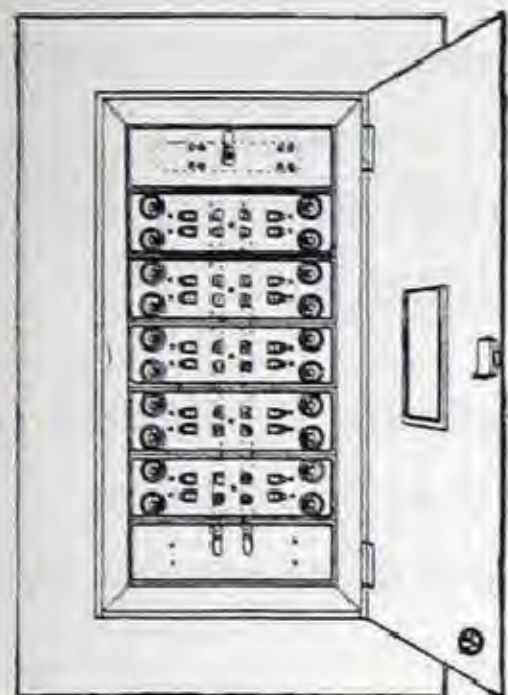
ANTP4D Panelboards with 3 phase 4 wire mains—prices, dimensions and weights on request.

*4½" deep. †6½" deep. ‡7" deep.

Single Door Construction

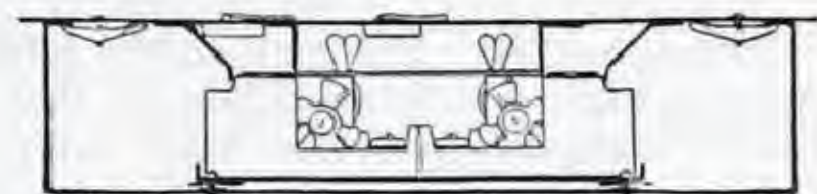


Mains: 125-250 V. 3 Wire
Capacity: 1928 Code per Branch
Branches: 125 V. 2 Wire

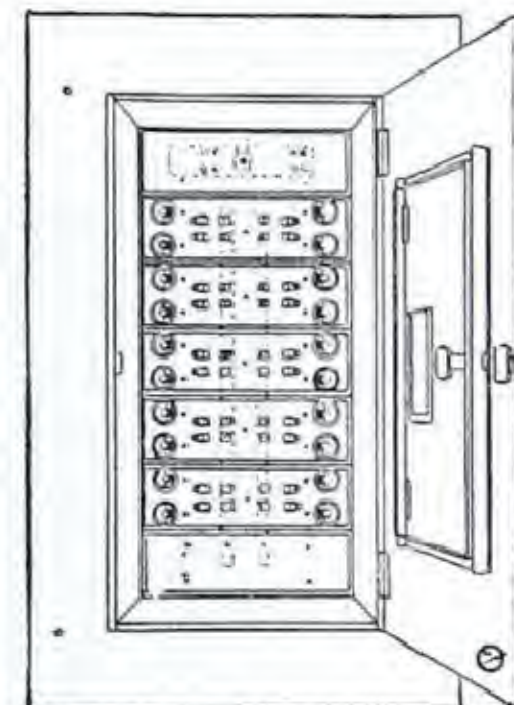


ANTP3L

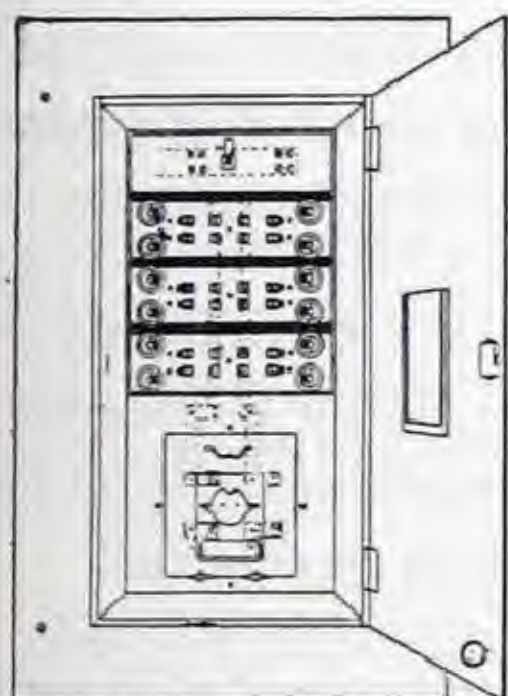
Door in Door Construction



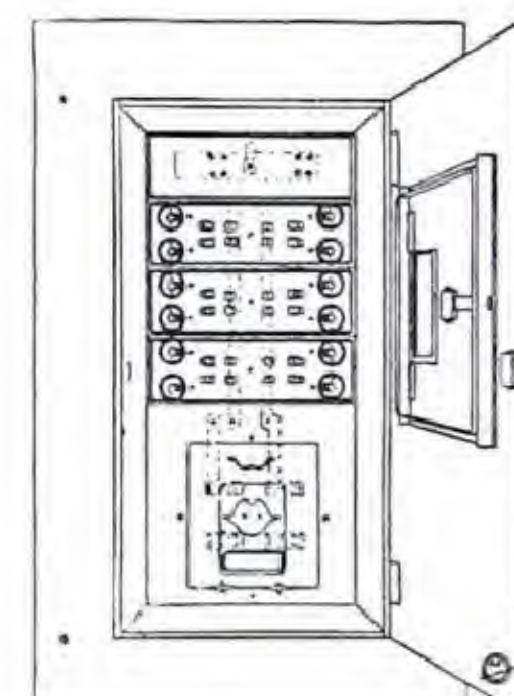
Mains: 125-250 V. 3 Wire
Capacity: 1928 Code per Branch
Branches: 125V. 2 Wire



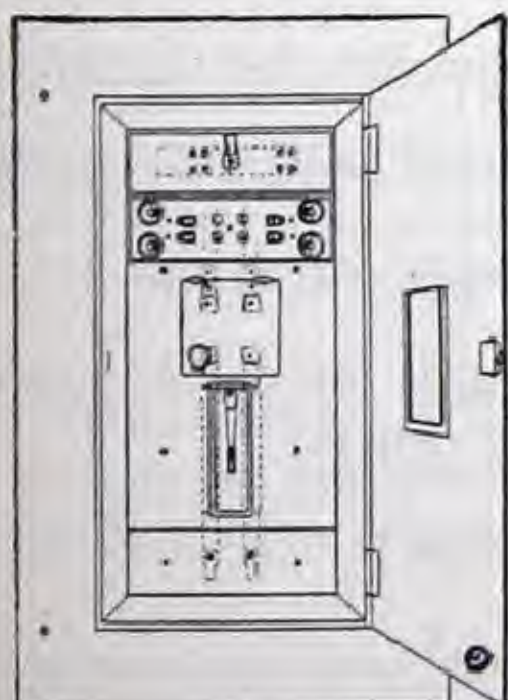
ANTP3LD



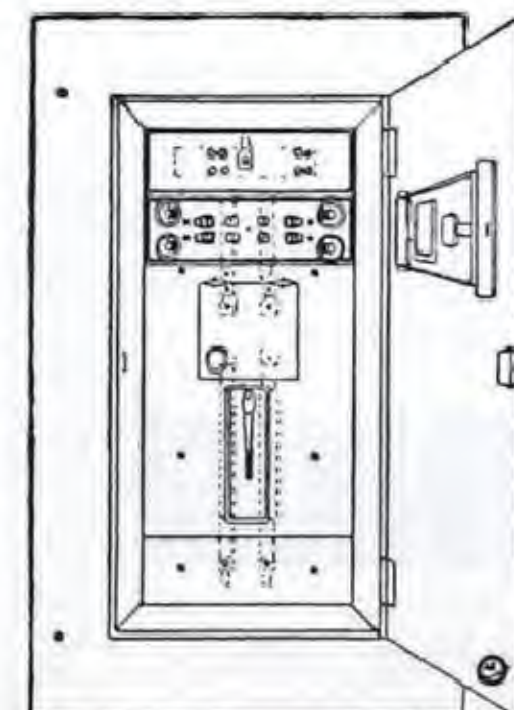
ANTP3F



ANTP3FD



ANTP3BSF



ANTP3BSFD

AMALGAMATED ELECTRIC PANELBOARDS

Type ANP and AP

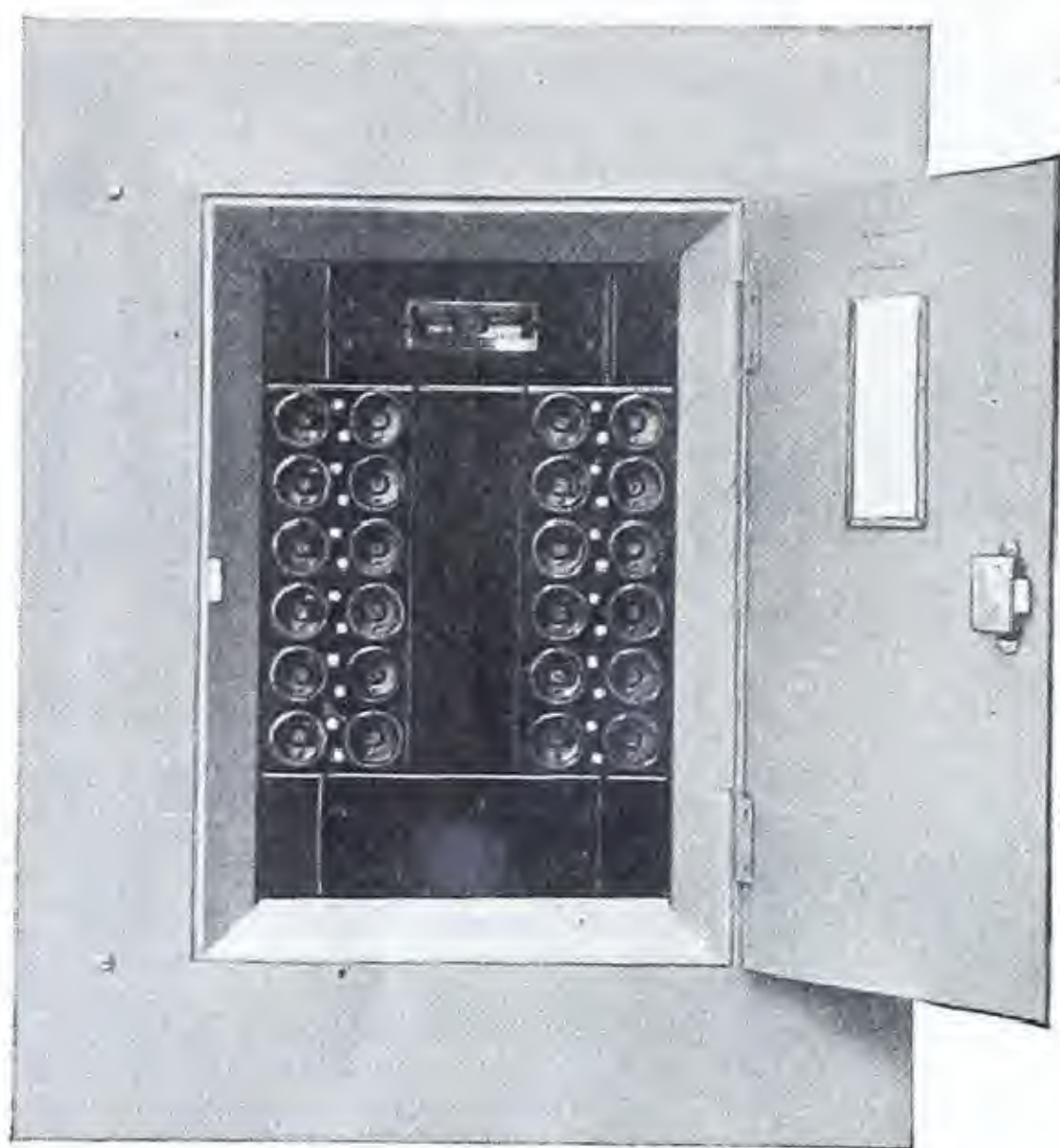
100% Canadian Made

Amalgamated Electric ANP and AP Panelboards serve as companions to Amalgamated Electric ANTP Panelboards. They possess the same high qualities of design, materials, workmanship and appearance to be found in Amalgamated Electric ANTP Panelboards and likewise are entirely MADE IN CANADA.

Applications

ANP and AP Panelboards are safety type panelboards and are designed for the protection of 2 wire 125 volt lighting circuits. Branch circuit protection is the plug fuse type.

ANP Panelboards have single fuse branch circuits and are for use where the system feeding the panelboard is either single phase 2 or 3 wire grounded neutral or 3 phase 4 wire grounded neutral.



Type AN2P3

AP Panelboards have 2 fuse branch circuits and are for use where the system feeding the panelboard is 2 or 3 wire with ungrounded neutral.

These panelboards are each subdivided into two types, namely, ANP3, AN2P3 and AP3, A2P3. Types ANP3 and AP3 are single row double branch panelboards with 3 inch wiring gutters at sides, top and bottom of cabinets. Type ANP3 Panelboards are made with branch circuits up to and including thirty-two circuits, while type AP3 Panelboards are made with branch circuits up to and including twenty circuits. These single row types of panelboards are ordinarily supplied with terminal lugs only in mains, due to their narrow width.

Types AN2P3 and A2P3 Panelboards are two row double branch panelboards with 4-inch wiring gutters at sides, top and bottom of cabinets and with centre vertical wiring gutter between rows of branch circuit units. These panelboards can be supplied with terminal lugs only in mains, with safety type fuse disconnecting device in mains, or with fusible brush contact switch in mains.

Details of Construction

Panel sections of ANP and AP Panelboards are made of brown Bakelite with notches moulded in them for the testing of each plug fuse.



Plug Fuse Section
(Front View)
Showing neat and
compact arrange-
ment.



Plug Fuse Section
(Side View)
Showing extra ven-
tilation openings
and saving in depth

AMALGAMATED ELECTRIC PANELBOARDS

Type ANP and AP

100% Canadian Made

The numbering of the branch circuits is accomplished by means of aluminum inserts with stamped figures.

Current carrying parts are made of 98 per cent pure hard drawn copper, and their number has been reduced to a minimum. All parts are of heavy construction with large contact surfaces rigidly held in place, thereby assuring against heating.

Like the ANTP Panelboard these panelboards are made with their neutral terminal connection bars accessible by removing the cover plate over the terminal bar without the necessity of removing the trim, thus obviating the possibility of marring the surface of a finished wall.

Connections can be readily made to the neutral terminal bar and it is so designed that there is no crowding of branch circuit wires and the branch circuit numbers can be readily seen after all connections are made.

The panel sections are mounted on one piece galvanized steel mounting backs, which extend the full width of the sections. Four mounting slots are provided in each mounting back to permit them being readily fitted over the support studs in the cabinet tubs without removing the nuts and washers on both sides of the panelboard from these studs. Slots are of such size as to allow for plumbing the panelboard, should the tub or box be installed out of alignment.

The narrow width of ANP and AP Panelboards and their attractive appearance makes them ideally suitable for mounting in any location. They are especially suitable for mounting where space is at a premium, such as on columns.

Tubs or boxes are of code gauge galvanized steel with wiring gutters as given above under "Applications."

Prices on the following special panelboards on request:— (A2P or AN2P types only will be supplied).

- (1) For use on 3 phase 4 wire grounded neutral systems.
- (2) For use on 3 phase 3 wire ungrounded neutral systems.
- (3) With 3 wire 2 fuse grounded neutral branch circuits.
- (4) A2P 2 row type Panelboards for use on 2 wire D.C.
- (5) A2P 2 row type Panelboards for 2 wire single phase systems with ungrounded neutral.
- (6) With "through-feed" mains.†
- (7) With "subfeeder" circuits.†

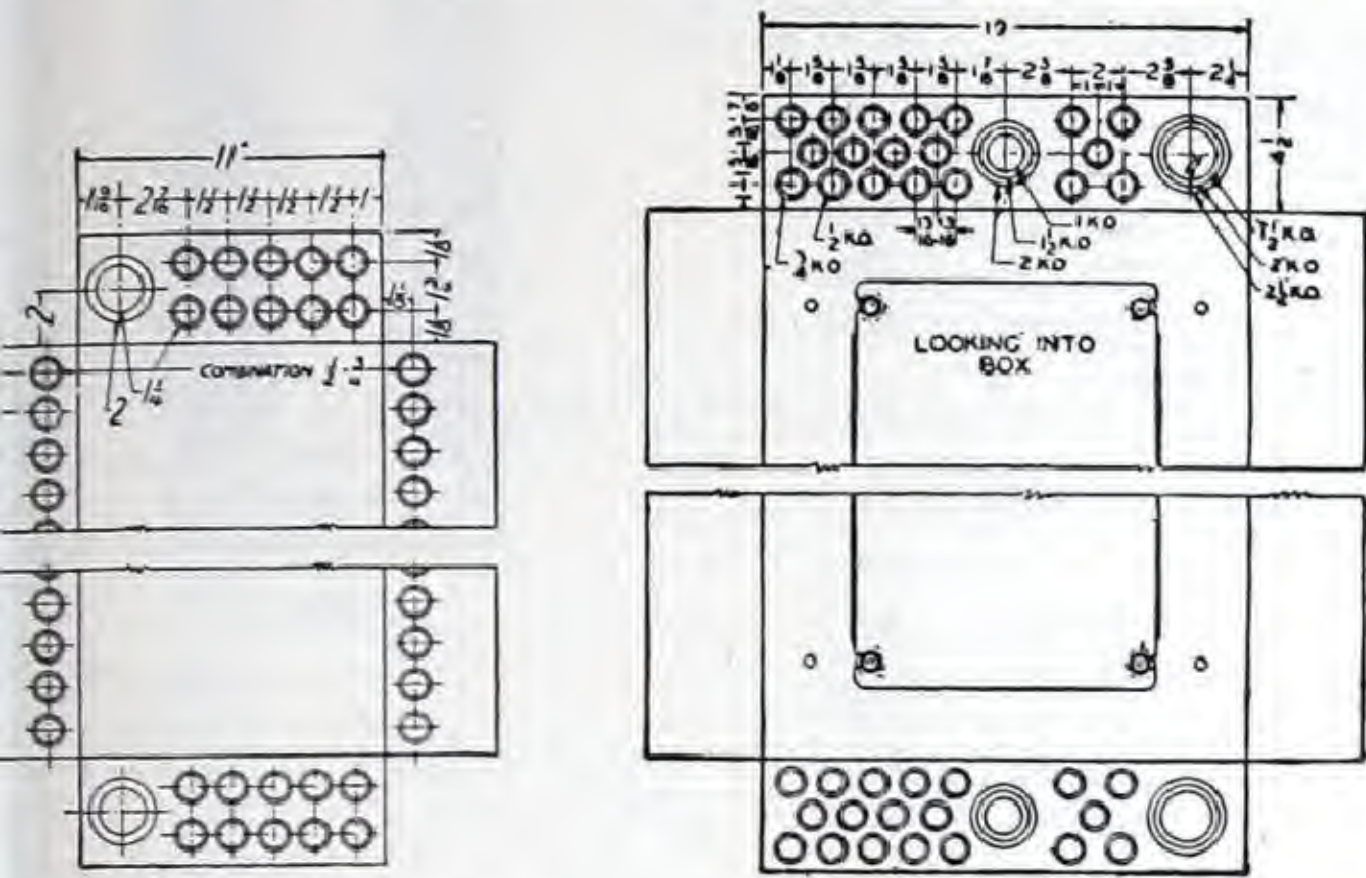
†For additions for increased mains, "subfeeder" circuits etc., see listing hereinafter.

AMALGAMATED ELECTRIC
PANELBOARDS

Type ANP and AP

100% Canadian Made

Increased wiring gutters will be supplied at an additional charge. The illustrations on this page give the arrangement, size and number of knockouts provided in ANP3, AP3, AN2P3 and A2P3 Panelboards. Sufficient number and proper layout of knockouts is provided for the average installation. By the use of these tubs with these standard



Types ANP3 and AP3

Types AN2P3 and A2P3

Standard Arrangements of Knockouts

Layouts of knockouts the electrical contractor will be saved time and expense of making up special drilling templates for each tub. A stock of tubs with these standard layouts of knockouts is carried in our Toronto factory ready for immediate shipment.

Each tub has provided in it four heavy support studs upon which the panelboard is mounted. Support studs are provided with nuts and washers for fastening purposes as well as with special adjusting nuts for leveling the panelboard in place.

The trims are made from a single piece of code gauge, cold rolled, full pickled sheet steel, and are of the "single row" type. A serviceable and pleasing appearing ring type door lift catch is provided for the doors of the single row panelboards, and a lock of similar construction with 2 keys for the doors of the 2 row panelboards. Doors over 48 inches height are also supplied with a vault handle and shoot bolts.

Trims are fastened to the tubs or boxes with adjustable clamps so as to provide for centering and plumbing the panelboard in case the tub is installed out of alignment. When trims are properly in place no live metal parts are exposed.

Trims are furnished in flush or surface types. The type of trim should be specified when ordering. If type of trim is not specified, flush type trims will be supplied.

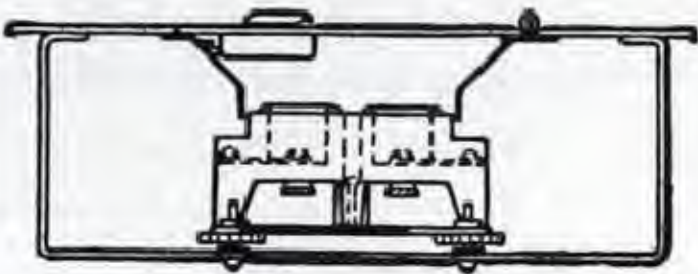
The standard finish of the steel trims for these panelboards is one coat of filler and one coat of grey lacquer. Other finishes of lacquer will be furnished at an increased cost when specified on order.

AMALGAMATED ELECTRIC
PANELBOARDS

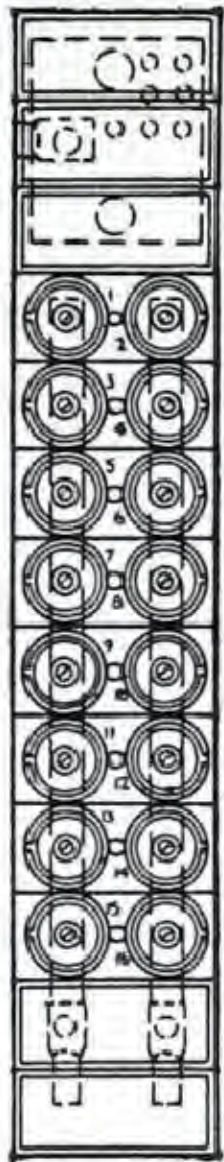
100% Canadian Made

A N P

ONE FUSE



Mains: 125-250 Volt
2 or 3 Wire
125 Volt Branches



ANP3

ANP3 Safety Type Panelboards and Cabinets

Panel—Made of sections of brown Bakelite.

Mains—2 or 3 wire, 1928 N.E.C. Capacity per Branch.

Branches—30 Amp. Single Pole N.E.C. Plug Fuse Connections.

Box—Code Thickness Galvanized Steel, 3-inch Gutter.

Front—Code Thickness Steel. Grey Lacquer Finish. Flush or Surface Mounting.

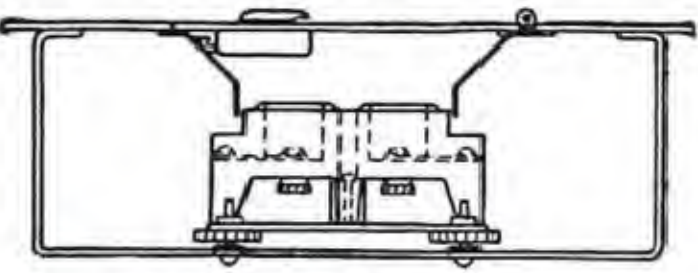
Combination of Panelboard, Box and Front
List List App.
No. Price Wgt.
Main Cable Lugs Only (ANP3)

Width 11 1/2". Depth 4".

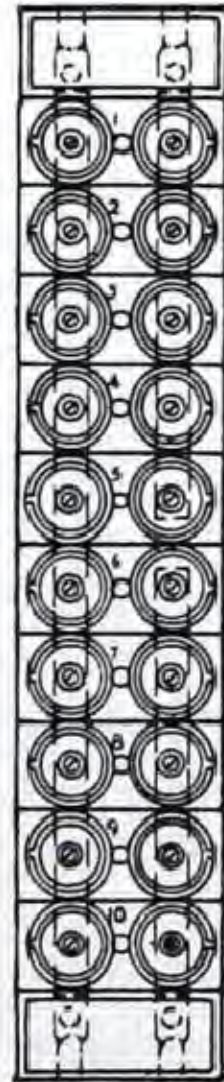
4	30	14	ANP304L	\$16.00	18
8	60	17	ANP308L	20.00	23
12	60	23	ANP312L	24.00	32
16	100	26	ANP316L	30.00	41
20	100	29	ANP320L	34.00	45
24	100	32	ANP324L	42.00	52
28	100	35	ANP328L	48.00	55
32	100	38	ANP332L	54.00	60

A P

TWO FUSE



Mains: 125-250 Volt
2 or 3 Wire
125 Volt Branches



AP3

AP3 Safety Type Panelboards and Cabinets

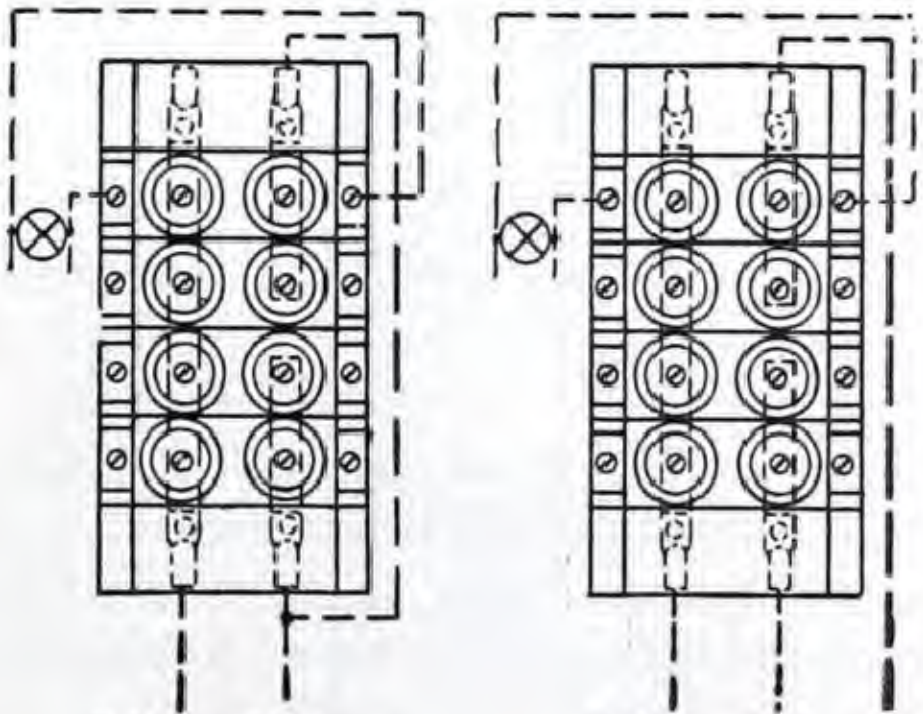
Branches—30 Amp. Two Pole N.E.C. Plug Fuse Connections.

Main Cable Lugs Only (AP3)

Width 11 1/2" Depth 4"

4	30	17	AP304L	\$16.00	23
6	60	20	AP306L	22.00	27
8	60	23	AP308L	26.00	35
10	60	26	AP310L	30.00	43
12	60	29	AP312L	34.00	48
14	100	32	AP314L	40.00	52
16	100	35	AP316L	44.00	55
18	100	38	AP318L	50.00	60
20	100	41	AP320L	54.00	65

Dimensions are for outside of box.



2-Wire Mains

3-Wire Mains

Note Connections—The same Panelboard can be used on 2 or 3 Wire Service.

AMALGAMATED ELECTRIC PANELBOARDS

100% Canadian Made

ONE FUSE

AN2P3 Safety Type Panelboards and Cabinets

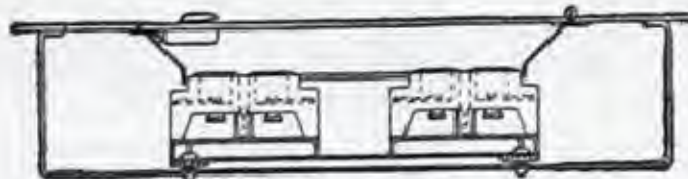
Panel—Made of sections of brown Bakelite.

Branches—30 Amp. Single Pole N.E.C. Plug Fuse Connections.

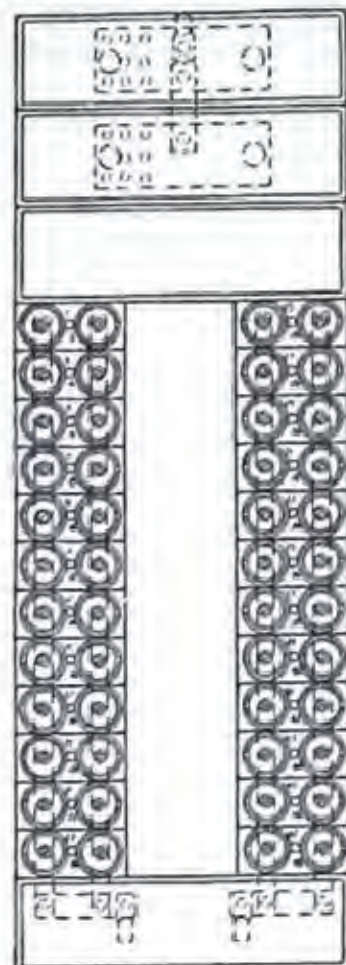
Box—Code Thickness Galvanized Steel, 4-inch Gutter Type.

Front—Code Thickness Steel. Grey Lacquer Finish. Flush or Surface Mounting.

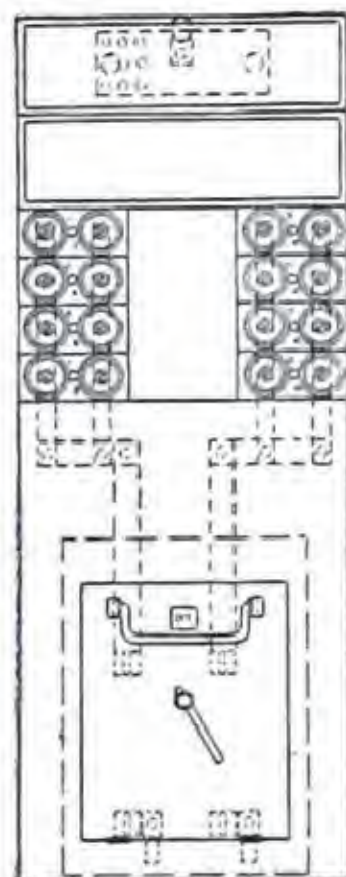
AN2P



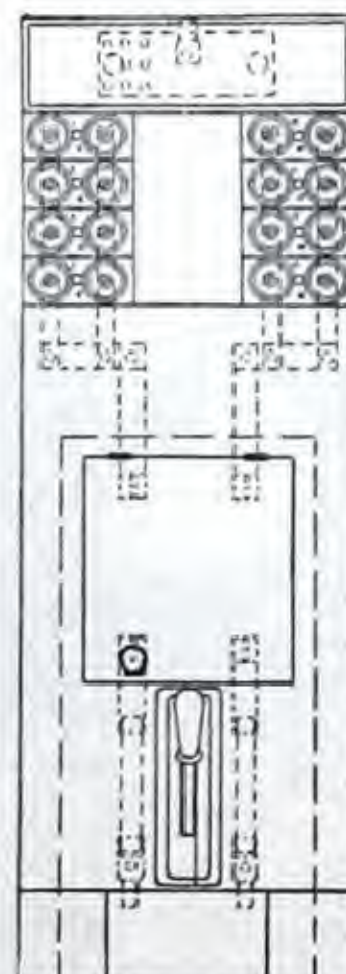
Mains: 125-250 V. 3 Wire
Capacity: 1928 Code per Branch
Branches: 125 V. 2 Wire



AN2P3L

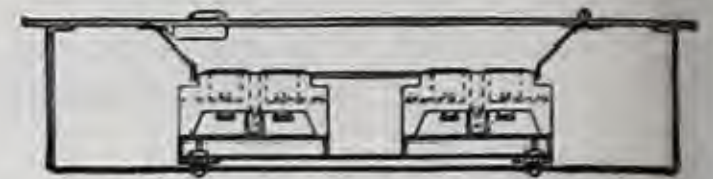


AN2P3SWF

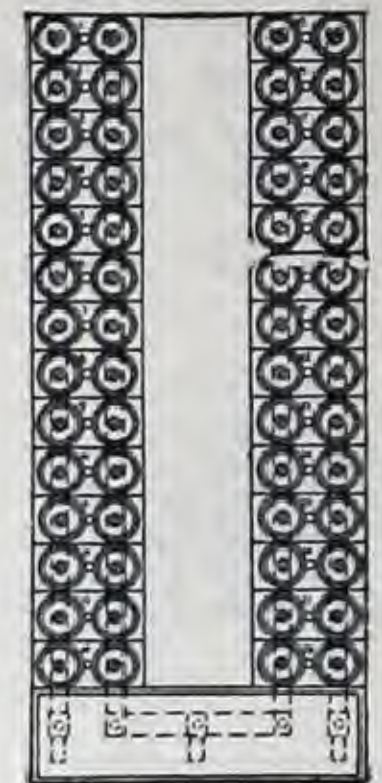


AN2P3BSF

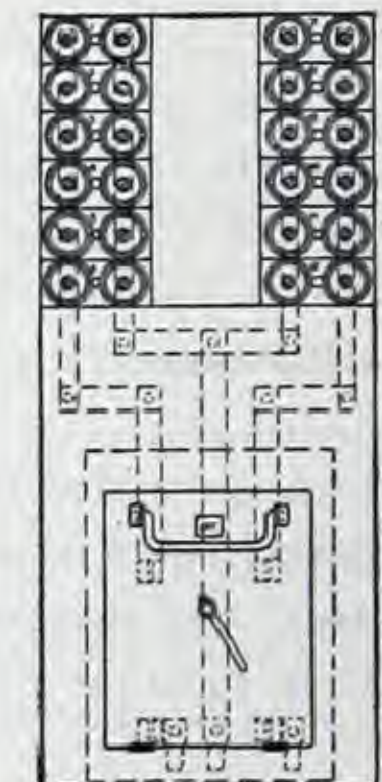
A2P



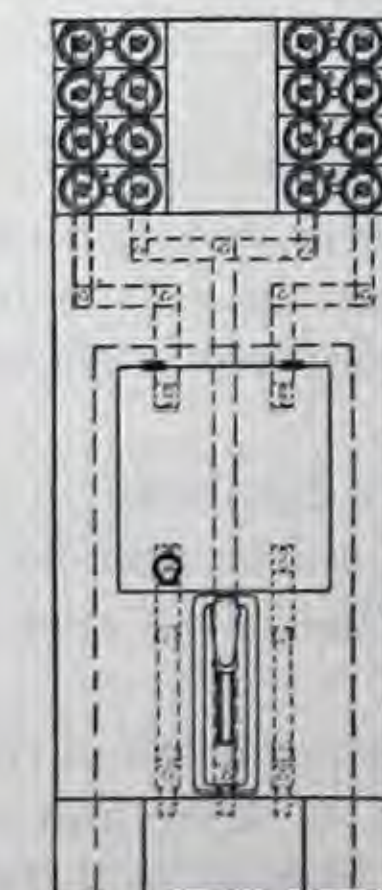
Mains: 125-250 V. 3 Wire
Capacity: 1928 Code per Branch
Branches: 125 V. 2 Wire



A2P3L



A2P3SWF



A2P3BSF

Combination of Panelboard,
Box and Front

Bran- ches	Mains	Hgt.	List No.	List Price	Approx. Weight
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Main Cable Lugs Only (AN2P3L)

Width 19½". Depth 4½".

16	100	25	AN2P316L	\$ 56.00	47
24	100	28	AN2P324L	66.00	52
32	100	34	AN2P332L	76.00	65
40	200	37	AN2P340L	106.00	90

For less than 16 circuits see ANP3 Panelboards.

Main Fuse Connections, Solid Neutral (AN2P3F)

Width 19½"

* 8	60	28	AN2P308F	\$ 60.00	85
†16	100	37	AN2P316F	80.00	120
‡24	100	40	AN2P324F	90.00	135
‡32	100	46	AN2P332F	105.00	140
‡40	200	52	AN2P340F	136.00	190

Main Brush Type Switch With Fuse Connections,

Solid Neutral (AN2P3BSF)

Width 19½"—Depth 4½"

8	60	34	AN2P308BSF	\$ 74.00	110
16	100	43	AN2P316BSF	95.00	150
24	100	46	AN2P324BSF	108.00	165
32	100	52	AN2P332BSF	120.00	180
40	200	61	AN2P340BSF	166.00	220

Dimensions are for outside of box.

*4½" deep. †6½" deep. ‡7" deep.

TWO FUSE

A2P3 Safety Type Panelboards and Cabinets

Branches—30 Amp. Two Pole N.E.C. Plug Fuse Connections.

Main Cable Lugs Only (A2P3L)

Width 19½"

Depth 4½"

8	60	19	A2P308L	\$ 45.00	70
12	60	22	A2P312L	52.00	80
16	100	25	A2P316L	60.00	100
20	100	28	A2P320L	70.00	110

Main Fuse Connections, Solid Neutral (A2P3F)

Width 19½"

* 4	30	22	A2P304F	\$ 54.00	80
* 8	60	25	A2P308F	62.00	85
*12	60	28	A2P312F	70.00	95
†16	100	40	A2P316F	85.00	120
†20	100	43	A2P320F	95.00	135

Main Brush Type Switch With Fuse Connections,

Solid Neutral (A2P3BSF)

Width 19½"

Depth 4½"

4	30	31	A2P304BSF	\$ 70.00	100
8	60	34	A2P308BSF	78.00	110
12	60	37	A2P312BSF	86.00	125
16	100	43	A2P316BSF	100.00	150
20	100	46	A2P320BSF	110.00	165

Dimensions are for outside of box.

*4½" deep. †6½" deep.

AMALGAMATED ELECTRIC PANELBOARDS

Lighting Panelboards

LIST PRICE ADDITIONS FOR SPECIAL FEATURES

Panelboards Types ANTP3, ANTP3D, ANP3, AP3, AN2P3 and A2P3 also 3 phase and 4 wire Types.

These list additions are per Panelboard (less fuses) and include increasing size of cabinets to accommodate the addition of these features.

INCREASED CAPACITY MAINS

(Including Heavier Busbars)

For all Panelboards having two "live" mains—2 wire or 3 wire (with or without neutral bar)

INCREASED CAPACITY		Lugs Only	MAINS	
From	To		Safety Fuse	Fusible Switch
60 Amp.	100 Amp.	\$4.00	\$ 4.00	\$ 6.00
60 "	200 "	6.00	16.00	30.00
100 "	200 "	5.00	12.00	26.00

For all Panelboards having three "live" mains—3 wire or 4 wire (with or without neutral bar)

30 Amp.	60 Amp.	\$0.00	\$ 2.00	\$ 3.00
30 "	100 "	5.00	8.00	10.00
60 "	100 "	5.00	6.00	8.00
60 "	200 "	8.00	20.00	34.00
100 "	200 "	7.00	16.00	32.00

SUB FEEDS

(When Sub Feeds increase capacity of mains over standard listed capacity, List Price Additions for Increased Mains must be added.)

For all 2 fuse circuits—2 wire or 3 wire (with or without neutral bar)

ALL TYPES

Capacity of Sub Feed	Lugs Only	Safety Fuse	Fusible Switch
30 Amp.	\$2.00	\$16.00	\$30.00
60 "	2.00	18.00	32.00
100 "	3.00	20.00	36.00
200 "	4.00	32.00	60.00

For all 3 fuse circuits—3 wire or 4 wire (with or without neutral bar)

ALL TYPES

30 Amp.	\$3.00	\$18.00	\$32.00
60 "	3.00	20.00	34.00
100 "	4.00	22.00	40.00
200 "	6.00	40.00	70.00

SPECIAL ADDITIONS

For meter loop lugs only—or for double Main Lugs—use table of Sub Feeds—List Price Additions column headed "Lugs Only" opposite correct ampere capacity in first column.

Where Panelboards are split in two or more sections, figure each section as a separate Panelboard with its individual cabinet and main connection.

For 3-2 wire Tumbler Switch Panelboards used for 3 phase 3 wire service with single phase, 125 volt 2 wire branch circuits, add 5% to List Prices types TP-3; TP-3D; TC-3D; AN2P3 and then, in accordance with table above, add the necessary amount for Increased Capacity Mains, if required.

For 2-2 wire Tumbler Switch Panelboards used for 220 volt service, use same price as corresponding 125 volt Panel-

board. (Panelboards with plug fuse branch circuits cannot be used on 220 volt services).

To obtain price for Panelboards having combinations of single and 2 pole Tumbler Switches, all fed from the same bus, add to the number of single pole circuits the total number of double pole circuits multiplied by two. With this equivalent number of single pole circuits, price in the regular manner and add 5%. For Panelboards having combinations of single and 2 pole circuits but fed from separate buses, figure as regular two section Panelboards mentioned above.

Unfused Main Switches or Sub Feed Switches—use same prices as for Fusible Switch.

AMALGAMATED ELECTRIC PANELBOARDS

Distribufuz

DISTRIBUTION PANELBOARDS

and

SWITCHBOARDS

100% Made in Canada

Amalgamated Electric Distribufuz Distribution Panelboards and Switchboards are designed to thoroughly meet the requirements of safety and severe use. Fabricated from high-grade materials, with many features of design to recommend them, they are entirely Made in Canada.

APPLICATIONS

Distribufuz Distribution Panelboards and Switchboards are for the protection of feeder and subfeeder circuits of both power and lighting systems. These distribution panelboards and switchboards are an assembly of Amalgamated Electric Distribufuz units in capacities from 30 amperes to 600 amperes for 250 volts a-c or d-c and for 600 volts a-c.

Distribufuz units are supplied in the 2 pole, 3 pole and 4 pole types, and have been approved by the H.E.P.C. of Ontario as load breaking devices, with the exception that the 600 volt a-c units above 100 amperes are approved for disconnecting purposes only.

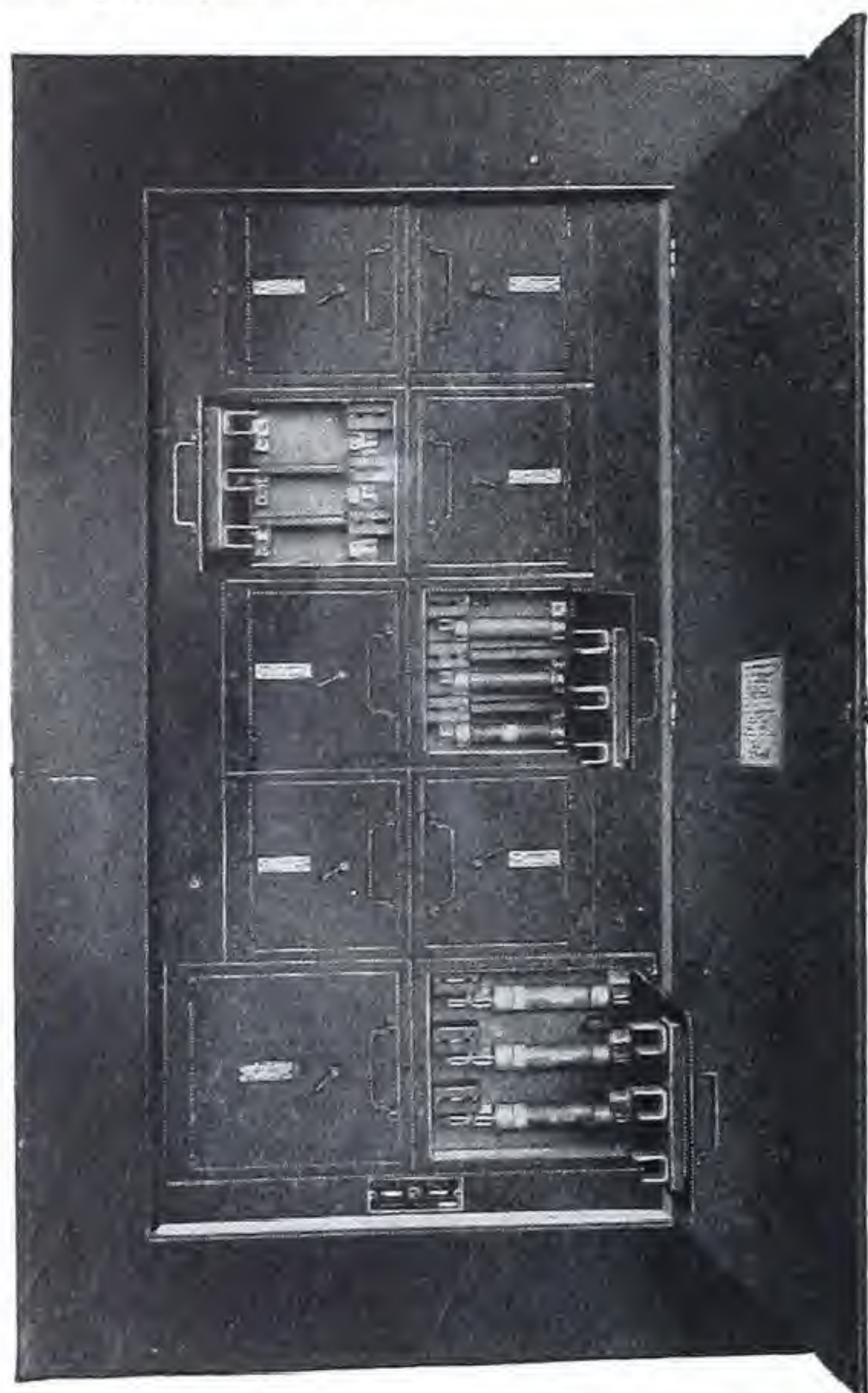


Illustration of Distribufuz Distribution Panelboard

The following are some of the systems to which Distribufuz Distribution Panelboards and Switchboards can be connected to protect the various feeder circuits:

- 125 volt a-c or d-c 2 wire.
- 125/250 volt a-c or d-c 3 wire grounded neutral.
- 3 phase, 4 wire grounded neutral.
- 250 volt 2 phase 4 wire.
- 250 volt 2 phase 3 wire.
- 250 volt 3 phase 3 wire.
- 440 volt 2 phase 4 wire.
- 440 volt 2 phase 3 wire.
- 440 volt 3 phase 3 wire.
- 550 volt 3 phase 3 wire.

DETAILS OF CONSTRUCTION

The Amalgamated Electric Distribufuz unit is a safety type unit combining a device for holding cartridge type fuses with a switching device. Each unit is of the completely enclosed type arranged for external operation and so constructed that the fuses can only be replaced when the unit is in the "off" position.

AMALGAMATED ELECTRIC PANELBOARDS

Distribufuz

DISTRIBUTION PANELBOARDS

and

SWITCHBOARDS

100% Made in Canada

DETAILS OF CONSTRUCTION (Continued)

A hinged door is provided with each unit, and when this door is in the open position no "live" metal parts can be touched. On the inside of the door, U-shaped bridging prongs are mounted on an insulating base, and these prongs, when the door is closed, bridge between contact jaws connected to the main busbars and contact jaws connected to the fuse clips. The "live" contacts are enclosed in insulating flameproof housings. With the hinged door construction there are no loose parts to misplace, and this construction precludes the possibility of damaged fuse-holder bases due to these bases being let fall when fuses are being replaced.

On the door of each unit a shifting handle is provided so that after the door is opened the bridging prongs can be shifted to the "off" or "on" position and the door again closed. This construction makes it possible to work on a circuit with the door closed and assures neat appearance when the circuit is out of service.

Each unit is enclosed in a galvanized sheet steel enclosure, and the contact bases and fuse-holder bases are made of cold mounted asbestos. All "live" metal parts are pure hard drawn copper. Adequate separation of the fuses assures ample air space for heat radiation.

Distribufuz units, because of their compact design, minimize the space required at the various distribution centres for fuse equipment. They are simple to operate—operate the door quickly to open or close the circuit.

Distribufuz Distribution Panelboards are supplied with Code gauge steel cabinets, complete with steel trims of the flush or surface type. In the trim a single door or double door, depending on the size of the panelboard, is regularly provided to open over the assembly of Distribufuz units. A substantial finger lift type lock is supplied with each trim door. For doors over 48 inches in height or with double doors a vault handle with shoot bolts is also supplied. These distribution panelboards can be supplied with lugs only in mains or with a Distribufuz unit in mains. Unless given on the order, Distribufuz Distribution Panelboards will be supplied with lugs only in mains and with surface type trims. Boxes or tubs of cabinets will be supplied with conduit knockouts in accordance with customer's template or drawing. Otherwise the boxes or tubs will be supplied with a reasonable number and size of conduit knockouts, depending on the size of mains and number and size of branch circuits.

Distribufuz Switchboards are supplied in two general types—the Safety type and the Dead Front type. The Safety type switchboard is completely enclosed at front and rear in a steel cabinet. Doors at the rear afford access to the busbar and wire compartment. The Dead Front type switchboard is not enclosed at the rear and therefore must have a protecting grill-work installed with it to prevent unauthorized persons obtaining access to the rear of the switchboard. The fronts of both switchboards are identical.

Distribufuz Distribution Panelboards and Switchboards are manufactured to order in accordance with customer's specifications as regards to size of mains and number and size of branch circuits. Prices will be given promptly on application for any arrangements of lines not shown.

AMALGAMATED ELECTRIC PANELBOARDS

Pulfuz

DISTRIBUTION PANELBOARDS

100% Made in Canada

In the Design of Amalgamated Electric PULFUZ Distribution Panelboards, careful thought has been given to the requirements of safety in the protection of 250 volt light and power feeder circuits of moderate size. Attractive in appearance and of sturdy construction, they represent another Amalgamated Electric product which is entirely Made in Canada.

Applications

PULFUZ Distribution Panelboards are for the protection of light and power feeder circuits of 30 ampere or 60 ampere capacity at 250 volts a-c or d-c. These distribution panelboards are an assembly of Amalgamated Electric PULFUZ units in two sizes, one size accommodating 3-30 ampere cartridge fuses and the other size accommodating 31-60 ampere cartridge fuses.

PULFUZ units are supplied in the single pole, 2 pole, 3 pole and 4 pole types and have been approved by the H.E.P.C. of Ontario as load breaking devices.

Some of the systems on which PULFUZ Distribution Panelboards can be used are given below:

- 125 volt a-c or d-c 2 wire.
- 125/250 volt 3 wire grounded neutral.
- 3 phase 4 wire grounded neutral (250 volts maximum).
- 250 volt 2 phase 4 wire.
- 250 volt 2 phase 3 wire.
- 250 volt 3 phase 3 wire.

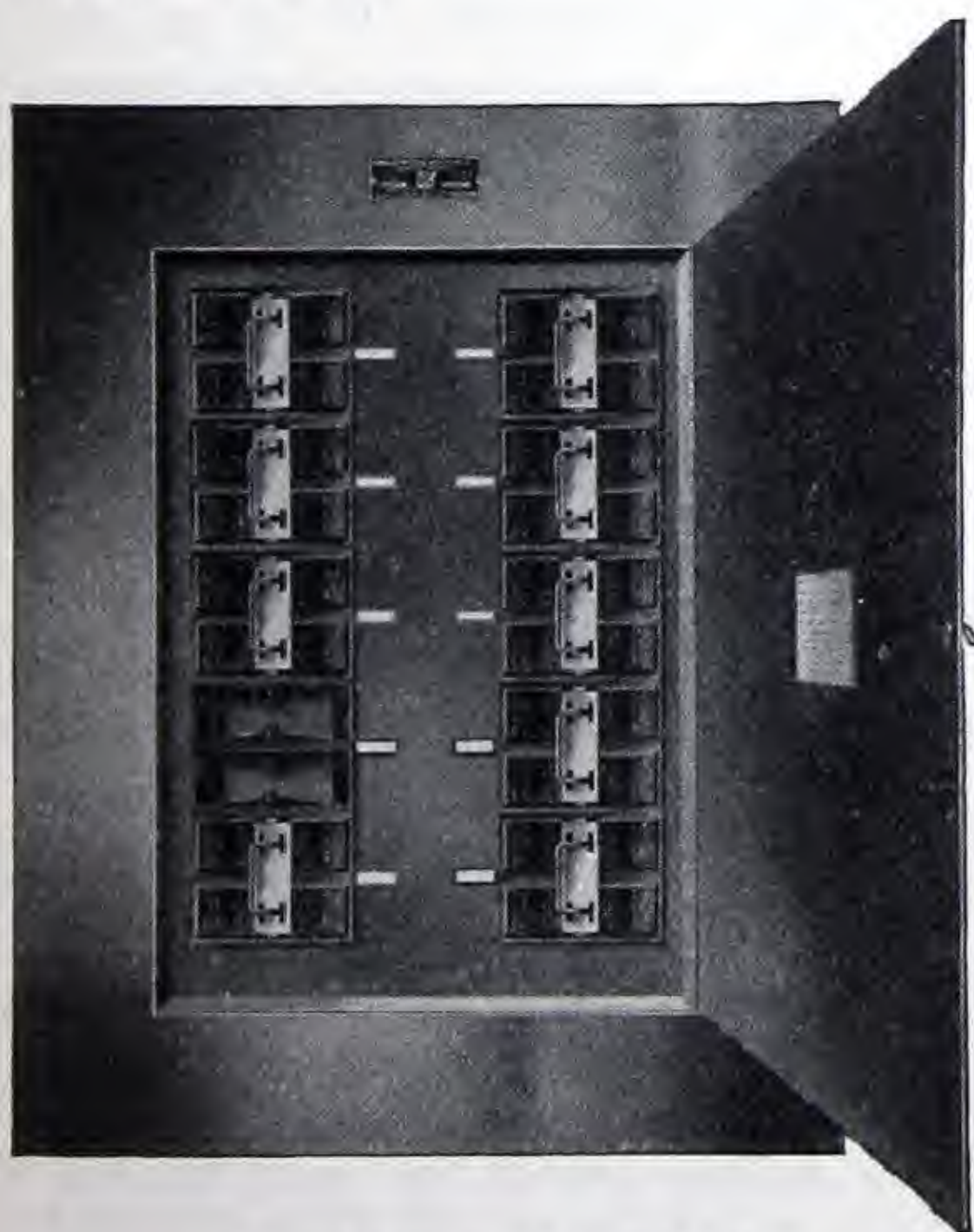


Illustration of PULFUZ
Distribution Panelboard
(With one fuse-holding device removed)

AMALGAMATED ELECTRIC PANELBOARDS

Pulfuz

DISTRIBUTION PANELBOARDS

100% Made in Canada

Details of Construction

The Amalgamated Electric PULFUZ unit is a safety type unit, combining a device for holding cartridge type fuses to and including the 60 ampere size, with a switching device. Each unit consists of a completely enclosed single device for holding the fuse and also includes an enclosure containing the main and branch terminal contacts or consists of a group of these single devices held together with a single operating handle, and complete with the corresponding number of enclosures containing the main and branch terminal contacts.

The separate units are made of brown Bakelite parts of attractive design and so constructed that fuses can only be replaced when the fuse-holding device is removed from the enclosure containing the main and branch terminal contacts.

A particular branch circuit can be worked on by removing the fuse-holding device from its enclosure and reinserting the fuse-holding device in a reversed position in this enclosure. Means are provided for testing the fuses without disconnecting them from the circuit.

Where space is at a premium for the mounting of distribution panelboards, PULFUZ Distribution Panelboards will be found admirably suited.

PULFUZ Distribution Panelboards are supplied with Code gauge steel cabinets complete with steel trims of the flush or surface type. A single door in the trim is provided to open over the assembly of PULFUZ units. Substantial finger lift type locks are supplied on the trim doors. These distribution panelboards can be supplied with lugs only in mains, or with PULFUZ unit in mains up to and including mains of the 60 ampere size or with DISTRIBUTUFUZ unit in mains. Unless given on the order, PULFUZ Distribution Panelboards will be supplied with lugs only in mains and with surface type trims. Boxes or tubs of cabinets will be supplied with conduit knockouts in accordance with customer's template or drawing. Otherwise the boxes or tubs will be supplied with a reasonable number and size of conduit knockouts, depending on the size of mains and number and size of branch circuits.

PULFUZ Distribution Panelboards are manufactured to order in accordance with customer's specifications as regards to size of mains and number and size of branch circuits.

Illustrations Showing Detailed Construction of PULFUZ Unit



Cartridge
Fuse-Holding
Device
(Front View)
Neat appearance
and sturdy
construction.



Cartridge
Fuse-holding
Device
(Rear View)
Cartridge fuses
held in extra heavy
spring bronze
clips, also showing
separate rigid
contact blades.



Enclosure
Containing Main
and Branch Term-
inal Contacts
View with Fuse-
holding Device
Removed)
Contact clips
fully protected by
snuffers and pro-
vision for rever-
sing fuse-holding
device to leave
circuit open

AMALGAMATED ELECTRIC PANELBOARDS

Pulfuz and Distribufuz

COMBINED SWITCH AND CARTRIDGE FUSE TYPE

With Enclosing Steel Cabinets
BASE LIST PRICE

Includes main lugs, top and bottom gutters, and portion of busbars, box and trim.

Main Lugs and Busbars					
Branch Circuits	200 Amp.	400 Amp.	600 Amp.	800 Amp.	1200 Amp.
Height Required.....	10½"	14½"	17½"	20"	22½"
200 A. or less	\$20.00	\$30.00	\$50.00	\$ 80.00	\$125.00
400 A. or less	....	50.00	70.00	110.00	150.00
Over 400 A.	....	....	90.00†	150.00	190.00

†For three wire mains \$100.00

CIRCUIT LIST PRICE

Includes circuit sections complete and portion of busbars, box and trim.

Ampere Capacity	List Price Complete Section	List Price Space Only for Section	Height of Section PULFUZ	Height of Section DISTRIBUFUZ
3 WIRE MAINS—125 OR 250 VOLTS ONLY				

These panelboards may also be used for 4 wire, 120-208 volts by adding neutral bar.

For 2 circuits—double branch					
Single	30-30 A.	\$18.00	\$5.80	1¾"	6¾"
	60-60 A.	18.00	5.80	1¾"	6¾"
Fuse	100-100 A.	18.00	5.80	....	7¾"
For 1 circuit—single branch					
Branch	200 A.	\$ 21.00	\$ 5.80	....	8½"
	400 A.	49.00	8.75	....	10 "
Circuits	600 A.	110.00	56.00	....	10¼"
For 2 circuits—double branch					
Two	30-30 A.	\$24.00	\$ 8.75	3½"	6¾"
	60-60 A.	24.00	8.75	3½"	6¾"
Fuse	100-100 A.	36.00	11.50	....	7¾"
For 1 circuit—single branch					
Branch	200 A.	\$ 42.00	\$11.50	....	8½"
	400 A.	97.00	16.75	....	10 "
Circuits	600 A.	160.00	56.00	....	10¼"
For 2 circuits—double branch					
Three	30-30 A.	\$33.00	\$11.50	5¼"	9¾"
	60-60 A.	33.00	11.50	5¼"	9¾"
Fuse	100-100 A.	54.00	16.75	....	10¾"
For 1 circuit—single branch					
Branch	200 A.	\$ 63.00	\$16.75	....	12 "
	400 A.	146.00	25.50	....	14 "
Circuits	600 A.	210.00	56.00	....	14½"

2 WIRE MAINS—125 OR 250 VOLTS* ONLY

These panelboards may be used for 3 wire, 110-220 volts by adding neutral bar.

For 2 circuits—double branch					
Single	30-30 A.	\$ 18.00	\$ 5.80	1¾"	6¾"
	60-60 A.	18.00	5.80	1¾"	6¾"
Fuse	100-100 A.	18.00	5.80	....	7¾"
For 1 circuit—single branch					
Branch	200 A.	\$ 21.00	\$ 5.80	....	8½"
	400 A.	49.00	8.75	....	10 "
Circuits	600 A.	110.00	56.00	....	10¼"
For 2 circuits—double branch					
Two	30-30 A.	\$ 24.00	\$ 8.75	3½"	6¾"
	60-60 A.	24.00	8.75	3½"	6¾"
Fuse	100-100 A.	36.00	11.50	....	7¾"
For 1 circuit—single branch					
Branch	200 A.	\$ 42.00	\$11.50	....	8½"
	400 A.	97.00	16.75	....	10 "
Circuits	600 A.	160.00	56.00	....	10¼"

*For PULFUZ Distribution Panelboards with 30 and 60 ampere circuits only, which Panelboards ordinarily require cabinets not greater than 6" deep and which have maximum 4" gutters and not exceeding 73" in height, mains not over 600 amperes, deduct \$10.00 list from base list price.

List prices do not include fuses.

AMALGAMATED ELECTRIC PANELBOARDS

Distribufuz

COMBINED SWITCH AND CARTRIDGE FUSE TYPE

With Enclosing Steel Cabinets

BASE LIST PRICE

Includes main lugs, top and bottom gutters, and portion of busbars, box and trim.

Main Lugs and Busbars					
Branch Circuits	200 Amp.	400 Amp.	600 Amp.	800 Amp.	1200 Amp.
Height Required.....	10½"	14½"	17½"	20"	22½"
200 A. or less	\$37.00	\$47.00	\$ 67.00	\$ 93.00	\$137.00
400 A. or less	....	69.00	87.00	124.00	162.00
Over 400 A.	....	....	100.00†	162.00	200.00

†For three wire mains \$110.00.

CIRCUIT LIST PRICE

Includes circuit sections complete and portion of busbars, box and trim.

Ampere Capacity	List Price Complete Section	List Price Space Only for Section	Height of Section DISTRIBUFUZ
3 WIRE MAINS—600 VOLTS (or less)			

For 2 circuits—double branch			
Single	30-30 A.	\$25.00	\$ 5.80
Fuse	60-60 A.	25.00	5.80
For 1 circuit—single branch			
Branch	100 A.	\$ 25.00	\$ 5.80
	200 A.	51.00	8.75
Circuits	400 A.	103.00	56.00
For 2 circuits—double branch			
Two	30-30 A.	\$37.00	\$11.50
Fuse	60-60 A.	37.00	11.50
For 1 circuit—single branch			
Branch	100 A.	\$ 37.00	\$11.50
	200 A.	81.00	16.75
Circuits	400 A.	152.00	56.00

2 WIRE MAINS—600 VOLTS (or less)

For 2 circuits—double branch			
One	30-30 A.	\$25.00	\$ 5.80
Fuse	60-60 A.	25.00	5.80
For 1 circuit—single branch			
Branch	100 A.	\$ 25.00	\$ 5.80
	200 A.	51.00	8.75
Circuits	400 A.	103.00	56.00
For 2 circuits—double branch			
Two	30-30 A.	\$37.00	\$11.50
Fuse	60-60 A.	37.00	11.50
For 1 circuit—single branch			
Branch	100 A.	\$ 37.00	\$11.50
	200 A.	81.00	16.75
Circuits	400 A.	152.00	56.00
For 2 circuits—double branch			
Three	30-30 A.	\$48.00	\$16.75
Fuse	60-60 A.	48.00	16.75
For 1 circuit—single branch			
Branch	100 A.	\$ 48.00	\$16.75
	200 A.	95.00	25.50
Circuits	400 A.	190.00	56.00

*List price includes neutral bar, main lug, lug for each branch circuit, and portion of back plate, box and trim.

**List price includes lugs and portion of busbars, back plate, box and trim that may be necessary.

List prices do not include fuses.

AMALGAMATED ELECTRIC PANELBOARDS

Pulfuz and Distribufuz

COMBINED SWITCH AND CARTRIDGE FUSE TYPE

With Enclosing Steel Cabinets

LIST PRICE ADDITIONS FOR SPECIAL FEATURES

(Applying to PULFUZ and DISTRIBUFUZ)

Main Switches (Safety Fuse Type)—figure same as a branch circuit from Circuit List Prices after adding Base List Price.

Note:—Where the mains of PULFUZ Distribution Panelboards are not in excess of 60 amperes PULFUZ Units will be supplied as main switches.

Neutral Busbars—3 wire single phase 110-220 volt solid neutral service or 4 wire 3 phase 120-208 volt solid neutral service:

Capacity of Main Lug	List Additions Panelboards complete with Cabinets
200 Amp.	\$14.00*
400 "	25.00*
600 "	30.00*
800 "	40.00*
1200 "	63.00*

Unfused Meter Loop or Split Bus	Sub Feed, Through Feed or Double Lugs (Lugs Only)
200 Amp. \$21.00*	200 Amp. \$12.00**
400 " 23.00*	400 " 24.00**
600 " 30.00*	600 " 36.00**
	800 " 48.00**
	1200 " 60.00**

Note—Amalgamated Electric PULFUZ Distribution Panelboards can only be supplied with branch circuits up to and including 60 amperes. For distribution Panelboards having any branch circuit larger than the 60 ampere size, Amalgamated Electric DISTRIBUFUZ Distribution Panelboards will be supplied.

AMALGAMATED ELECTRIC PANELBOARDS

"Util" Type

100% Canadian Made

SINGLE POLE PLUG FUSES ONLY IN BRANCHES



These panelboards have been designed to meet the requirements of small-size installations. Panel sections are brown Bakelite and are mounted in shallow depth steel cabinets, which permit these panelboards to be used in practically any type of building construction. Notches are provided in the panel sections for testing of fuses. The attractive appearance and sturdy construction of these panelboards recommends them for use in residences, apartment buildings, etc.

Tubs are furnished with ample number and suitable arrangement of knockouts for loom and conduit.

Mains, 2 or 3 wire grounded neutral; branch circuits, 2 wire single pole plug fuse.

Fronts finished in aluminum weatherproof metallic paint; tubs galvanized.

List Number	Branches	Mains	Height	Width	Depth	List Price Each
2102	2	30	7 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	\$3.00
2104	4	30	7 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	4.30
2106	6	60	9 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	5.70
2108	8	60	11 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	7.00
2110	10	60	13 ¹ / ₄	7 ³ / ₄	2 ¹ / ₁₆	8.90
2112	12	60	14 ¹ / ₂	7 ³ / ₄	2 ¹ / ₁₆	10.50

Above 12 Circuits Supplied in ANP3 Series Panelboard.

WITH TWO POLE PLUG FUSE CIRCUITS ONLY

These panelboards serve satisfactorily where 2 pole plug fuse only branch circuits are required. They are of the same general construction and attractive appearance as the "UTIL" Panelboards with single pole plug fuse circuits only.

Mains, 2 or 3 wire; branch circuits, 2 wire, 2 pole plug fuse.

Fronts finished in aluminum weatherproof metallic paint; tubs galvanized.

List Number	Branches	Mains	Height	Width	Depth	List Price Each
2802	2	30	7 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	\$3.85
2804	4	30	11 ³ / ₄	7 ³ / ₄	2 ¹ / ₁₆	13.50
2806	6	60	14 ¹ / ₂	7 ³ / ₄	2 ¹ / ₁₆	21.00
2808	8	60	11 ³ / ₄	16 ¹ / ₂	2 ¹ / ₁₆	36.50
2810	10	60	13 ¹ / ₄	16 ¹ / ₂	2 ¹ / ₁₆	43.50
2812	12	60	14 ¹ / ₂	16 ¹ / ₂	2 ¹ / ₁₆	68.00

THREE NORTHERN ELECTRIC RULES THAT INSURE PROFIT

1. Know your overhead. All operating expenses, rent, bad accounts, clerical salaries—everything except time and material is overhead. Divide this expense by the amount of business you do and you have your overhead percentage.
2. Get your materials from Northern Electric.
3. Use the table below to figure your prices.

Example:—

Your overhead is 30% and you wish to make 10% net on this job. 67 is the factor shown by the intersection of these two lines and you, therefore, add

67% to your estimated prime cost (time and material). This establishes your selling price and brings you the profit you desire.

Per Cent of Net Profit	Per Cent of Overhead Expense						
Desired	15	20	25	30	35	40	45
5	25	33	43	54	67	82	100
10	33	43	54	67	82	100	122
15	43	54	67	82	100	122	150
20	54	67	82	100	122	150	185
25	67	82	100	122	150	185	233

AMALGAMATED ELECTRIC PANELBOARDS

"Util" Type

100% Canadian Made

WITH DEAD FRONT 60 AMP. RANGE CIRCUIT

These panelboards have been designed to meet the demand for a residence lighting panelboard having a dead front range circuit.

Plug fuseholders are provided for the lighting circuits, and the 60 ampere range fuses are held in heavy spring bronze clips, mounted on the brown Bakelite cover of the fuse unit. Suitably designed contacts, attached to the clips holding the fuses, make connection with the contact clips in the interior of the fuse unit when the cover is inserted in place. The construction is such that heating is minimized. An outward pull on the cover disconnects the cartridge fuses from the main busbars, thereby permitting fuse replacement. All live contacts of the range circuit are inaccessible. The fuse unit cover can be reversed so that the circuit can be worked on or disconnected. Holes are provided in the fuse cover for testing of fuses.

Mains, 3 wire grounded neutral; lighting circuits, 2 wire single pole plug fuse; range circuit, 31-60 amperes 3 wire grounded neutral.

Fronts finished in aluminum weatherproof metallic paint; tubs galvanized.

List No.	Lighting Circuits	60 Amp. Circuits	Mains	Hgt.	Wd.	Depth	List Price Each
2200	0	1	60	9 $\frac{3}{4}$	7 $\frac{3}{4}$	2 $\frac{1}{16}$	\$5.90
2202	2	1	60	11 $\frac{3}{4}$	7 $\frac{3}{4}$	2 $\frac{1}{16}$	6.30
2204	4	1	60	13 $\frac{1}{4}$	7 $\frac{3}{4}$	2 $\frac{1}{16}$	7.60
2206	6	1	100	17 $\frac{1}{2}$	10 $\frac{5}{8}$	2 $\frac{1}{16}$	9.50
2208	8	1	100	11 $\frac{3}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	11.60
2210	10	1	100	13 $\frac{1}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	15.20
2212	12	1	100	13 $\frac{1}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	17.10

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

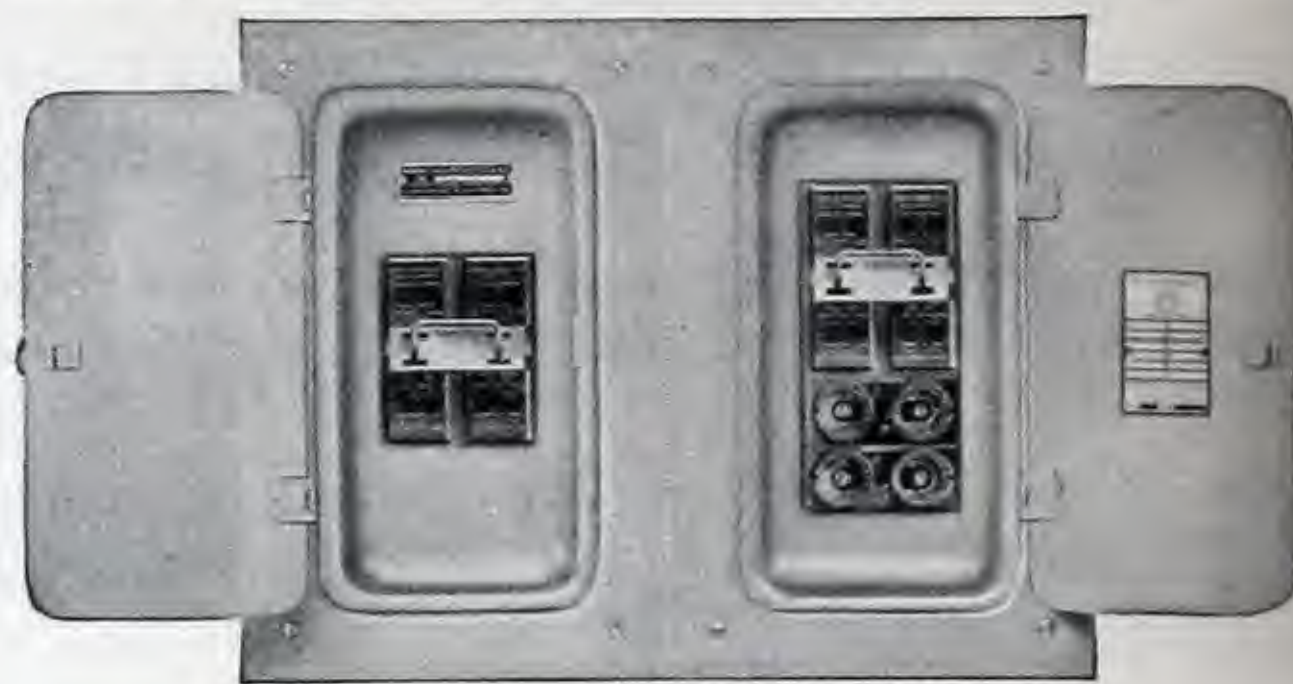


AMALGAMATED ELECTRIC PANELBOARDS

"Util" Type

100% Canadian Made

WITH DEAD FRONT 60 AMP. RANGE CIRCUIT
AND DEAD FRONT 30 AMP. HEATER CIRCUIT



These panelboards satisfactorily meet the requirements where a 30 ampere dead front cartridge fuse circuit as well as the 60 ampere range circuit and the plug fuse circuits is desired. This 30 ampere circuit serves to protect equipment such as water heaters, electric grates, etc. It is built along the same lines as the 60 ampere circuit described under "UTIL" Panelboards with Dead Front 60 amp. Range Circuit, and the general construction of these panelboards is the same.

Mains, 3 wire grounded neutral; lighting circuits, 2 wire single pole plug fuse; range circuit, 31-60 amperes 3 wire grounded neutral; heater circuit, 3-30 amperes 3 wire grounded neutral.

Fronts finished in aluminum weatherproof metallic paint; tubs galvanized.

List No.	Lighting Circuits	60 Amp. Circuits	30 Amp. Circ.	Mains	Hgt.	Wd.	Depth	List Price Each
2302	2	1	1	60	11 $\frac{3}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	\$16.25
2304	4	1	1	60	11 $\frac{3}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	17.60
2306	6	1	1	100	13 $\frac{1}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	19.50
2308	8	1	1	100	13 $\frac{1}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	21.50
2310	10	1	1	100	17 $\frac{1}{2}$	22 $\frac{3}{4}$	2 $\frac{1}{16}$	25.25
2312	12	1	1	100	17 $\frac{1}{2}$	22 $\frac{3}{4}$	2 $\frac{1}{16}$	27.10

WITH PROVISION FOR TOGGLE SWITCHES



These panelboards are for use in installations where control of the lighting outlets is desired from the panelboard, where cost prohibits the use of type ANTP Panelboards. Space is provided in cabinets for the mounting of standard flush toggle switches in such a manner that their handles protrude through the face of the cabinet front.

Mains, 2 or 3 wire grounded neutral; branch circuits, 2 wire single pole plug fuse.

Fronts finished in aluminum weatherproof metallic paint; tubs galvanized.

Note—Prices do not include flush toggle switches.

List No.	Lighting Circuits	Switch Space Provided	Mains	Hgt.	Wd.	Depth	List Price Each
2402	2	2	30	14 $\frac{1}{2}$	7 $\frac{3}{4}$	2 $\frac{1}{16}$	\$10.00
2404	4	4	30	14 $\frac{1}{2}$	7 $\frac{3}{4}$	2 $\frac{1}{16}$	12.00
2406	6	6	60	11 $\frac{3}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	18.00
2408	8	8	60	11 $\frac{3}{4}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	25.00
2410	10	10	60	14 $\frac{1}{2}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	35.00
2412	12	12	60	14 $\frac{1}{2}$	16 $\frac{1}{2}$	2 $\frac{1}{16}$	45.00

BULL DOG LIGHTING PANELBOARDS

SUPERIOR FEATURES OF DESIGN

'Bull Dog' Heavy Duty Toggle Switch

30 Amp. 250 V.

60 Amp. 125 V.



Insulating Handles Withstand Smashing Hammer Blows

Surveys made of large installations of Lighting Panels of various makes disclosed a big mortality in Panelboard Toggle Switches, from the following causes:

1. Breakage of Switch Operating Handles.

2. Breakage or deterioration of Switch springs, particularly the pull or extension type. Note—Switches having extension or pull type springs often depend on the spring to hold the switch mechanism together. In these cases, breakage of spring usually causes destruction of the Switch.

3. Break down of insulation.

4. Switch too small in capacity, resulting in damage to contacts.

Having discovered these causes of break-down the "BULL DOG" Toggle switch used in UNIT-VERSAL Panelboards is designed and built to overcome all of these defects, and the following considerations will show:

1. Insulating Handle tested by Hammer Blow as illustrated.

2. Spring is of the compression type (not pull or extension type). In actual test it was subjected to over 500,000 continuous operations.

3. Successfully withstood a dielectric or insulation test at 2,300 Volts.

4. Contacts tested for continuous carrying capacity—60 Amp. 125 Volts, 30 Amp. at 250 Volts.

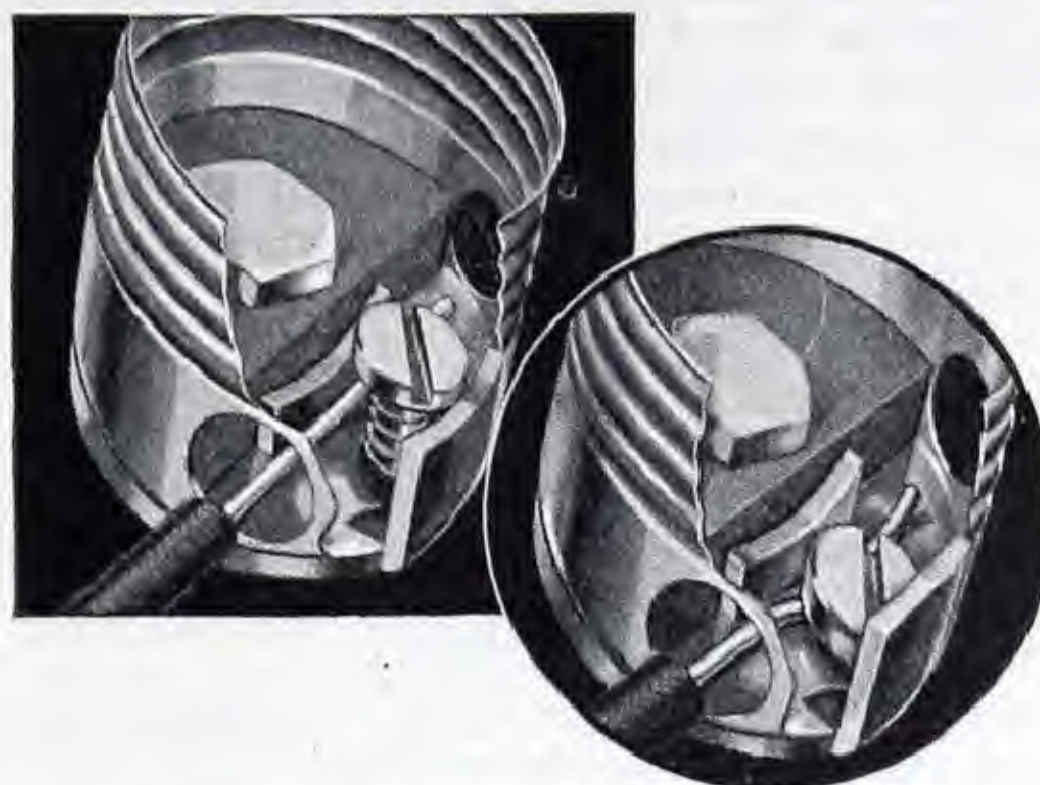
5. Operating Test under load. Successfully broke 90 Amps. at 125 Volts, 50 Amps. at 250 Volts, 5 Amps. at 600 Volts.

6. Toggle Switch framework. Of rugged reinforced construction. No appreciable wear after 500,000 operations—tested once.

BULL DOG LIGHTING PANELBOARDS

Quick and Easy Wiring Feature of "Bull Dog" Panelboards

A Great Time Saver



This cut illustrates the ease and rapidity with which Bull Dog Branch Circuits can be wired.

It is not necessary to curl or bend the wire. Simply loosen the round head screw inside shell, skin and clean wire about $\frac{3}{4}$ ". Insert the straight wire under head of screw and screw down tight. This kinks wire and locks it in place.

This obviates the necessity for making loops or bends in the wires or twisting under screw head.

With a great many circuits to wire, an appreciable amount of the wireman's time and patience, can be saved.

This method of wiring also applies to Cartridge Fusible Branch Circuit Sections.

TYPES OF MAINS

The different types of Mains used in "BULL DOG" UNIT-VERSAL Panelboards are illustrated on this page:

Panels with Branch Circuit Toggle Switches or Panels with N. E. C. Plug Fuse only Branches have Mains as follows:

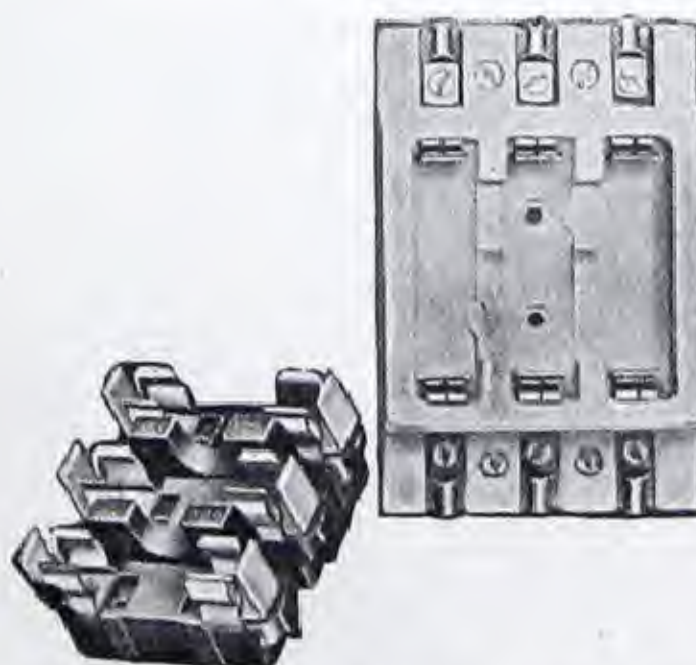
Main Lugs—Are of wrought copper, 98% conductivity, or high grade composition castings, designed for convenience in connecting.

MAIN FUSE CONNECTIONS

Are the "BULL DOG" SAFtoFUSE? Fuses cannot be touched while "alive" (means are provided, however, for the testing of Fuses, through holes in the composition blocks).

The 100 Amp. and larger SAFtoFUSE are as illustrated, and consist of high grade asbestos base molded material. The 30 Amp. and 60 Amp. type are familiar to the trade.

Mains up to and including 200 Amp. capacity may be installed in our standard depth UNIT-VERSAL Boxes. For larger than 200 Amp., deeper Boxes are required. Mains in excess of 200 Amp. for Lighting Panelboards are not recommended by manufacturers.



30 Amp. and 60 Amp. SAFtoFUSE Mains.

BULL DOG LIGHTING PANELBOARDS

Types of Mains—(Continued)

The SAFToFUSE is listed as standard by "H.E.P.C. of Ontario" as a "Combination Switch and Cut Out." In many cases the Main Switch is seldom used being required only for disconnecting the Panel to make it safe and convenient to make additional connections or replacements. The SAFToFUSE ideally meets these conditions, and in many instances may be used as a combined Switch and Fuse. All live metal parts are guarded against accidental contact, and they are "SAFToFUSE."

Main Switches

When conditions of installation require the frequent throwing "on" or "off" of all Branch Circuits connected to the Panelboards (instead of operating each individual branch switch) Safety Toggle or Brush Type Switches in the Mains conveniently perform this function.

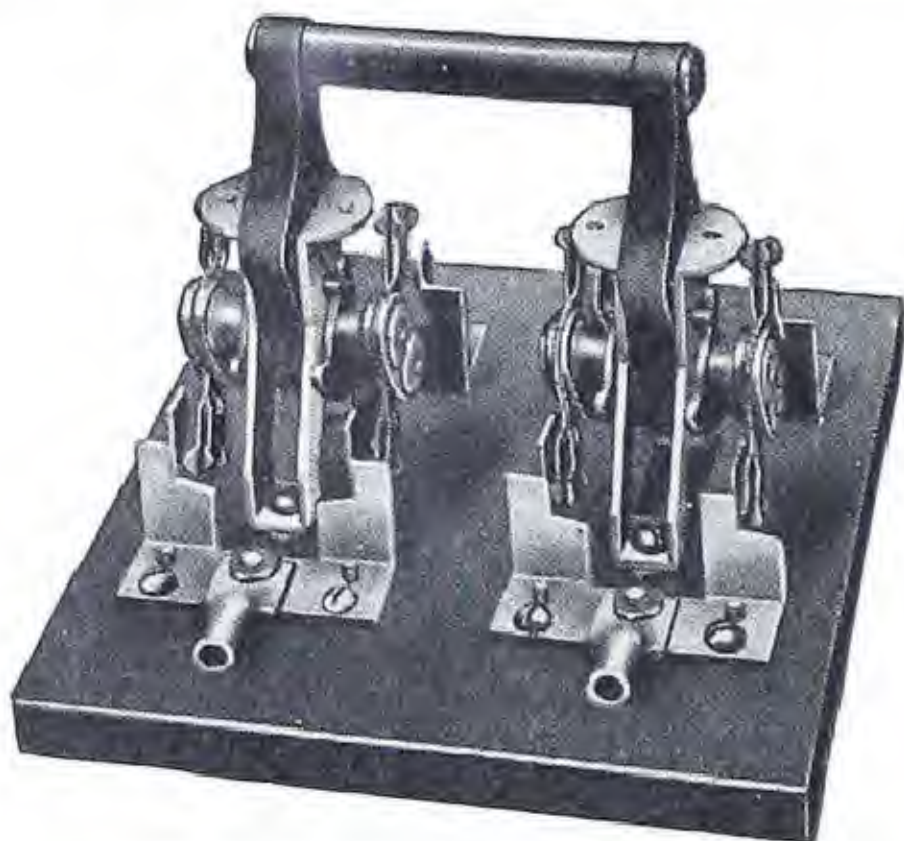
Therefore Main Switches are listed in addition to the SAFToFUSE. However, Main Brush or Toggle Type Switches only without SAFToFUSE can be furnished. Ask for special quotation.

Main Switches as furnished on "Bull Dog" Unit-Versal Panelboards are of two types, each best adapted for their particular purpose.

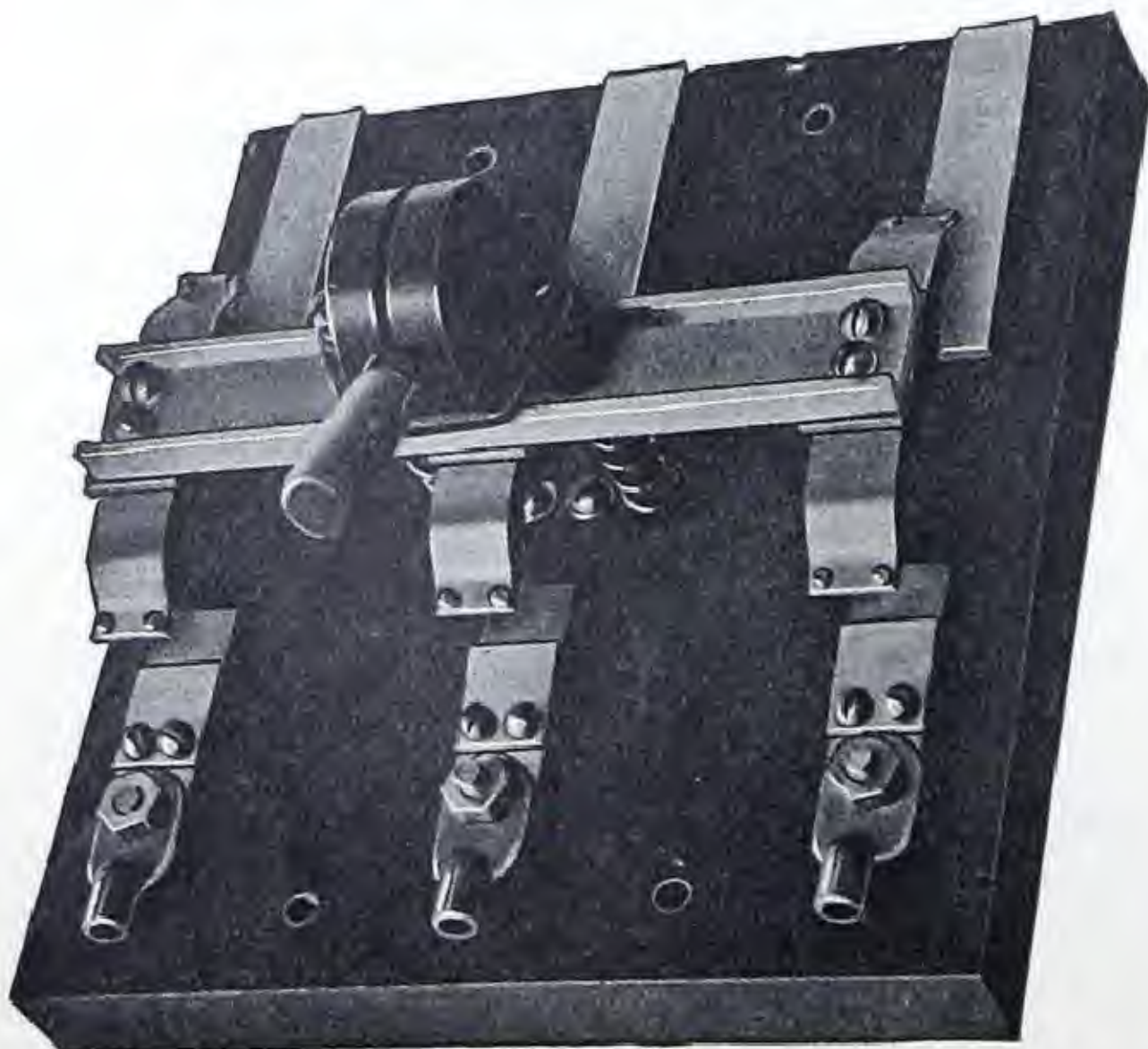
30 Amp. and 60 Amp. Mains are Heavy Duty, Quick-Make and Quick-Break "Bull Dog" Toggle Switches.

100 Amp. and larger are Brush Type Switches.

Brush Type Main Switches are mounted on a separate slate base which may be removed from front of panel for cleaning of contacts—as Brush Type contacts should be periodically inspected and cleaned.



"Bull Dog" Toggle Switches
as used for 30 Amp. and 60 Amp. Mains



Brush Type Switches as used for 100 Amp. Mains and larger

BULL DOG LIGHTING PANELBOARDS

Branch Circuit Sections

Below are shown a few of the standardized units made of high grade molded insulating material, of the "Bull Dog" Unit-Versal Panelboard Line.

These units are designed for a uniform width of Panel of approximately 11 inches, furnished with their enclosing steel Boxes as assembled in Panelboards to meet almost any conceivable condition of installation.

The standard width of steel Boxes is 19 inches I. D. (except "R" Type). This allows a 4-inch Wiring Gutter on all sides of Panel.

A 4-inch Wiring Gutter is standard for all Unit-Versal Panelboards, the complete line of which comprises:

Lighting Panelboards of various Types.

Metering Panels of various Types.

Power and Light Feeder Panels.

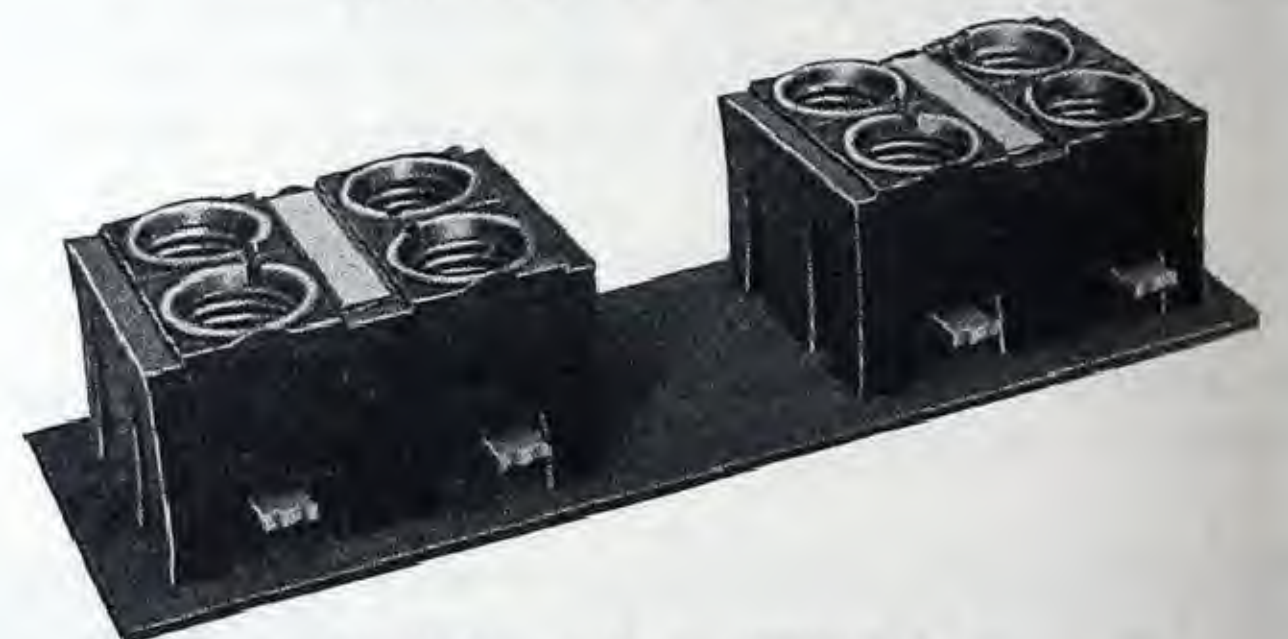
These may all be installed in our standard width 19-inch Boxes.



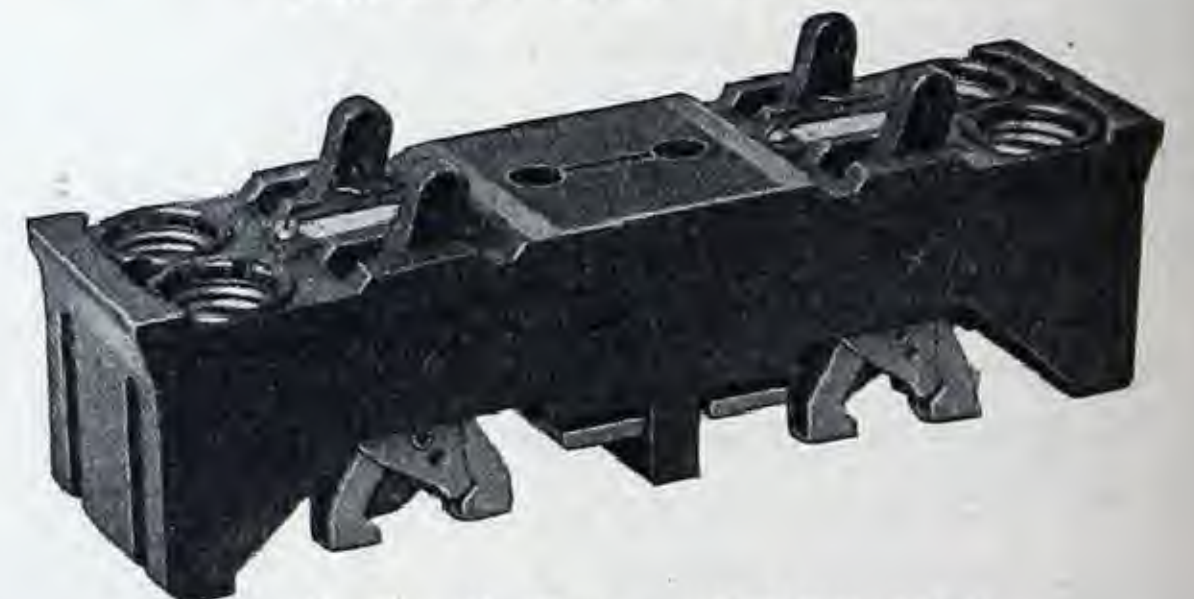
"Bull Dog" Type "RP" Unit



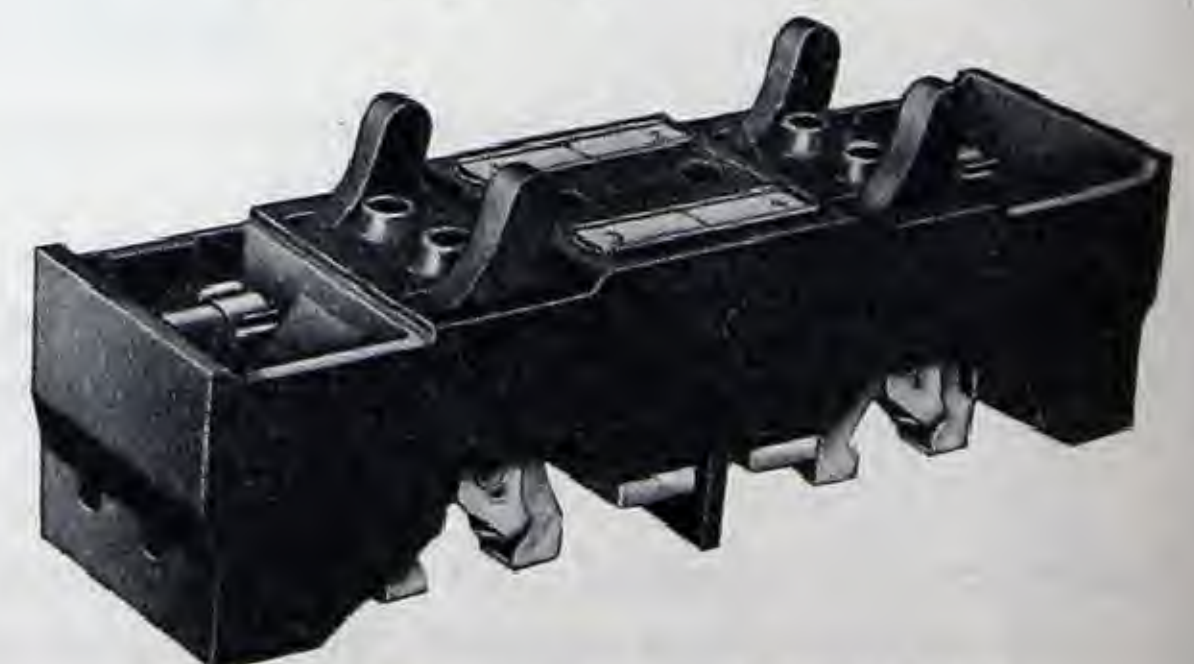
"Bull Dog" Type "TP" Unit



"Bull Dog" Type "2P" Unit



"Bull Dog" Type "NTP" Unit



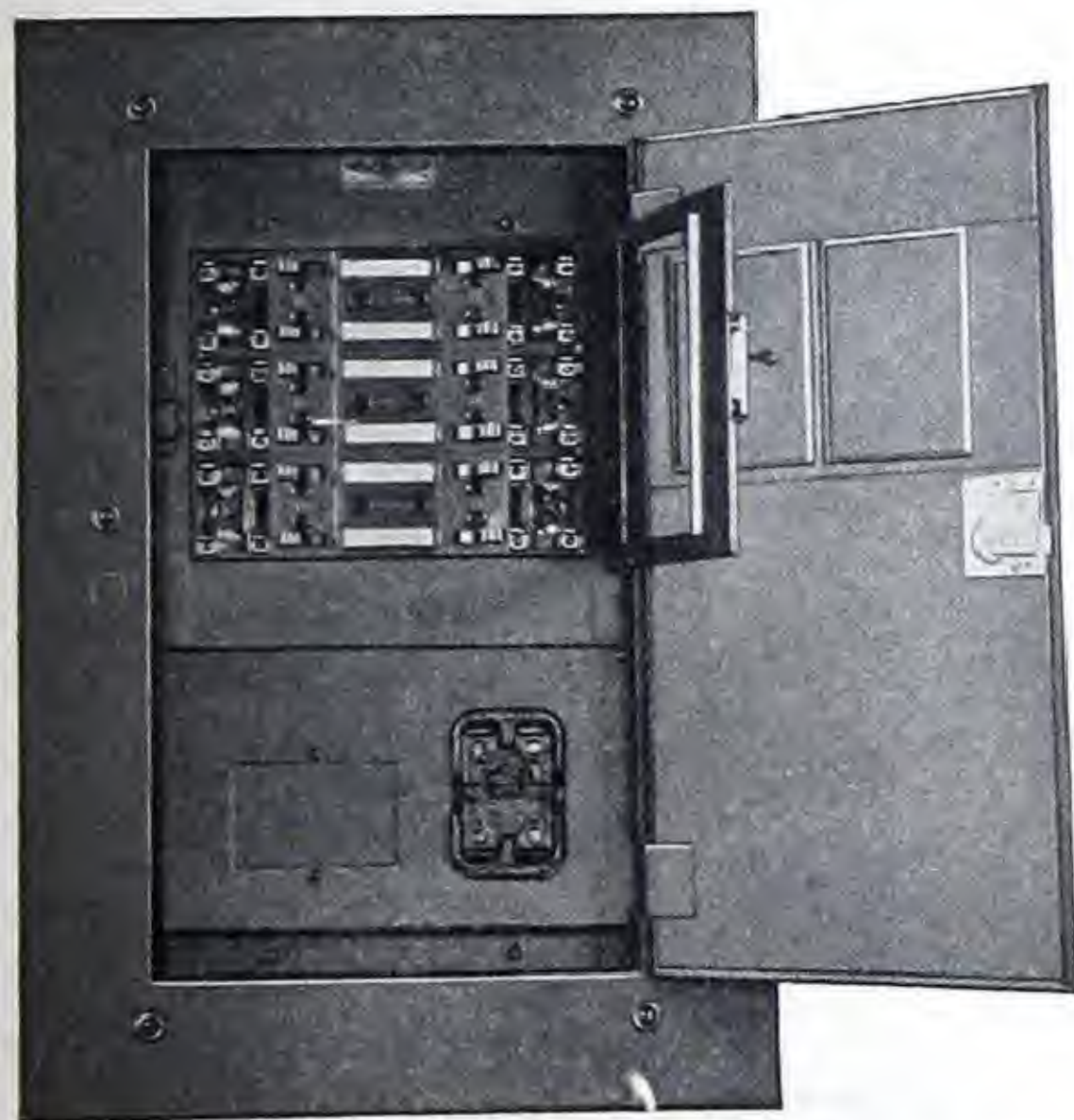
"Bull Dog" Type "NTC" Unit

BULL DOG LIGHTING PANELBOARDS

Standardized Steel Fronts



"BULL DOG" One Door or Outer Door Construction, equipped with Flush Spring Lock and 2 keys.



Two Door Construction. Both doors are equipped with "BULL DOG" Flush Spring Lock and 2 keys.



This Flush Spring Lock with Ring Handle is of special design, designed and manufactured in the BULL DOG Factory. It was designed to overcome the annoyance, inconvenience and constant breakage experienced with the old style protruding knob locks usually furnished with panelboards. It shows lock in open position. The ring handle fits in a recess and is thus flush with front.

BULL DOG LIGHTING PANELBOARDS

Construction

"BULL DOG" Standard Steel Cabinet Fronts are made from a single sheet of cold rolled Code Gauge Steel. The door is blanked out, leaving a trim (mat) of proper width all around the door. A neat and ornamental moulding completely surrounds and is welded on to the door and mitered at the corners, reinforcing the door and making it attractive in appearance, as well as providing a rabbet around the door opening.

Hardware

The Fronts of UNIT-VERSAL Panelboards are furnished with flush hinges and with "BULL DOG" Flush Spring Lock and 2 keys.

Trim Clamps

BULL DOG make—illustrated and described below.

Flush or Surface

All Fronts for Cabinet Boxes set flush in wall with finished plaster, are made 1" larger than Box, and all Fronts for Cabinet Boxes set on wall are made approximately the size of the outside of the box.

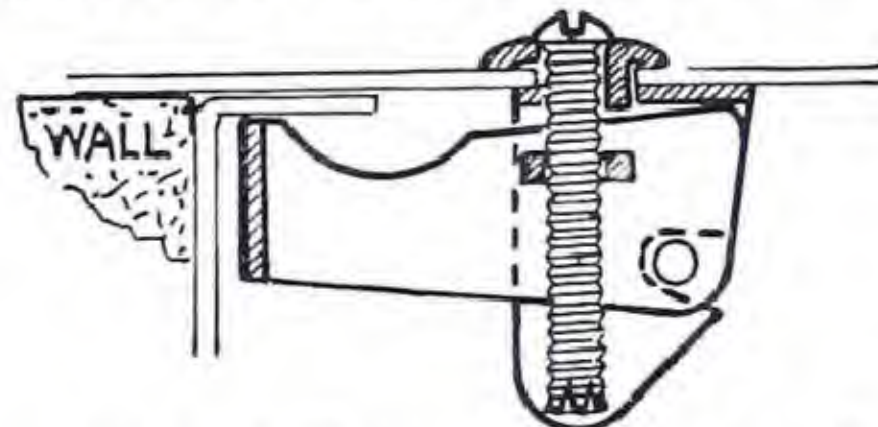
Important—FLUSH TYPE FRONTS WILL ALWAYS BE FURNISHED UNLESS CUSTOMER SPECIFIES THAT SURFACE TYPE IS REQUIRED.

Finish

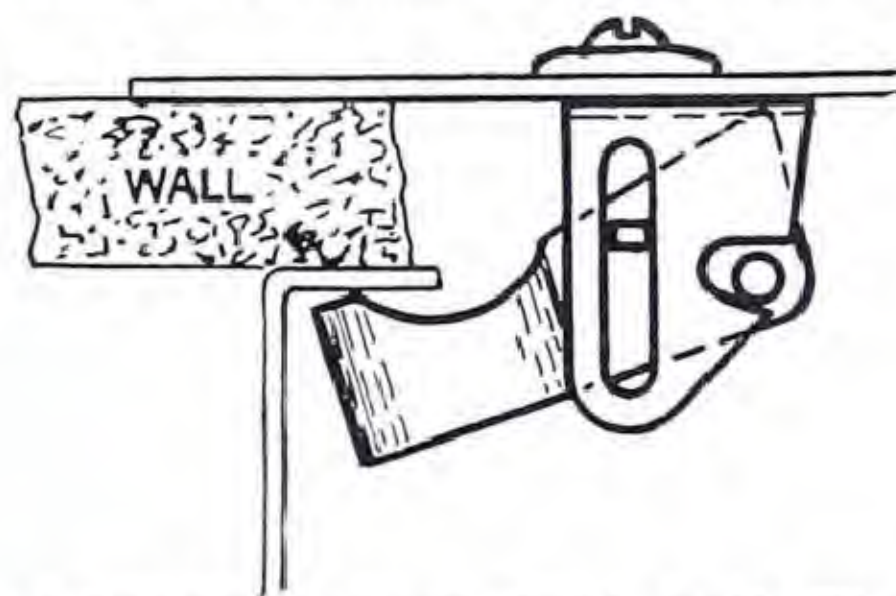
The FRONTS of all UNIT-VERSAL Panelboards, with the exception of "R" Type, are finished Black. When specified, LUMINIZED Finish will be furnished at additional cost. LUMINIZED is the standard finish for "R" Type Panels.

The New BULL DOG Trim Clamp

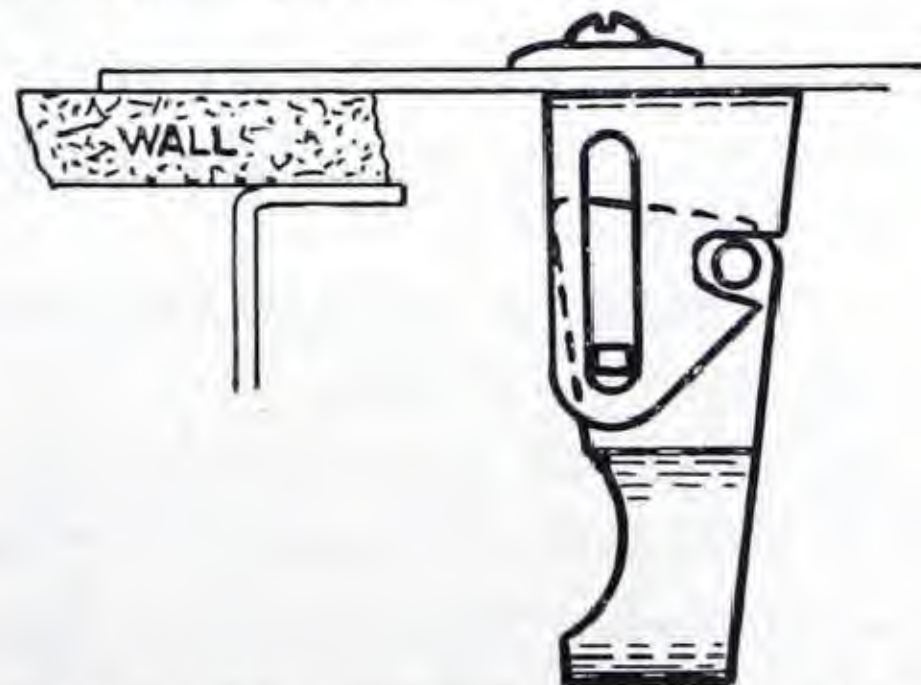
Instantly self-adjusting—no indicator to manipulate. The bottom clamps also act as a rest to support the Front in position while tightening the remaining clamps. A one-man job—making for easier and quicker installation.



Showing position of Clamp with Box installed flush with wall. This is a cut away view of Clamp showing Interlocking Washer on outside of Cabinet Front that prevents turning.



Clamp with Box recessed over $\frac{3}{4}$ " in wall. The heel always rests against the trim, regardless of position. This removes the strain from other parts.



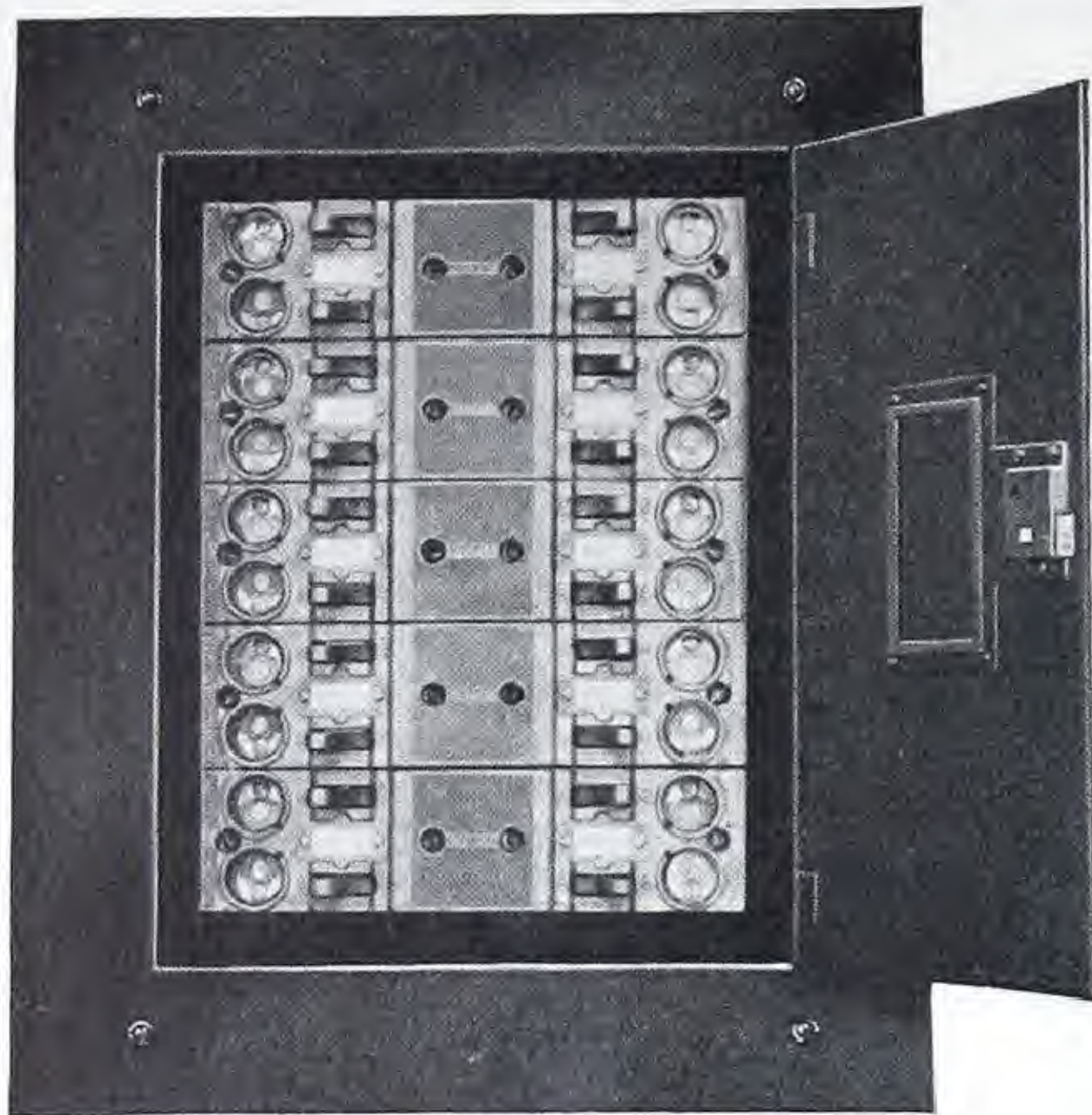
Full open view. No twisting or turning of clamp required to mount or remove Front from Cabinet. Nut rests in a straight slot, always keeping screw head straight.

BULL DOG LIGHTING PANELBOARDS

Type TP and NTP

(ONE DOOR CONSTRUCTION)

Branch Circuits—Toggle Switches with Plug Fuse Connections



Type NTP have Single Pole Toggle Switches and One Plug Fuse Connection per Branch Circuit.

Type TP have Two Pole Toggle Switches and Two Plug Fuse Connections per Branch Circuit.

These Panels are built up of Branch Circuit Sections of molded material, each section having 30 Amp. 250 Volt "Bull Dog" Heavy Duty Toggle Switches with N. E. C. Plug Fuse Connections and these Sections with their Main Connections are mounted on removeable steel mounting plates.

Type of Mains.

Main Lugs.

Main Fuse Connections—The "Bull Dog" SAFtoFUSE, which is listed by H. E. P. C. of Ontario Laboratories as a "Combination Switch and Cut Out." The SAFtoFUSE may therefore be used as a Main Fusible Switch especially under conditions where the Main Switch on Panel would be very infrequently operated.

Main Fusible Switches (for frequent operation).

30 Amp. and 60 Amp. Safety Type, Heavy Duty Toggle Switches fusible with "Bull Dog" SAFtoFUSE.

100 Amp. and larger—Safety Brush Type Switches, fusible with "Bull Dog" SAFtoFUSE.

Boxes are of code thickness Galvanized Steel—19" wide, with 4 inch wiring gutters on all sides.

Cabinet Fronts are of cold rolled steel with neat molding mitered on the corners, surrounding and reinforcing door.

Doors are provided with "Bull Dog" Flush Spring Locks (superior to the projecting door knob type) and 2 keys.

Flush Fronts furnished unless Surface Type specified on orders.

BULLDOG PANELBOARDS

Type NTP3

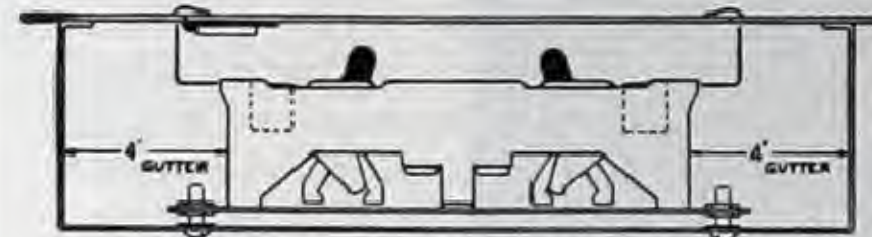
Panel: Made of Sections of Molded Material.

Branches: 30 Amp. S. P., Bull Dog Toggle Switches with N. E. C. Plug Fuse Connections.

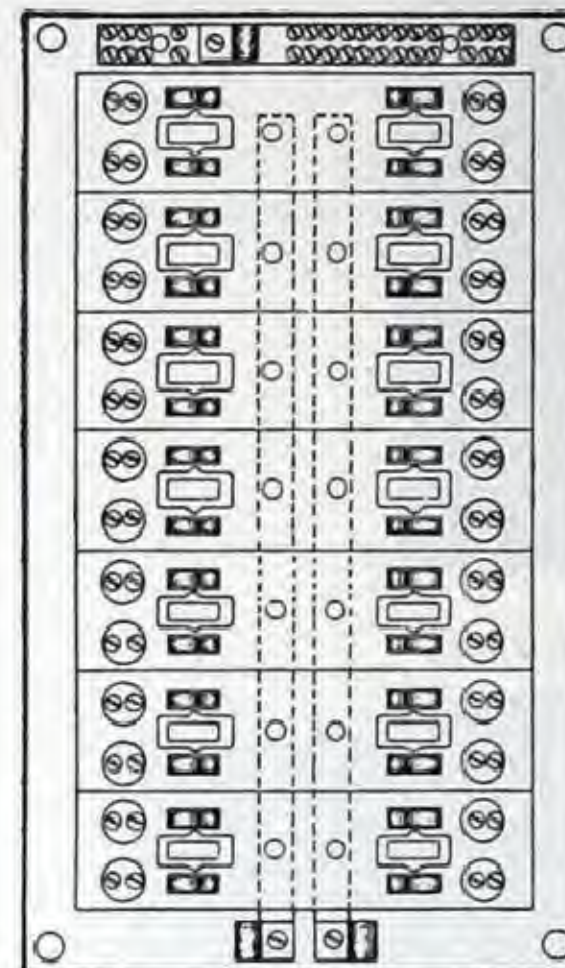
Box: Code Thickness Galvanized Steel — Gutter Type.

Front: Code Thickness Steel—Black Finish. See Footnote.

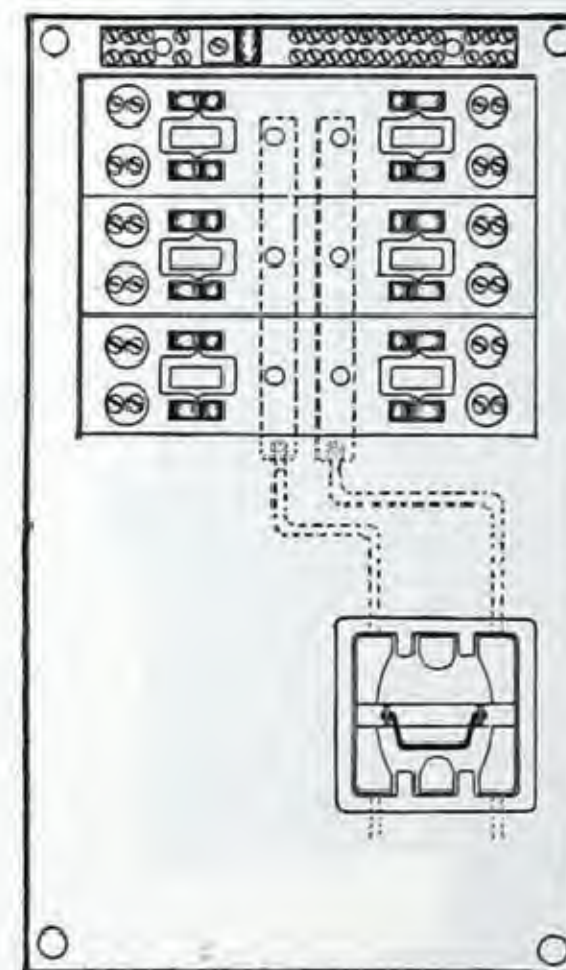
Dimensions: Inside width 19" and depth 5½". Gutter 4".



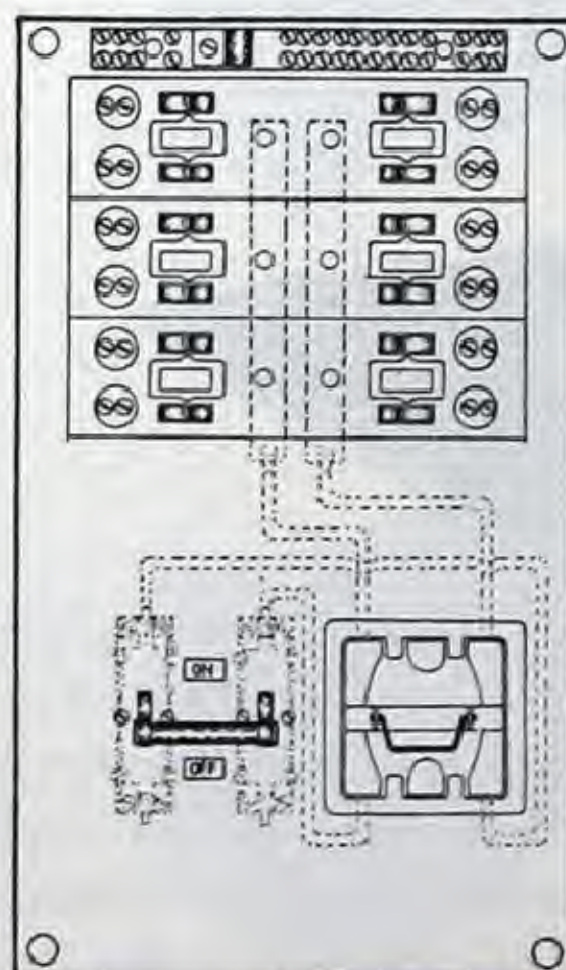
Mains—125-250 V. 3-Wire
Branches—125 V. 2-Wire



Style NTP3L



Style NTP3F



Style NTP3BSF

Combined Panel and Steel Cabinet (Box and Front) Code Gauge

No. Circ.	List Price	List No.	Approx. Weight	Amp. Capacity of Mains	Inside Height inches
Mains: Lugs Only					
4	\$34.00	NTP304L	63	30	14
8	40.00	NTP308L	75	60	17
12	50.00	NTP312L	85	60	20
16	74.00	NTP316L	95	100	23
20	84.00	NTP320L	105	100	26
24	94.00	NTP324L	125	100	29
28	104.00	NTP328L	135	100	32
32	114.00	NTP332L	145	100	35
36	140.00	NTP336L	170	200	41
40	150.00	NTP340L	185	200	44

Main Fuse Connections (SAFtoFUSE—Fusible Switch)—Solid Neutral

4	\$46.00	NTP304F	95	30	23
8	58.00	NTP308F	105	60	26
12	70.00	NTP312F	125	60	29
16	90.00	NTP316F	145	100	35
20	102.00	NTP320F	160	100	38
24	114.00	NTP324F	170	100	41
28	126.00	NTP328F	185	100	44
32	138.00	NTP332F	205	100	47
36	166.00	NTP336F	225	200	53
40	178.00	NTP340F	240	200	56

Main Toggle or Brush Switch with SAFtoFUSE—Solid Neutral

4	\$64.00	NTP304BSF	95	30	23
8	74.00	NTP308BSF	105	60	26
12	86.00	NTP312BSF	125	60	29
16	110.00	NTP316BSF	145	100	35
20	122.00	NTP320BSF	160	100	38
24	134.00	NTP324BSF	170	100	41
28	146.00	NTP328BSF	185	100	44
32	158.00	NTP332BSF	205	100	47
36	206.00	NTP336BSF	225	200	53
40	218.00	NTP340BSF	240	200	56

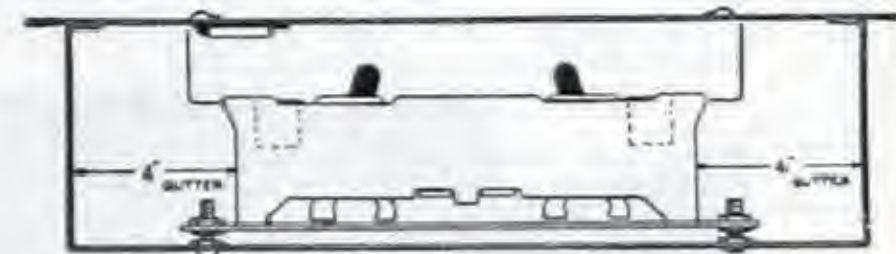
Flush Type Fronts shipped unless Surface Type specified on order.

BULL DOG PANELBOARDS

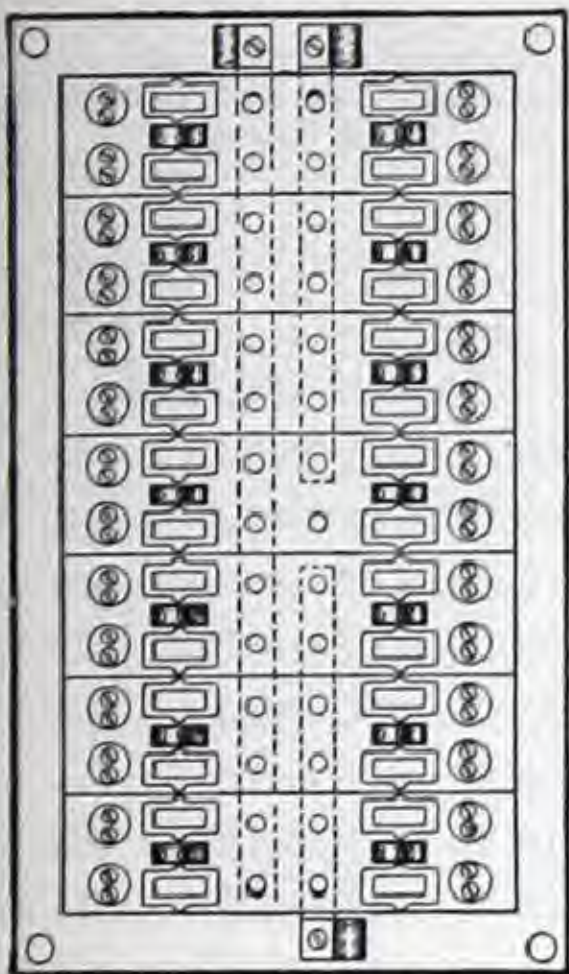
Type TP3

Panel: Made of Sections of Molded Material.
 Branches: 30 Amp. 2 P., Bull Dog Toggle Switches with N.E.C. Plug Fuse Connections.
 Box: Code Thickness Galvanized Steel—Gutter Type.
 Front: Code Thickness Steel—Black Finish. See footnote.
 Dimensions: Cabinet depth inside 5½" and width 19". Gutter 4" deep.

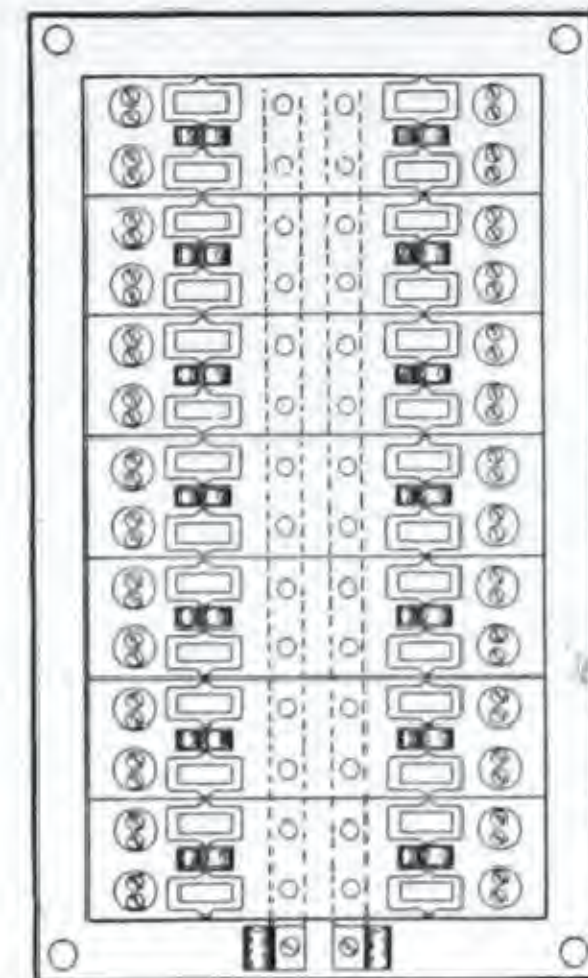
Mains—125-250 V. 3-Wire
 Branches—125 V. 2-Wire



Mains—125-V. 2-Wire
 Branches—125 V. 2-Wire



Style TP3L



Style TP2L

No. Circ.	List Price	Combined Panel and Steel Cabinet (Box and Front) Code Gauge	Approx. Weight	Amp. Capacity of Mains	Inside Height Inches
Mains: Lugs Only					
4	\$ 38.00	TP304L	75	30	17
6	48.00	TP306L	85	60	20
8	58.00	TP308L	95	60	23
10	68.00	TP310L	105	60	26
12	78.00	TP312L	125	60	29
14	90.00	TP314L	135	100	32
16	100.00	TP316L	145	100	35
18	110.00	TP318L	160	100	38
20	124.00	TP320L	170	100	41

Main Fuse Connections (SAFtoFUSE—Fusible Switch) Solid Neutral

4	\$ 52.00	TP304F	105	30	26
6	62.00	TP306F	125	60	29
8	72.00	TP308F	135	60	32
10	82.00	TP310F	145	60	35
12	92.00	TP312F	160	60	38
14	112.00	TP314F	185	100	44
16	122.00	TP316F	205	100	47
18	132.00	TP318F	215	100	50
20	142.00	TP320F	225	100	53

Main Toggle or Brush Switch with SAFtoFUSE—Solid Neutral

4	\$ 70.00	TP304BSF	105	30	26
6	80.00	TP306BSF	125	60	29
8	90.00	TP308BSF	135	60	32
10	100.00	TP310BSF	145	60	35
12	110.00	TP312BSF	160	60	38
14	130.00	TP314BSF	185	100	44
16	140.00	TP316BSF	205	100	47
18	150.00	TP318BSF	215	100	50
20	166.00	TP320BSF	225	100	53

Type TP2

Branches: 30 Amp. 2 P., Toggle Switches with N. E. C. Plug Fuse Connections.

Mains: Lugs Only

4	\$ 42.00	TP204L	75	60	17
6	52.00	TP206L	85	100	20
8	62.00	TP208L	95	100	23
10	72.00	TP210L	105	100	26
12	82.00	TP212L	125	200	29
14	94.00	TP214L	135	200	32
16	104.00	TP216L	145	200	35
18	114.00	TP218L	160	200	38
20	124.00	TP220L	170	200	41

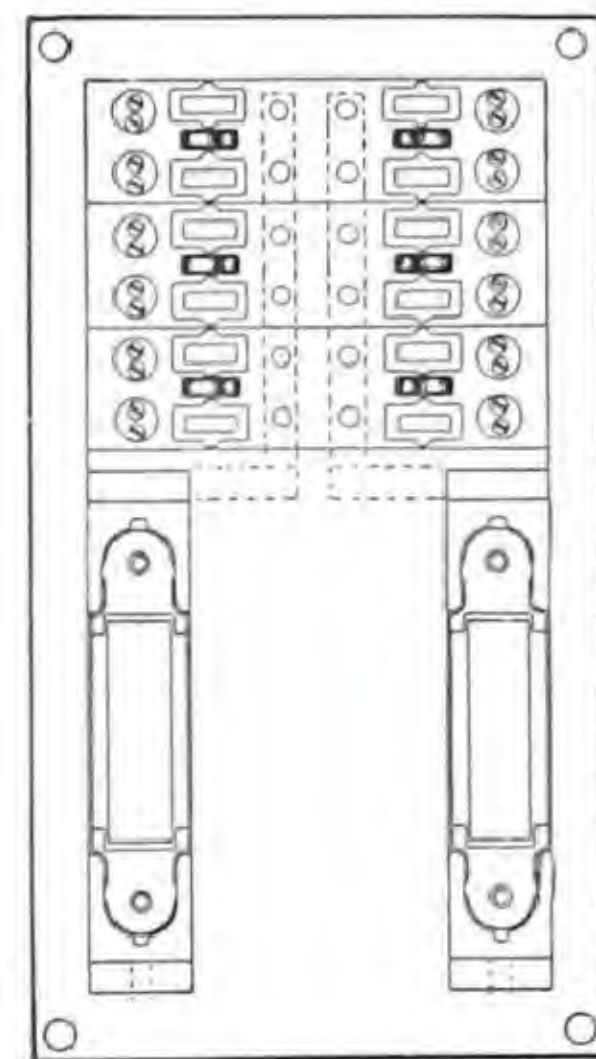
Main Fuse Connections (SAFtoFUSE—Fusible Switch)

4	\$ 58.00	TP204F	105	60	26
6	70.00	TP206F	135	100	32
8	80.00	TP208F	145	100	35
10	90.00	TP210F	160	100	38
12	110.00	TP212F	170	200	41
14	120.00	TP214F	185	200	44
16	130.00	TP216F	205	200	47
18	140.00	TP218F	215	200	50
20	150.00	TP220F	225	200	53

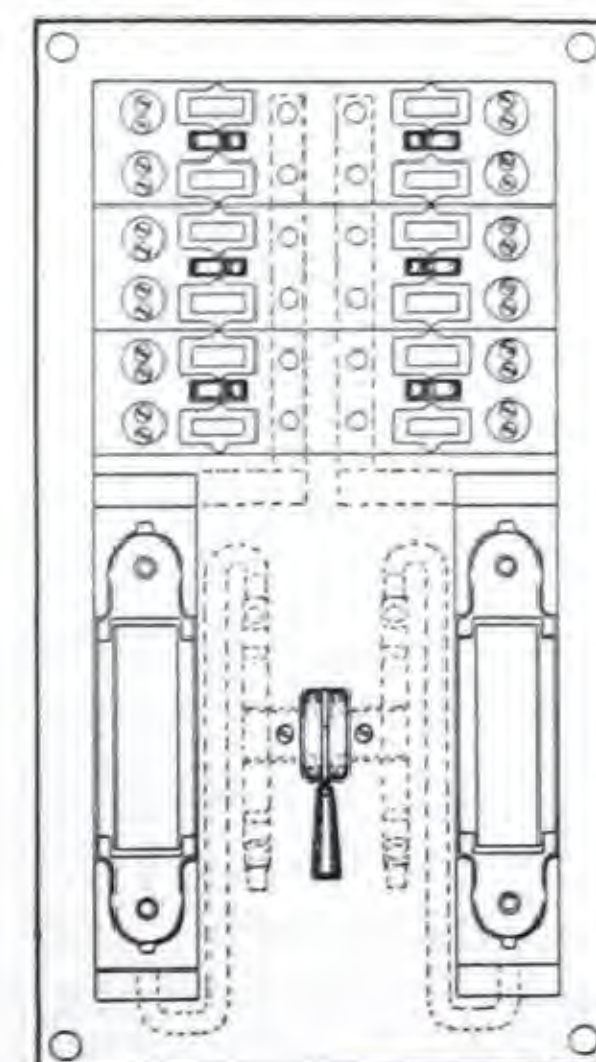
Main Toggle or Brush Switch with SAFtoFUSE

4	\$ 72.00	TP204BSF	105	60	26
6	92.00	TP206BSF	135	100	32
8	102.00	TP208BSF	145	100	35
10	112.00	TP210BSF	160	100	38
12	144.00	TP212BSF	170	200	41
14	154.00	TP214BSF	185	200	44
16	174.00	TP216BSF	205	200	47
18	184.00	TP218BSF	215	200	50
20	194.00	TP220BSF	225	200	53

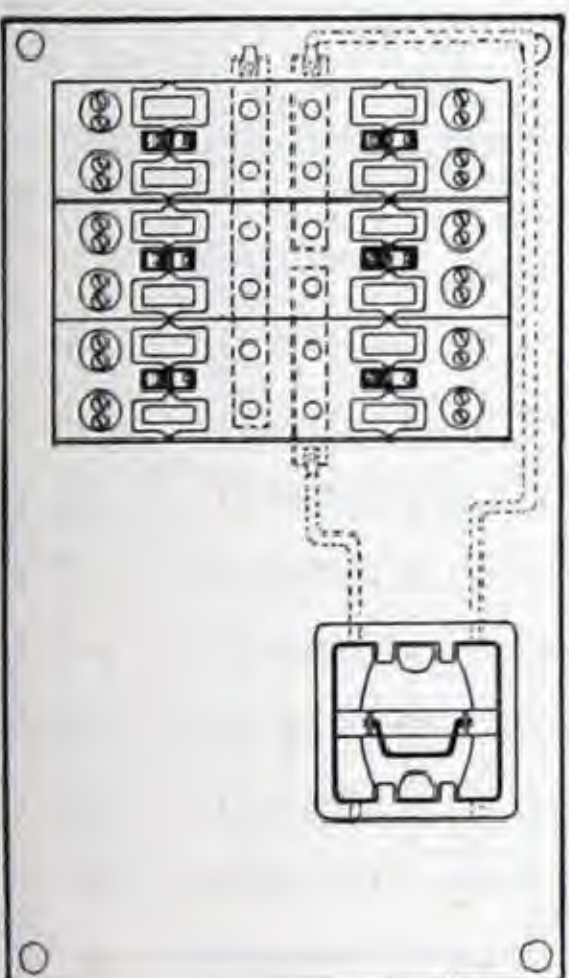
Flush Type Fronts shipped unless Surface Type specified on order.



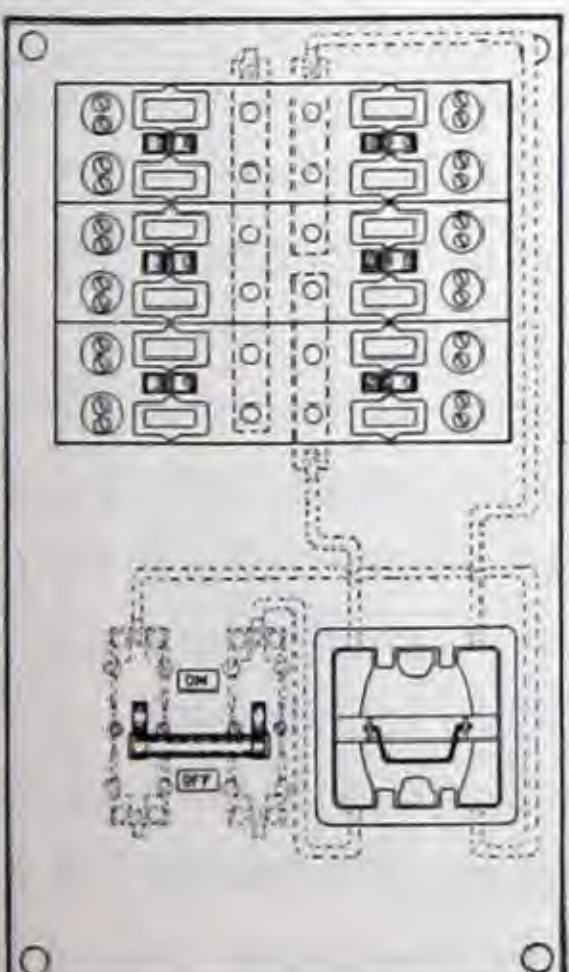
Style TP2F



Style TP2BSF



Style TP3F



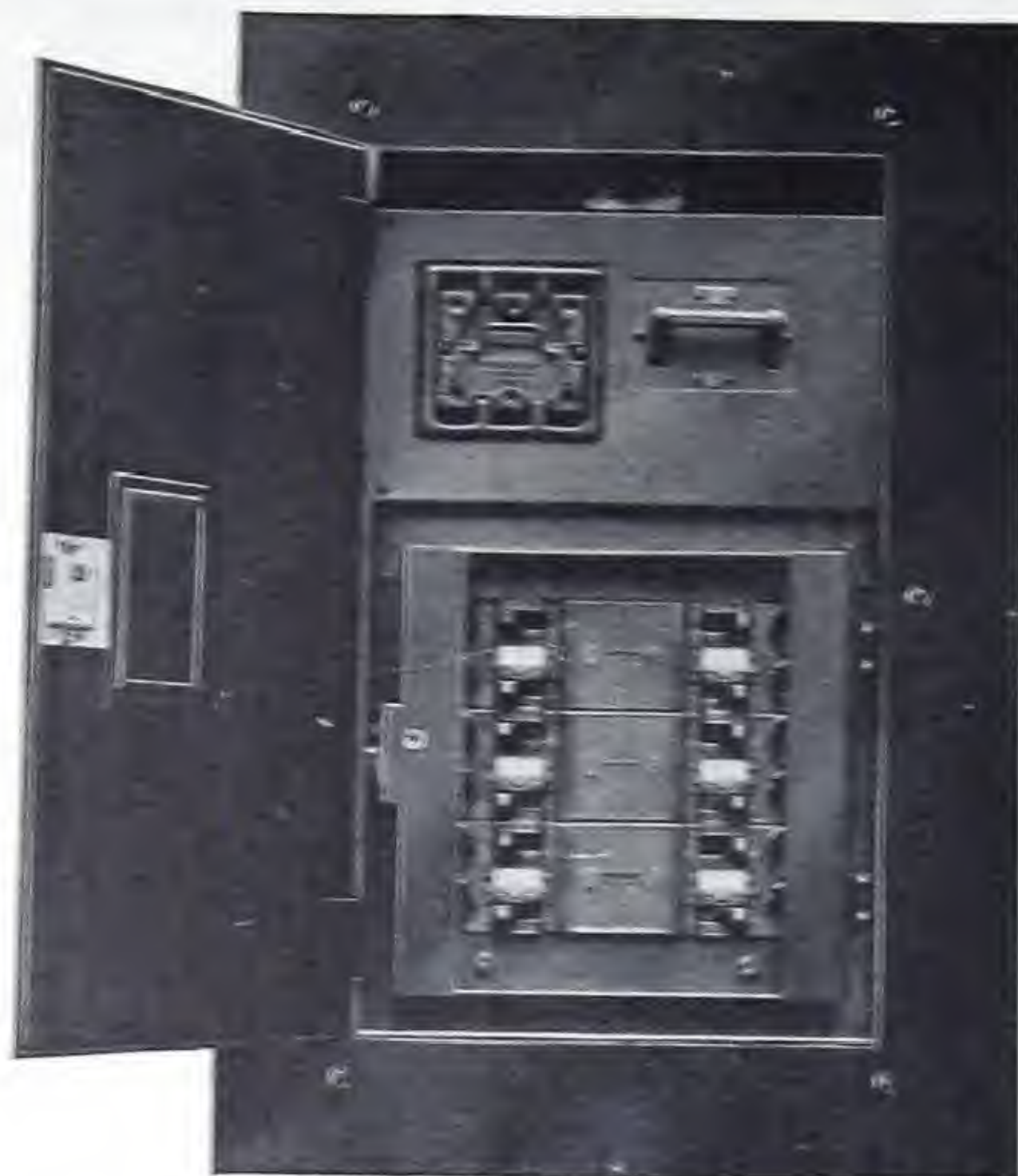
Style TP3BSF

BULL DOG LIGHTING PANELBOARDS

Type TPD and NTPD

(INNER DOOR CONSTRUCTION)

Branch Circuits—Toggle Switches with Plug Fuse Connections



These Panels have an additional or Inner Door over the Branch Circuit Fuses, equipped with "Bull Dog" Flush Spring Lock.

Type NTPD have Single Pole Toggle Switches and One Plug Fuse Connection per Branch Circuit.

Type TPD have Two Pole Toggle Switches and Two Plug Fuse Connections per Branch Circuit.

These Panels are built up of Branch Circuit Sections of molded material, each section having 30 Amp. 250 Volt Heavy Duty Toggle Switches with N. E. C. Plug Fuse Connections and these Sections with their Main Connections are mounted on removable steel mounting plates.

Type of Mains.

Main Lugs.

Main Fuse Connections—The "Bull Dog" SAFtoFUSE, which is listed by H. E. P. C. of Ontario Laboratories as a "Combination Switch and Cut Out." The SAFtoFUSE may therefore be used as a Main Fusible Switch especially under conditions where the Main Switch on Panel would be very infrequently operated.

Main Fusible Switches (for frequent operation).

30 Amp. and 60 Amp. Safety Type, Heavy Duty Toggle Switches fusible with "Bull Dog" SAFtoFUSE.

100 Amp. and larger—Safety Brush Type Switches, fusible with "Bull Dog" SAFtoFUSE.

Boxes are of code thickness Galvanized Steel—19" wide, with 4 inch wiring gutters on all sides.

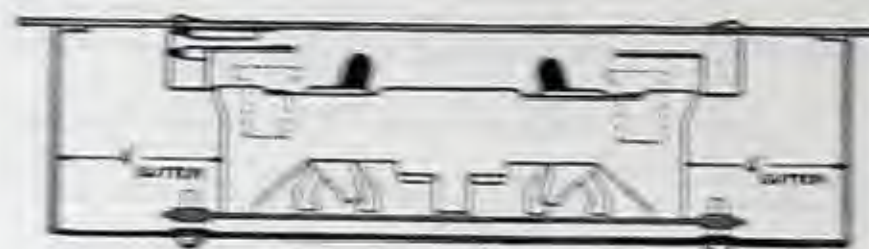
Cabinet Fronts are of cold rolled steel with neat molding mitered on the corners, surrounding and reinforcing door.

Doors are provided with "Bull Dog" Flush Spring Locks (superior to the projecting door knob type) and 2 keys.

Flush Fronts furnished unless Surface Type specified on orders.

BULL DOG PANELBOARDS

Type NTP3D



Mains—125-250 V. 3-Wire
Branches—125 V. 2-Wire

Panel: Made of Sections of Molded Material.

Branches: 30 Amp. S. P. Toggle Switches with N. E. C. Plug Fuse Connections.

Box: Code Thickness Galvanized Steel—Gutter Type.

Front: Code Thickness Steel—Black Finish. See Footnote.

Dimensions: Cabinet width inside 19" and depth 5 1/2". Gutter 4".

No. Circ.	List Price	List No.	Approx. Weight	Amp. Capacity of Mains	Inside Height in inches
Mains: Lugs Only					
4	\$50.00	NTP304LD	68	30	14
8	60.00	NTP308LD	75	40	17
12	70.00	NTP312LD	85	60	20
16	86.00	NTP316LD	95	100	21
20	96.00	NTP320LD	105	100	21
24	106.00	NTP324LD	125	100	29
28	116.00	NTP328LD	135	100	32
32	126.00	NTP332LD	145	100	35
36	152.00	NTP336LD	170	200	41
40	162.00	NTP340LD	185	200	44

Style NTP3LD

No. Circ.	List Price	List No.	Approx. Weight	Amp. Capacity of Mains	Inside Height in inches
Main Fuse Connections (SAFtoFUSE—Fusible Switch) Solid Neutral					
4	\$62.00	NTP304FD	95	30	21
8	74.00	NTP308FD	105	40	20
12	86.00	NTP312FD	125	60	29
16	102.00	NTP316FD	145	100	35
20	114.00	NTP320FD	160	100	38
24	126.00	NTP324FD	170	100	41
28	138.00	NTP328FD	185	100	44
32	150.00	NTP332FD	205	100	47
36	178.00	NTP336FD	225	200	51
40	190.00	NTP340FD	240	200	54

Style NTP3FD

No. Circ.	List Price	List No.	Approx. Weight	Amp. Capacity of Mains	Inside Height in inches
Main Toggle or Brush Switch with SAFtoFUSE—Solid Neutral					
4	\$80.00	NTP304BSFD	95	30	21
8	90.00	NTP308BSFD	105	40	20
12	102.00	NTP312BSFD	125	60	29
16	122.00	NTP316BSFD	145	100	35
20	124.00	NTP320BSFD	160	100	38
24	146.00	NTP324BSFD	170	100	41
28	158.00	NTP328BSFD	185	100	44
32	170.00	NTP332BSFD	205	100	47
36	218.00	NTP336BSFD	225	200	51
40	230.00	NTP340BSFD	240	200	54

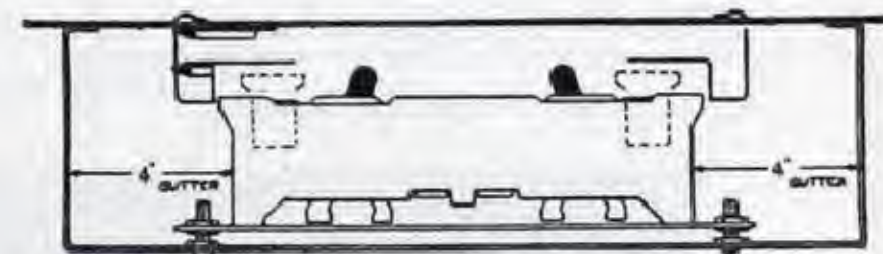
Style NTP3BSFD

Flush Type Fronts shipped unless Surface Type specified on order.

BULL DOG PANELBOARDS

Type TP3D

Panel: Made of Sections of Molded Material.
 Branches: 30 Amp. 2, P., Toggle Switches with N.E.C. Plug Fuse Connections.
 Box: Code Thickness Galvanized Steel—Gutter Type.
 Front: Code Thickness Steel—Black Finish. See footnote.
 Dimensions: Cabinet depth inside 5½" and width 19". Gutter 4" deep.



Mains—125 V. 2-Wire
 Branches—125 V. 2-Wire

Combined Panel and Steel Cabinet (Box and Front) Code Gauge					
No. Circ.	List Price	List Number	Approx. Weight	Amp. Capacity of Mains	Inside Height Inches
Mains: Lugs Only					
4	\$ 58.00	TP304LD	75	30	17
6	68.00	TP306LD	85	60	20
8	78.00	TP308LD	95	60	23
10	88.00	TP310LD	105	60	26
12	98.00	TP312LD	125	60	29
14	106.00	TP314LD	135	100	32
16	116.00	TP316LD	145	100	35
18	126.00	TP318LD	160	100	38
20	140.00	TP320LD	170	100	41

Main Fuse Connections (SAFtoFUSE—Fusible Switch) Solid Neutral

4	\$ 68.00	TP304FD	105	30	26
6	78.00	TP306FD	125	60	29
8	88.00	TP308FD	135	60	32
10	98.00	TP310FD	145	60	35
12	108.00	TP312FD	160	60	38
14	128.00	TP314FD	185	100	44
16	138.00	TP316FD	205	100	47
18	148.00	TP318FD	215	100	50
20	158.00	TP320FD	225	100	53

Main Toggle or Brush Switch with SAFtoFUSE—Solid Neutral

4	\$ 86.00	TP304BSFD	105	30	26
6	96.00	TP306BSFD	125	60	29
8	106.00	TP308BSFD	135	60	32
10	116.00	TP310BSFD	145	60	35
12	126.00	TP312BSFD	160	60	38
14	146.00	TP314BSFD	185	100	44
16	156.00	TP316BSFD	205	100	47
18	166.00	TP318BSFD	215	100	50
20	182.00	TP320BSFD	225	100	53

Type TP2D

Mains: Lugs Only

4	\$ 62.00	TP204LD	75	60	17
6	68.00	TP206LD	85	100	20
8	78.00	TP208LD	95	100	23
10	88.00	TP210LD	105	100	26
12	98.00	TP212LD	125	200	29
14	110.00	TP214LD	135	200	32
16	120.00	TP216LD	145	200	35
18	130.00	TP218LD	160	200	38
20	140.00	TP220LD	170	200	41

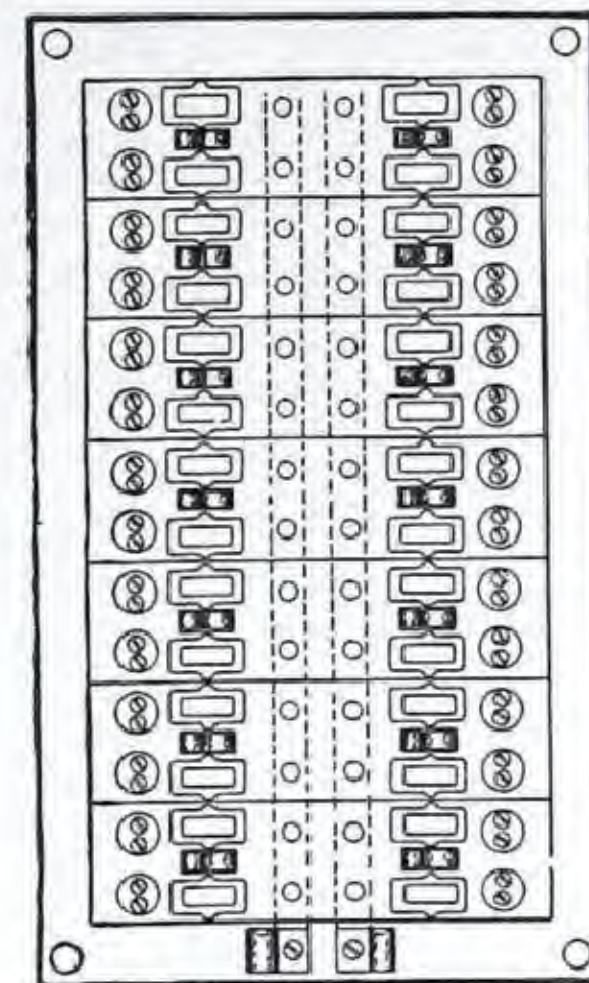
Main Fuse Connections (SAFtoFUSE—Fusible Switch)

4	\$ 74.00	TP204FD	105	60	26
6	86.00	TP206FD	135	100	32
8	96.00	TP208FD	145	100	35
10	106.00	TP210FD	160	100	38
12	126.00	TP212FD	170	200	41
14	136.00	TP214FD	185	200	44
16	146.00	TP216FD	205	200	47
18	156.00	TP218FD	215	200	50
20	166.00	TP220FD	225	200	53

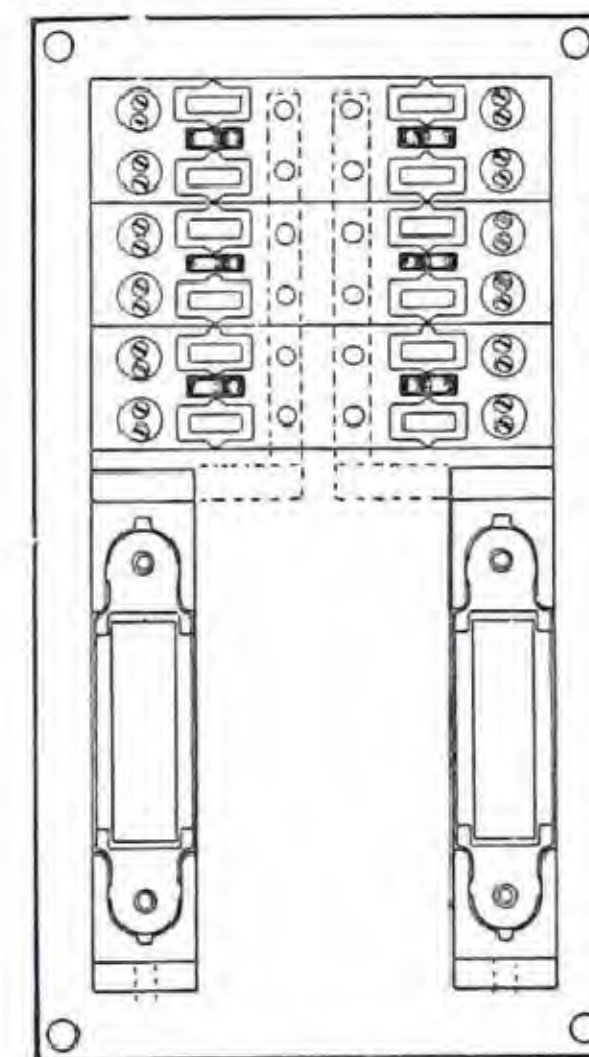
Main Toggle or Brush Switch with SAFtoFUSE

4	\$ 88.00	TP204BSFD	105	60	26
6	108.00	TP206BSFD	135	100	32
8	118.00	TP208BSFD	145	100	35
10	128.00	TP210BSFD	160	100	38
12	160.00	TP212BSFD	170	200	41
14	170.00	TP214BSFD	185	200	44
16	190.00	TP216BSFD	205	200	47
18	200.00	TP218BSFD	215	200	50
20	210.00	TP220BSFD	225	200	53

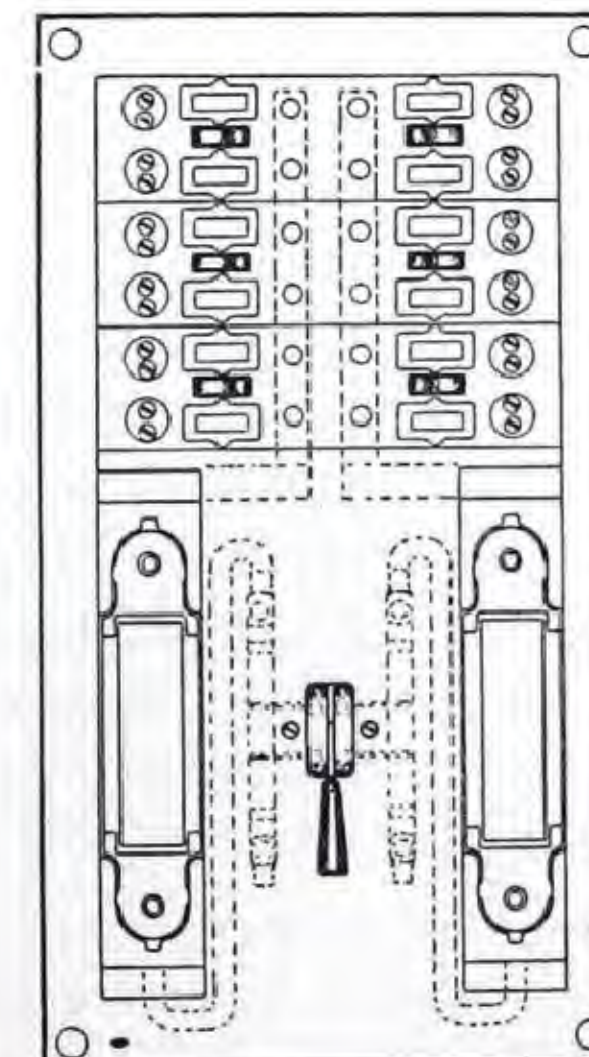
Flush Type Fronts shipped unless Surface Type specified on order.



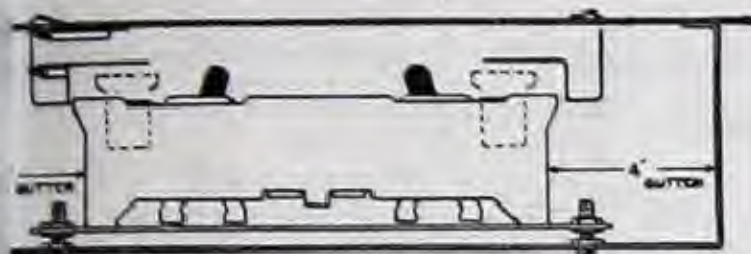
Style TP2LD



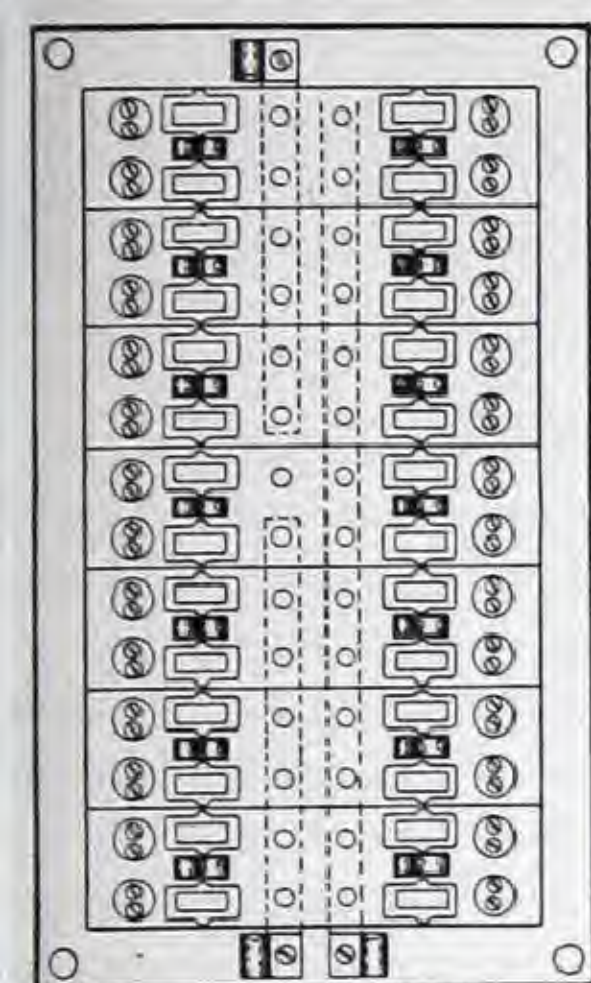
Style TP2FD



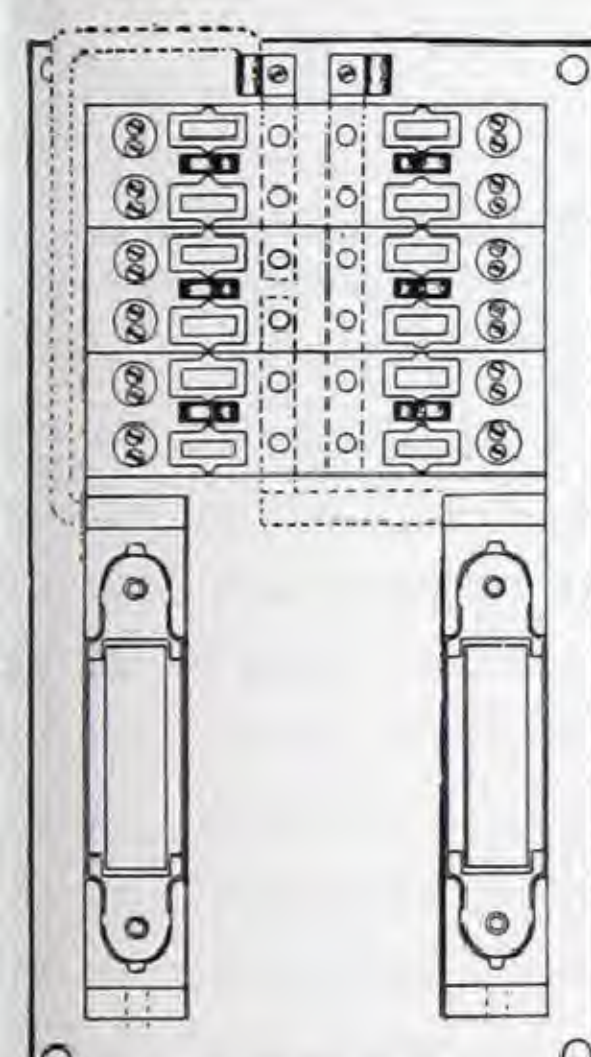
Style TP2BSFD



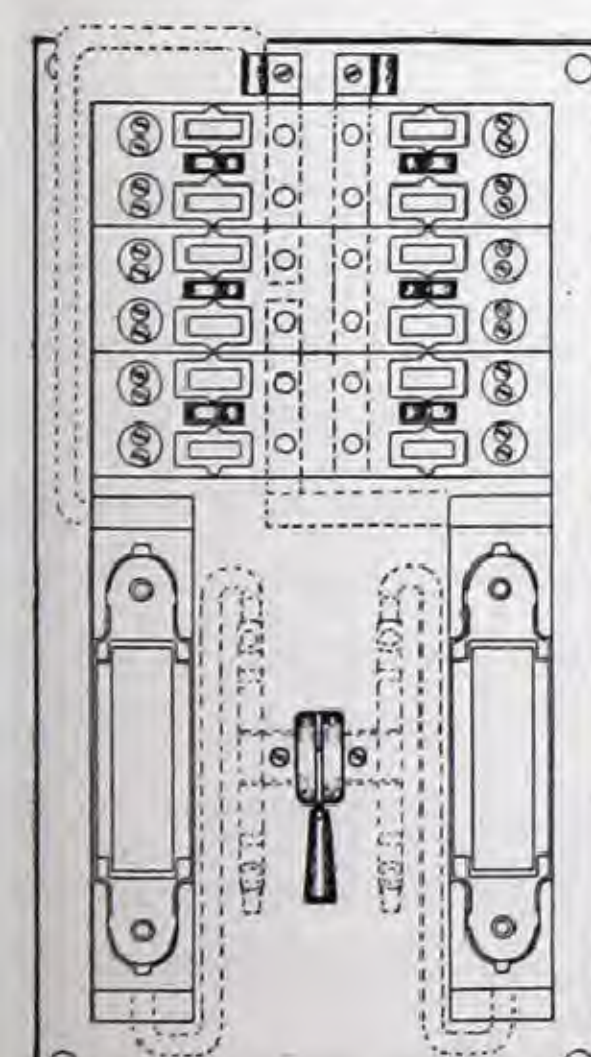
Mains—125-250 V. 3-Wire
 Branches—125 V. 2-Wire



Style TP3LD



Style TP3FD



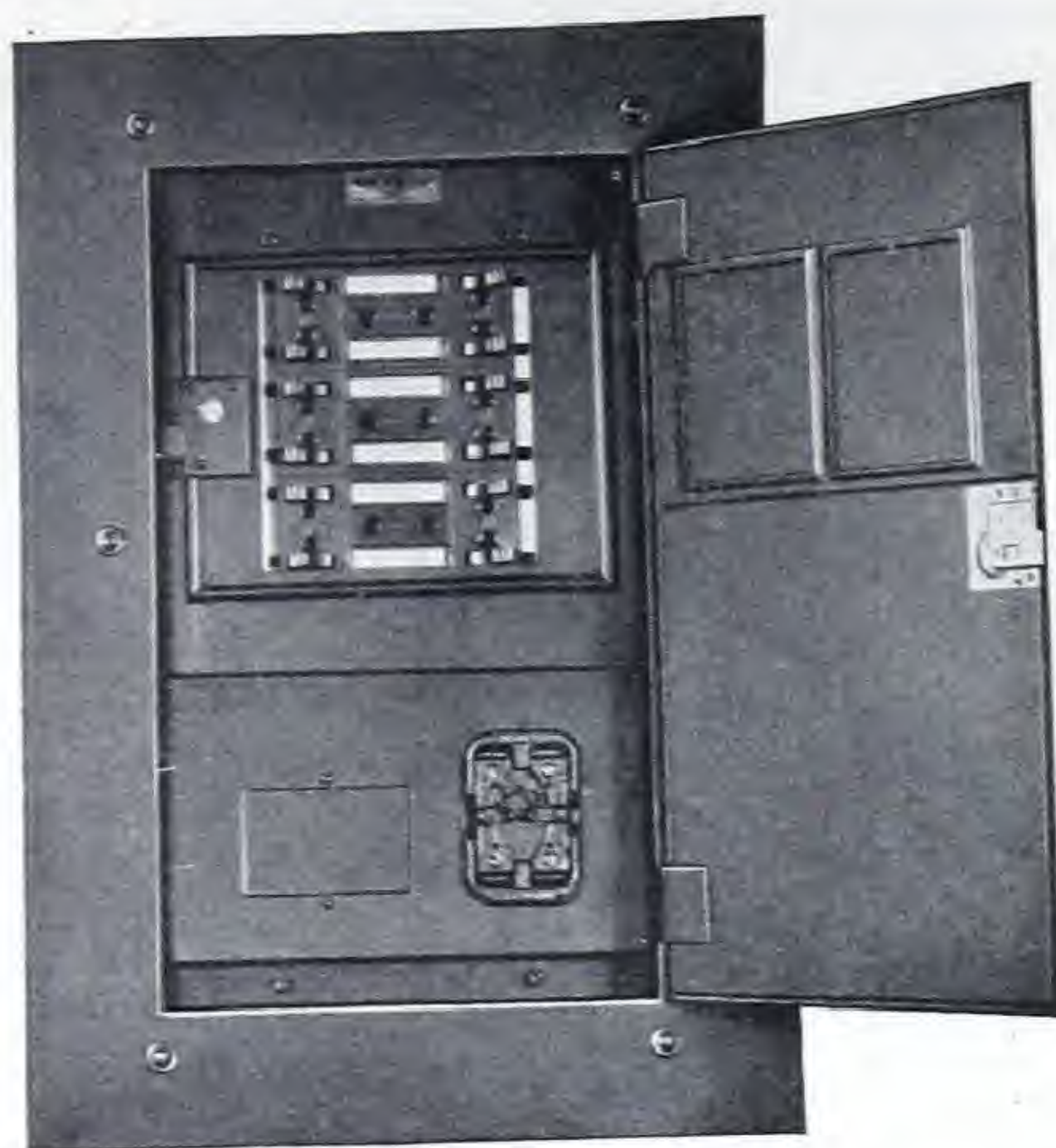
Style TP3BSFD

BULL DOG LIGHTING PANELBOARDS

Type TCD and NTCD

(INNER DOOR CONSTRUCTION)

Branch Circuits—Toggle Switches with Cartridge Fuse Connections



These Panels have an additional or Inner Door over the Branch Circuit Fuses, equipped with "Bull Dog" Flush Spring Lock.

Type NTCD have Single Pole Toggle Switches and One Cartridge Fuse Connection per Branch Circuit.

Type TCD have Two Pole Toggle Switches and Two Cartridge Fuse Connections.

These Panels are built up of Branch Circuit Sections of Bakelite, each section having 30 Amp. 250 Volt Heavy Duty Toggle Switches with N. E. C. Cartridge Fuse Connections and these Sections with their Main Connections are mounted on removable steel mounting plates.

Type of Mains.

Main Lugs.

Main Fuse Connections—The "Bull Dog" SAFtoFUSE, which is listed by H. E. P. C. of Ontario Laboratories as a "Combination Switch and Cut Out." The SAFtoFUSE may therefore be used as a Main Fusible Switch especially under conditions where the Main Switch on Panel would be very infrequently operated.

Main Fusible Switches (for frequent operation).

30 Amp. and 60 Amp. Safety Type, Heavy Duty Toggle Switches fusible with "Bull Dog" SAFtoFUSE.

100 Amp. and larger—Safety Brush Type Switches, fusible with "Bull Dog" SAFtoFUSE.

Boxes are of code thickness Galvanized Steel—19" wide, with 4 inch wiring gutters on all sides.

Cabinet Fronts are of cold rolled steel with neat molding mitered on the corners, surrounding and reinforcing door.

Doors are provided with "Bull Dog" flush Spring Locks (superior to the projecting door knob type) and 2 keys.

Flush Fronts furnished unless Surface Type specified on orders.

BULL DOG PANELBOARDS

Type "NTC 3D"

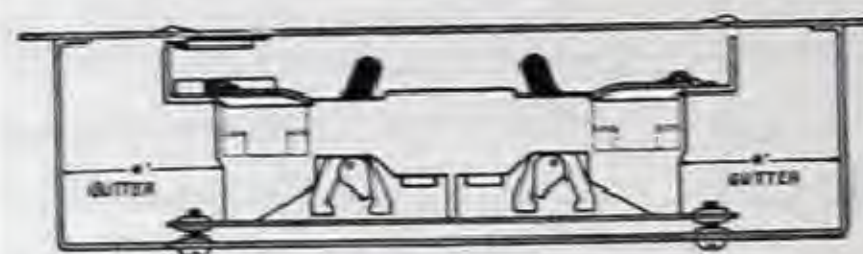
Panel: Made of Sections of Bakelite.

Branches: 30 Amp. S. P. Toggle Switches with N.E. C. Cartridge Fuse Connections.

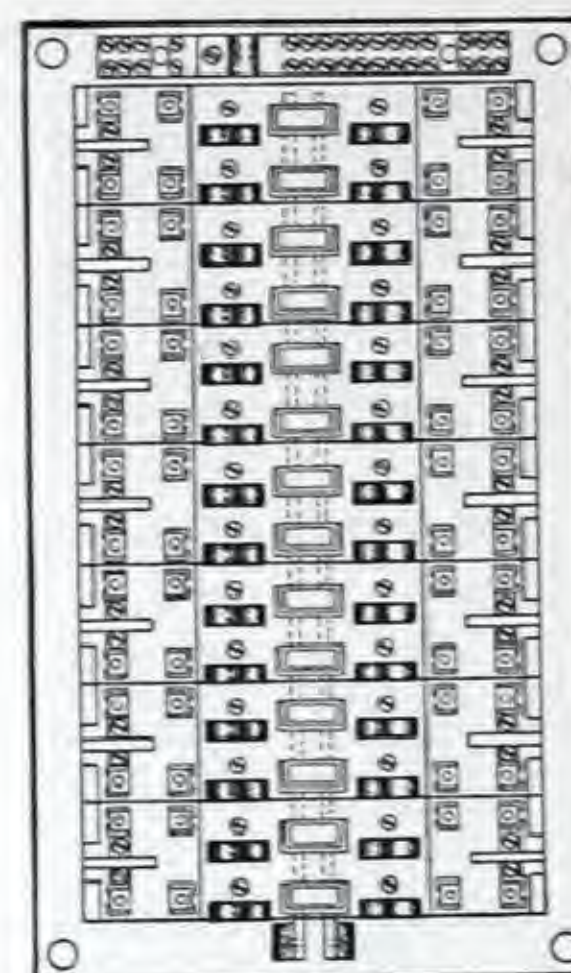
Box: Code Thickness Galvanized Steel—Gutter Type.

Front: Code Thickness Steel—Black Finish. See footnote.

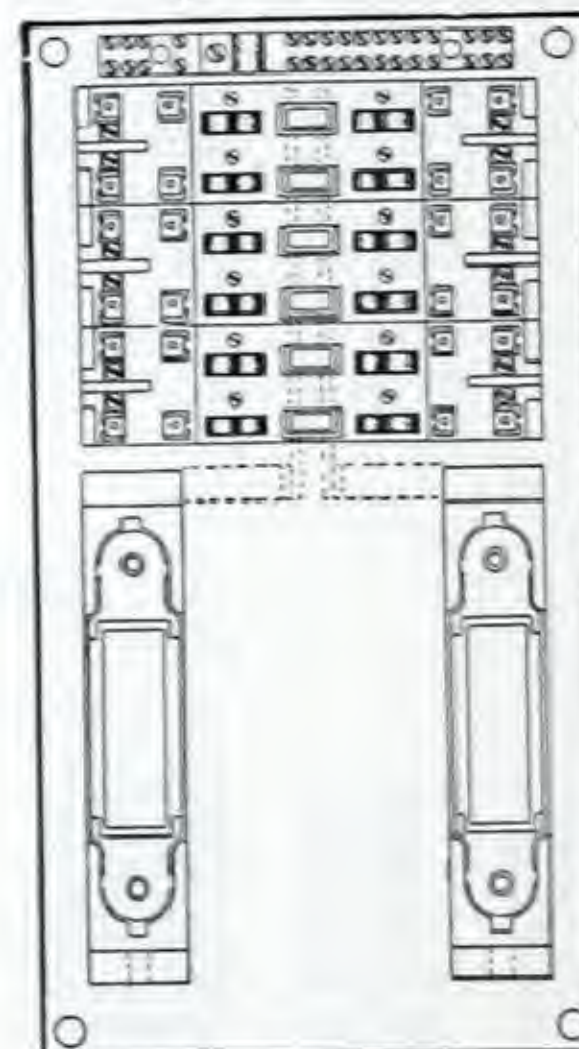
Dimensions: Cabinet width inside 19" and depth 5 1/2". Gutter 4".



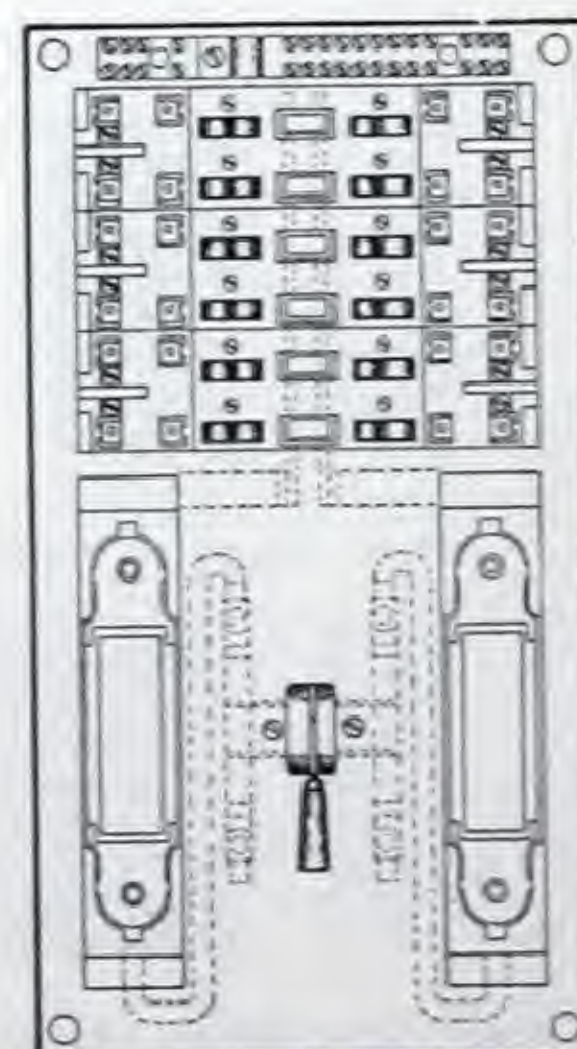
Mains—125-250 V. 3-Wire
Branches—125 V. 2-Wire



Style NTC3LD



Style NTC3FD



Style NTC3BSFD

Combined Panel and Steel Cabinet (Box and Front) Code Gauge

No. Circ.	List Price	List No.	Approx. Weight	Amp. Capacity of Mains	Inside Height (inches)
Mains: Lugs Only					
4	\$50.00	NTC304LD	70	30	14
8	60.00	NTC308LD	80	60	17
12	70.00	NTC312LD	90	60	20
16	86.00	NTC316LD	100	100	23
20	96.00	NTC320LD	120	100	26
24	106.00	NTC324LD	130	100	29
28	116.00	NTC328LD	140	100	32
32	126.00	NTC332LD	165	100	35
36	152.00	NTC336LD	180	200	41
40	162.00	NTC340LD	200	200	44

Main Fuse Connections (SAFtoFUSE—Fusible Switch) Solid Neutral

4	\$62.00	NTC304FD	95	30	23
8	74.00	NTC308FD	105	60	26
12	86.00	NTC312FD	125	60	29
16	102.00	NTC316FD	155	100	35
20	114.00	NTC320FD	165	100	38
24	126.00	NTC324FD	180	100	41
28	138.00	NTC328FD	200	100	44
32	150.00	NTC332FD	220	100	47
36	178.00	NTC336FD	235	200	53
40	190.00	NTC340FD	260	200	56

Main Toggle or Brush Switch with SaftoFuse—Solid Neutral

4	\$80.00	NTC304BSFD	95	30	23
8	90.00	NTC308BSFD	105	60	26
12	102.00	NTC312BSFD	125	60	29
16	122.00	NTC316BSFD	155	100	35
20	134.00	NTC320BSFD	165	100	38
24	146.00	NTC324BSFD	180	100	41
28	158.00	NTC328BSFD	200	100	44
32	170.00	NTC332BSFD	220	100	47
36	218.00	NTC336BSFD	235	200	53
40	230.00	NTC340BSFD	260	200	56

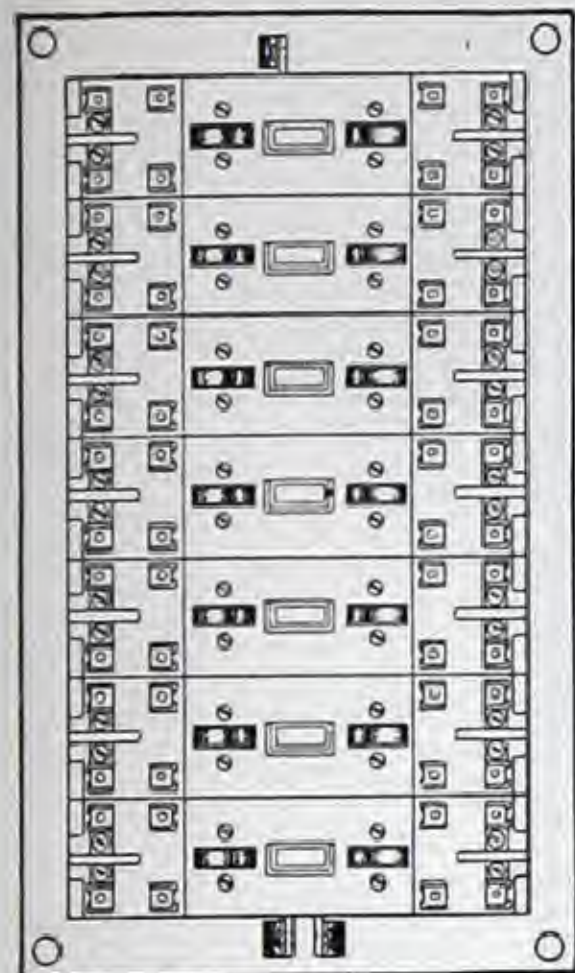
Flush Type Fronts shipped unless Surface Type Specified on Order.

BULL DOG PANELBOARDS

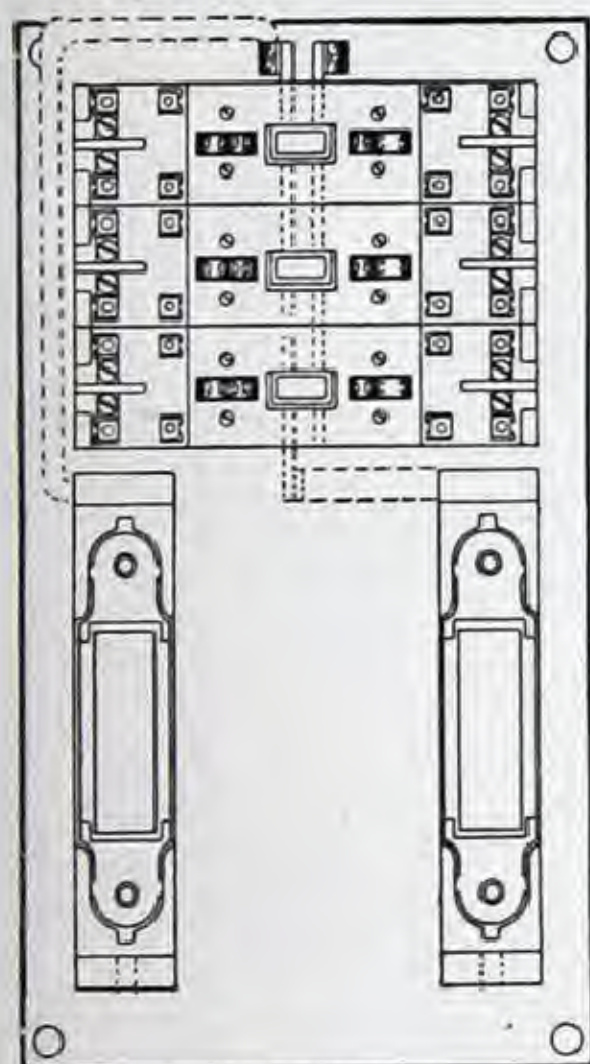
Type TC3D

Panel: Made of Sections of Bakelite
 Branches: 30' Amp. 2 P., Toggle Switches with N.E.C. Cartridge Fuse Connections.
 Box: Code Thickness Galvanized Steel—Gutter Type.
 Front: Code Thickness Steel—Black Finish. See footnote.
 Dimensions: Cabinet depth inside 5½" and width 19". Gutter 4" deep.

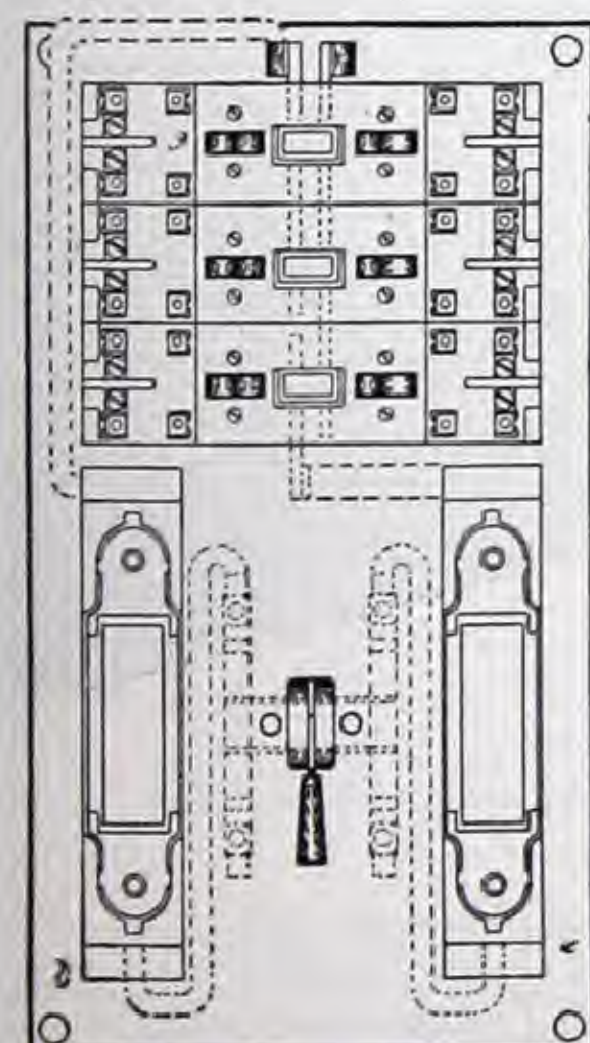
Mains—125-250 V. 3-Wire
 Branches—125 V. 2-Wire



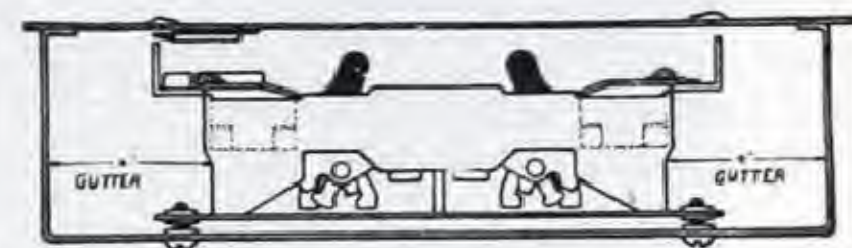
Style TC3LD



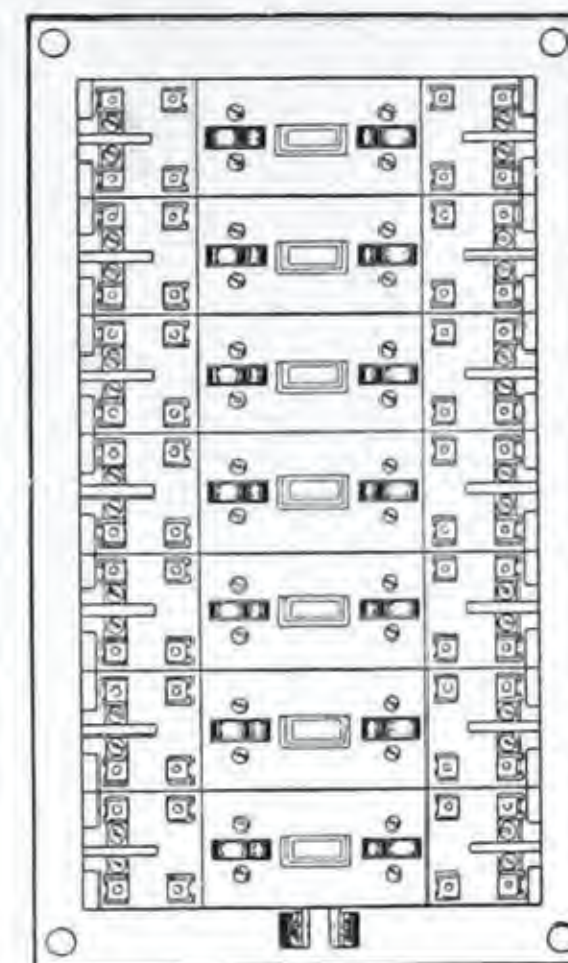
Style TC3FD



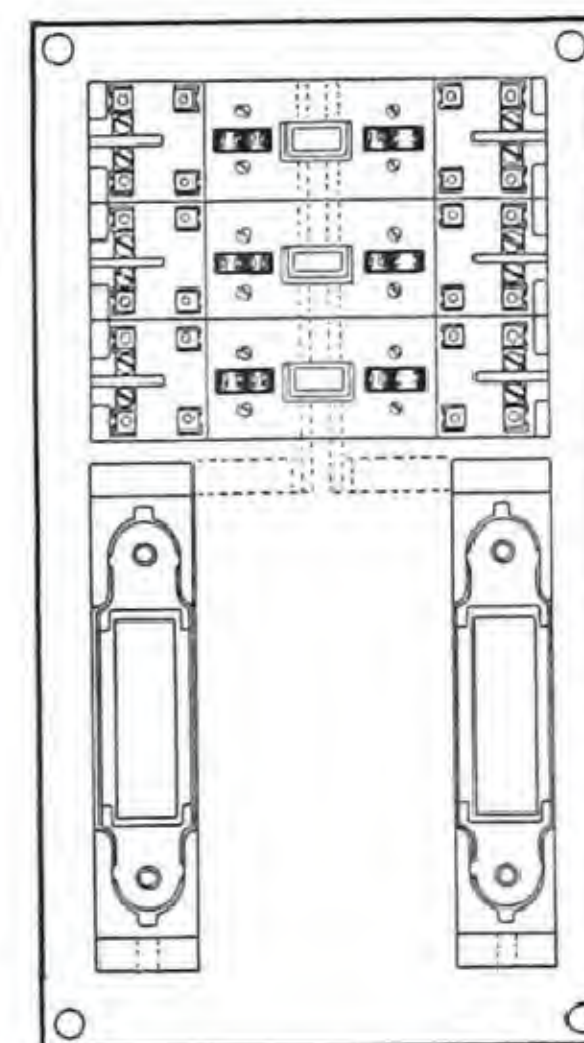
Style TC3BSFD



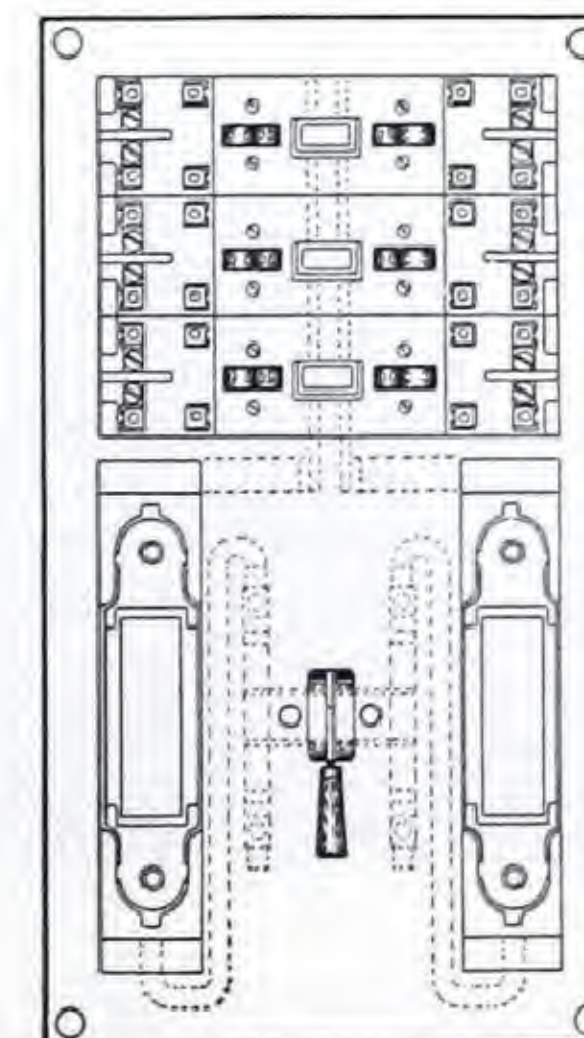
Mains—125 V. 2-Wire
 Branches—125 V. 2-Wire



Style TC2L



Style TC2F



Style TC2BSFD

Combined Panel and Steel Cabinet (Box and Front) Code Gauge					
No. Circ.	List Price	List Number	Approx. Weight	Amp. Capacity of Mains	Inside Height Inches
Mains: Lugs Only					
4	\$ 58.00	TC304LD	75	30	17
6	68.00	TC306LD	85	60	20
8	78.00	TC308LD	95	60	23
10	88.00	TC310LD	105	60	26
12	98.00	TC312LD	125	60	29
14	106.00	TC314LD	135	100	32
16	116.00	TC316LD	145	100	35
18	126.00	TC318LD	160	100	38
20	140.00	TC320LD	170	100	41

Main Fuse Connections (SAFtoFUSE—Fusible Switch) Solid Neutral

4	\$ 68.00	TC304FD	105	30	26
6	78.00	TC306FD	125	60	29
8	88.00	TC308FD	135	60	32
10	98.00	TC310FD	145	60	35
12	108.00	TC312FD	160	60	38
14	128.00	TC314FD	185	100	44
16	138.00	TC316FD	205	100	47
18	148.00	TC318FD	215	100	50
20	158.00	TC320FD	225	100	53

Main Toggle or Brush Switch with SAFtoFUSE—Solid Neutral

4	\$ 86.00	TC304BSFD	105	30	26
6	96.00	TC306BSFD	125	60	29
8	106.00	TC308BSFD	135	60	32
10	116.00	TC310BSFD	145	60	35
12	126.00	TC312BSFD	160	60	38
14	146.00	TC314BSFD	185	100	44
16	156.00	TC316BSFD	205	100	47
18	166.00	TC318BSFD	215	100	50
20	182.00	TC320BSFD	225	100	53

Type TC2D

Mains: Lugs Only

4	\$ 62.00	TC204LD	75	60	17
6	68.00	TC206LD	85	100	20
8	78.00	TC208LD	95	100	23
10	88.00	TC210LD	105	100	26
12	98.00	TC212LD	125	200	29
14	110.00	TC214LD	135	200	32
16	120.00	TC216LD	145	200	35
18	130.00	TC218LD	160	200	38
20	140.00	TC220LD	170	200	41

Main Fuse Connections (SAFtoFUSE—Fusible Switch)

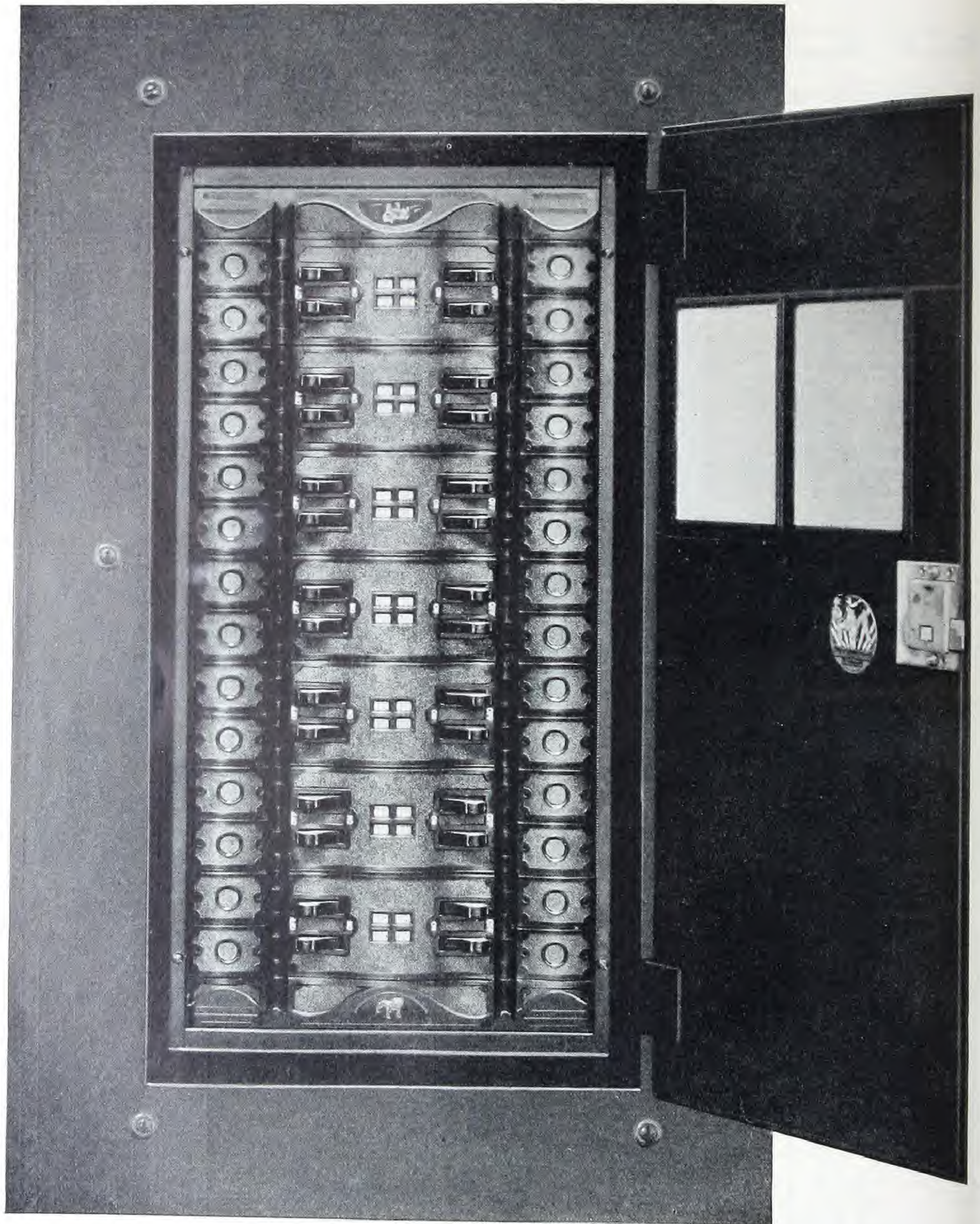
4	\$ 74.00	TC204FD	105	60	26
6	86.00	TC206FD	135	100	32
8	96.00	TC208FD	145	100	35
10	106.00	TC210FD	160	100	38
12	126.00	TC212FD	170	200	41
14	136.00	TC214FD	185	200	44
16	146.00	TC216FD	205	200	47
18	156.00	TC218FD	215	200	50
20	166.00	TC220FD	225	200	53

Main Toggle or Brush Switch with SAFtoFUSE

4	\$ 88.00	TC204BSFD	105	60	26
6	108.00	TC206BSFD	135	100	32
8	118.00	TC208BSFD	145	100	35
10	128.00	TC210BSFD	160	100	38
12	160.00	TC212BSFD	170	200	41
14	170.00	TC214BSFD	185	200	44
16	190.00	TC216BSFD	205	200	47
18	200.00	TC218BSFD	215	200	50
20	210.00	TC220BSFD	225	200	53

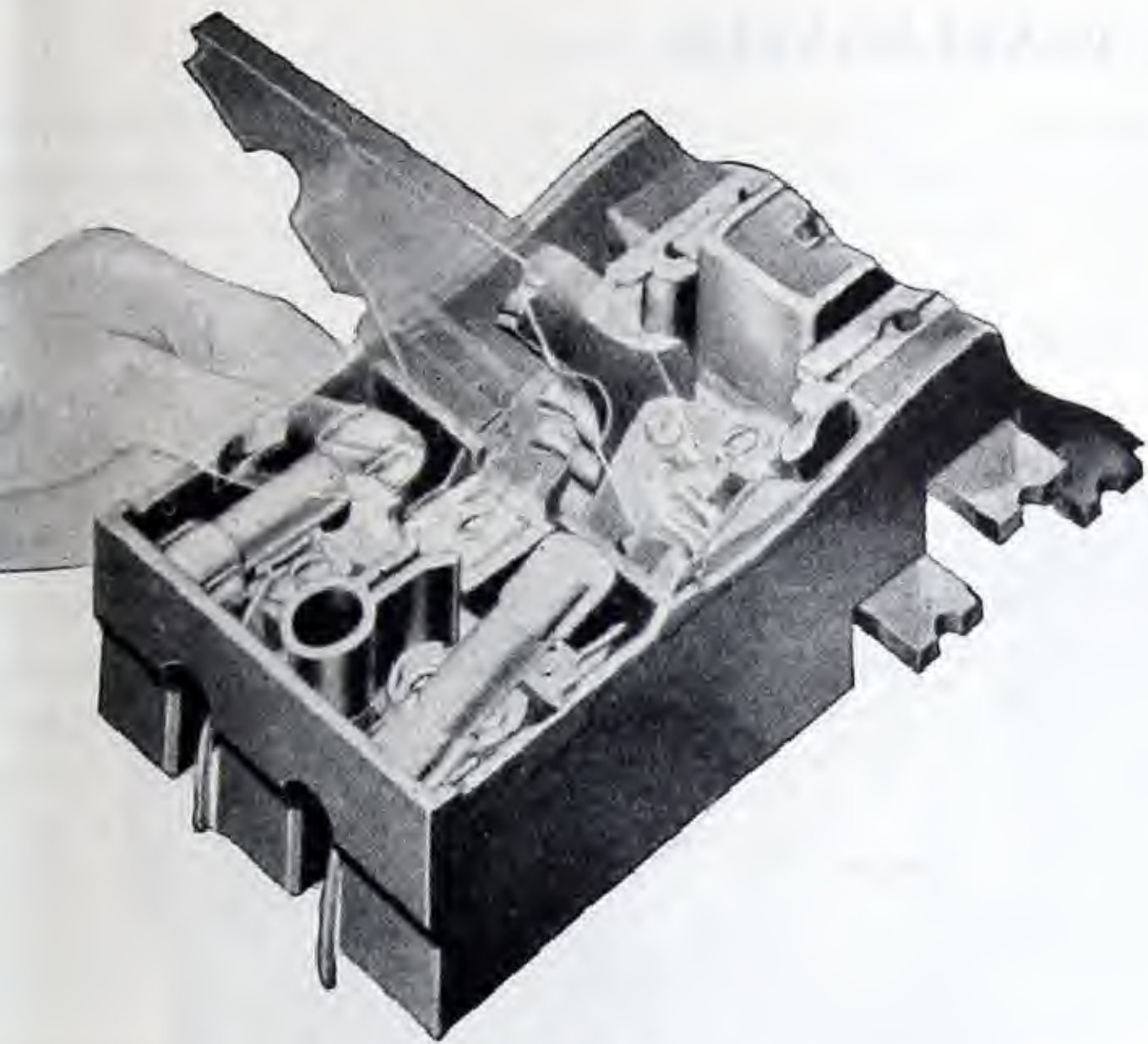
Flush Type Fronts shipped unless Surface Type specified on order.

BULL DOG SUPERBA PANELBOARDS



"A superb Engineering and Artistic Accomplishment"

BULL DOG SUPERBA PANELBOARDS



Cartridge Fuse Ejector

The Fuse Ejector is a unique feature of the SUPERBA. A flip of the finger ejects the fuse instantly. Saves fuse clips, time and temper.

Cartridge or Plug Type Fuses Interchangeable

Interchanging cartridge or plug fuses in the SUPERBA requires only the substituting of the cartridge fuse clips or the plug fuse shell. The change of the type of fuse connections can be made before or after the panel is installed and without removing the door and trim. The fuse parts are immediately accessible upon opening the fuse door for replacement, either singly or in pairs, and without disturbing the unit proper.

Complete Safety

In contrast to previous lighting panelboard design, the SUPERBA offers Absolute Safety. The complete deadfront construction of the SUPERBA removes the danger of coming in contact with live fuses or empty fuse connections of spare circuits. No live parts are accessible at any time.

Switch and Fuse Safety Interlock

The door over the fuse compartment is interlocked with the toggle switch so that fuses are inaccessible while the switch is in the ON position. In opening the door with the switch in the ON position the switch is automatically thrown to the OFF position.

Safer Cartridge Fuse Type Panels

With the old door-in-door type of construction, the man placing a fuse in any one circuit was liable to come in contact with adjacent fuses which were alive in other circuits. There has never been a safe cartridge fuse type panel until BULL DOG developed its SUPERBA which gives the operator of the cartridge fuse type Panel every advantage of the plug fuse panel in safe operation and easy replacement of fuses and still further gives him the advantage of the inherently better characteristics of cartridge type fuses over plug fuses.

The public has become very familiar with the art of short-circuiting with pennies, plug fuses that frequently blow, which of course cannot be done with the cartridge type of fuse. It is also not so easy to over-fuse with cartridge fuses as with the plug type fuses.

BULL DOG SUPERBA PANELBOARDS

SUPER-FLEXIBILITY

Many panelboards contain flexible features which represent advantages mainly from a manufacturing standpoint by effecting economies in production or assembly but in the SUPERBA, Bull Dog has dedicated the flexible features to the interests of the Engineer, Contractor and Owner, which enables them to meet changing conditions of installation at any time as well as to insure against obsolescence.

The exclusive OMNI-Bus feature of the SUPERBA permitting ready changes of circuit connections for both voltage and phase gives a practical value to the ability to interchange Single and Double Pole toggle switches and Plug and Cartridge type fuses.

Changing Distribution System

The SUPERBA can thus be easily adapted to any of the following types of distributing systems either before or after it is installed:

125/250 V. Single Phase AC or DC Edison 3-2 wire System.

125/250 V. Grounded Neutral Single Phase AC or DC Edison 3-2 wire System.

125/250 V. Grounded Neutral 3 to 3-Wire Single Phase AC or DC Edison System.

120/208 V. 3-Phase, 4-Wire AC grounded neutral 4-2 Wire System.

125 V. 3-Phase to Single Phase AC 3-2 Wire System.

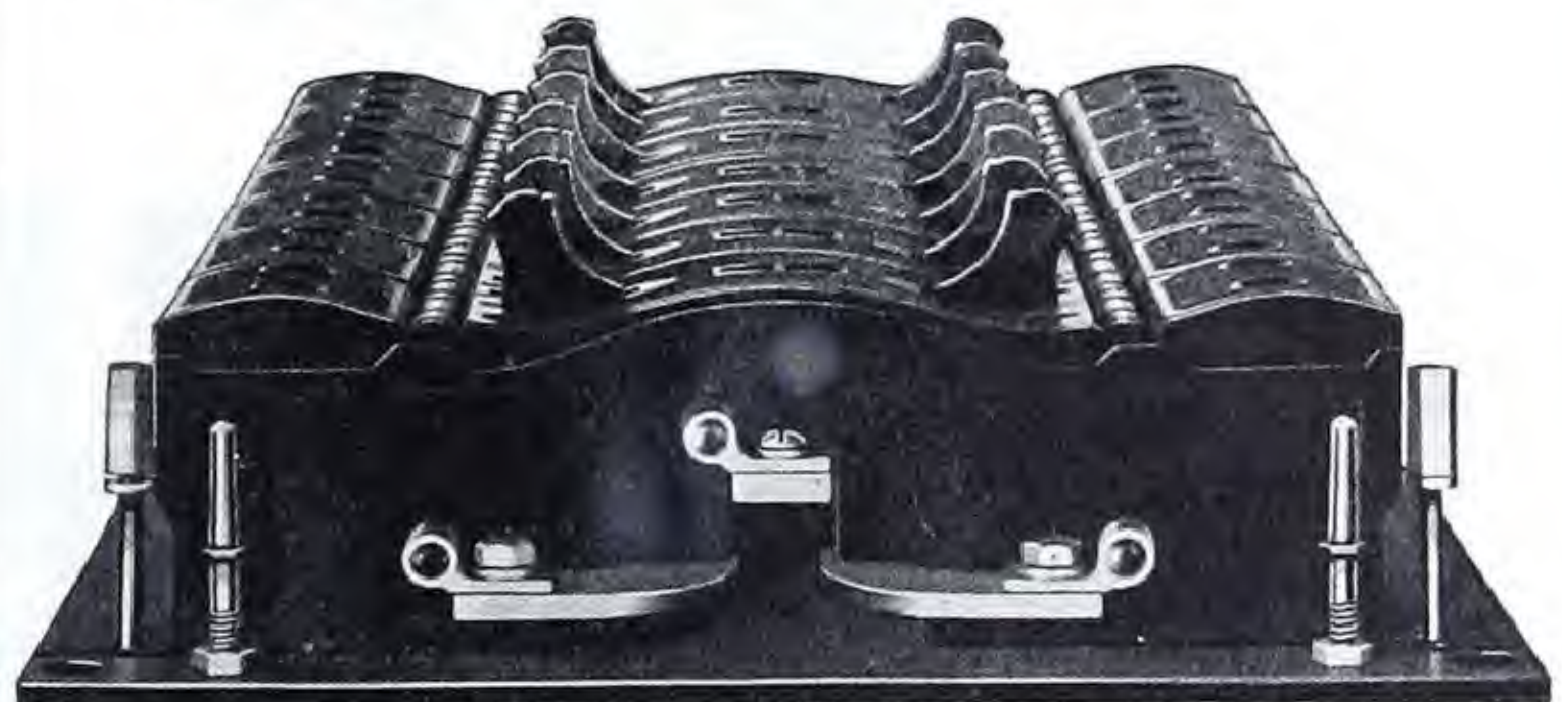
125 V. 2-2 Wire System.

Equalizing Phase Loads

The OMNI-Bus feature permitting ready changes of voltage and phase, offers a very easy way of balancing the load on the phases of the SUPERBA after it is installed and without removing the door and trim or disturbing the load wiring connections.

Subfeeds and Special Panels

The SUPERBA and SAftoFUSE units are the same width, permitting easy combinations for subfeeds and special combination panels.



SUPERBA panel with Main Lugs. End Section over Main Lugs removed.

Type of Mains

The SUPERBA can be supplied with any of the following types of mains:

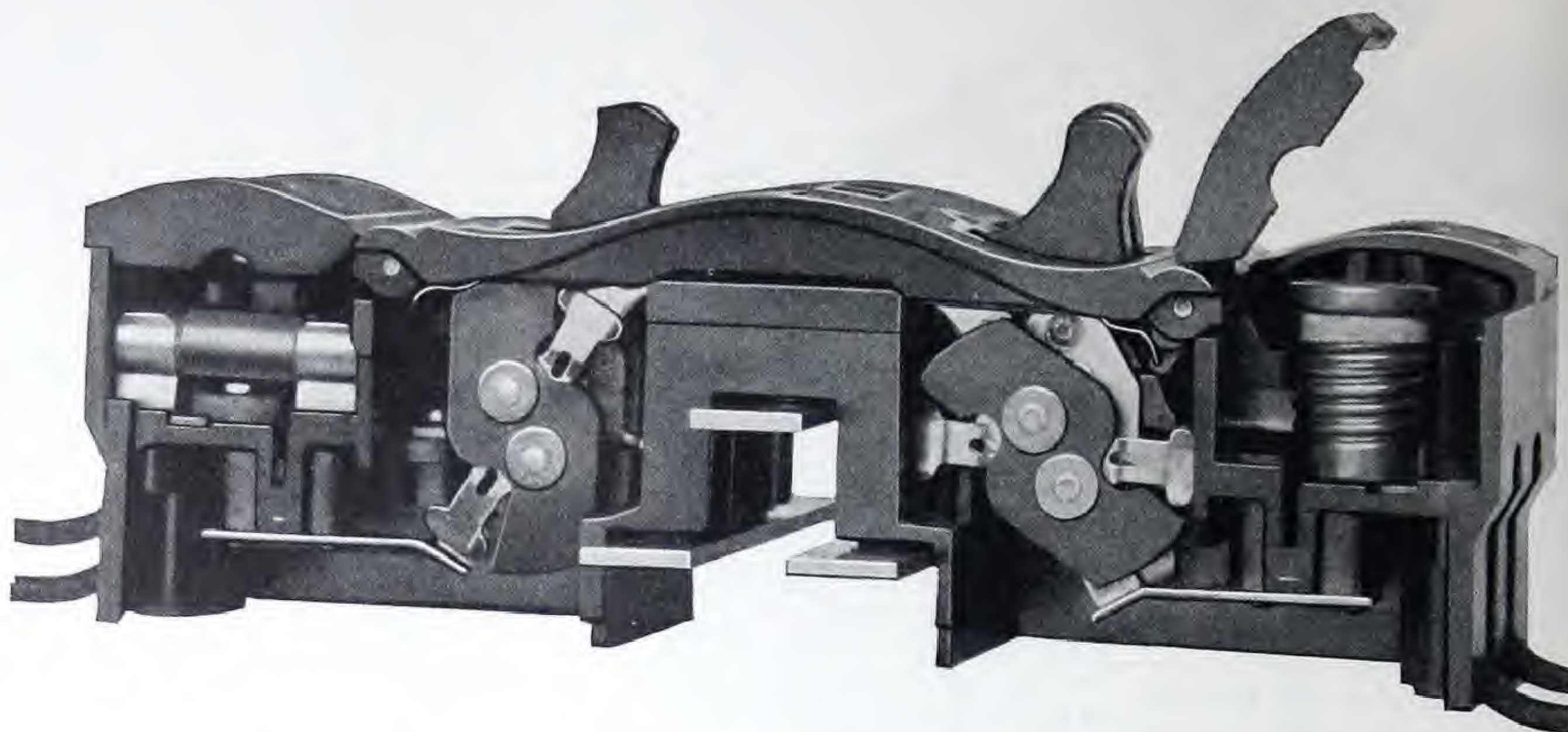
Main Lugs.

Main SAftoFUSE (for disconnect or infrequent switching).

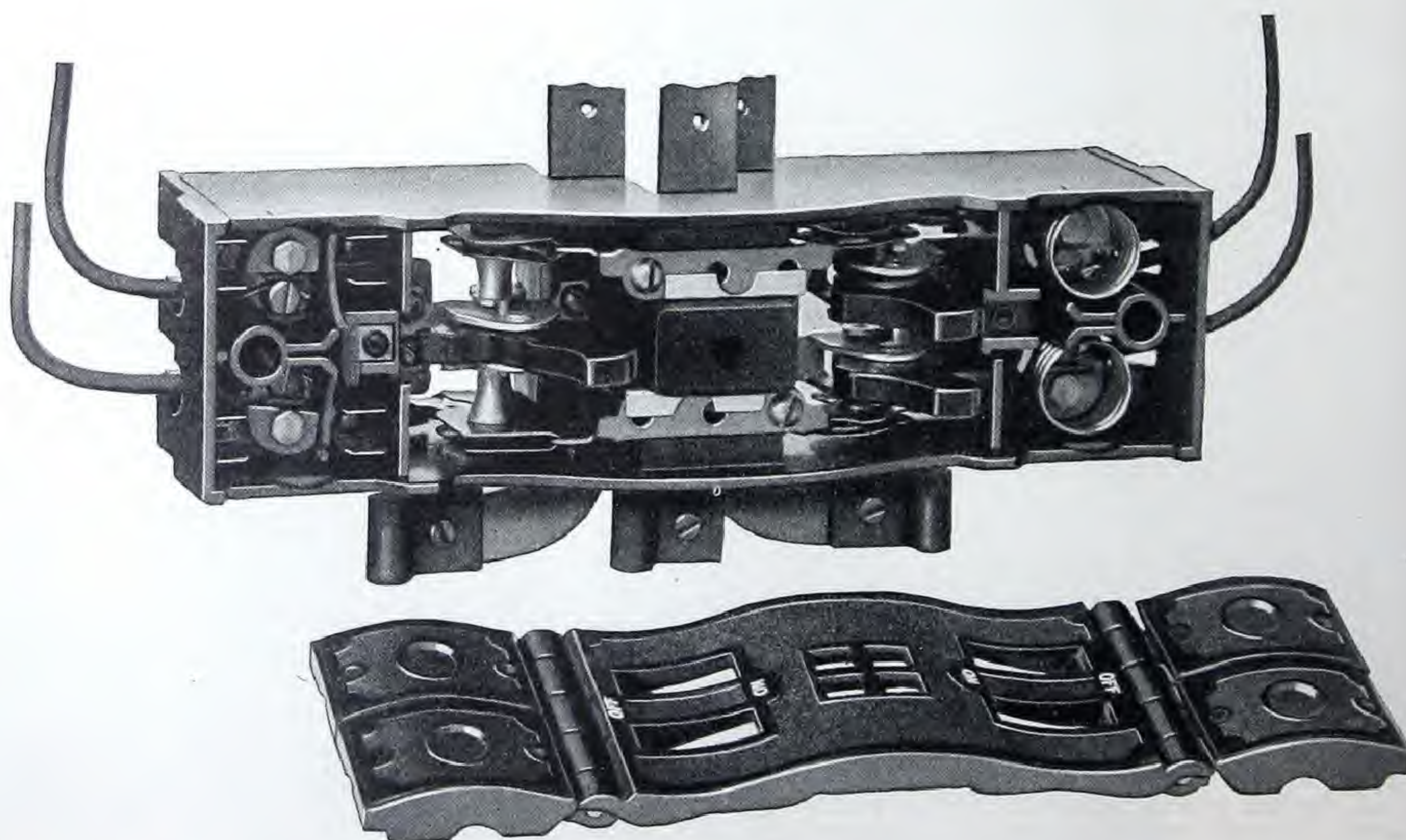
Main Operating SAftoFUSE (for frequent switching).

SIMPLE TO MAINTAIN

For easy maintenance the SUPERBA offers in addition to its Scientific Design and Super Flexibility, ready Accessibility of all important parts for Inspection, Tightening and Replacement, without removing the door and trim. The wire terminal connections, fuse clips and fuse shells just inside the Bakelite fuse doors are of course immediately accessible at all times. By removing the sectional cover instant access is gained to the OMNI-Bus Toggle Switches and Contacts, or, if desired, the entire Unit may be removed from the panel without removing the door and trim.

BULL DOG SUPERBA PANELBOARDS

The scientific design of SUPERBA is graphically illustrated in this cut-away view of the SUPERBA Unit. Note that Fuse Connections, Toggle Switches and Bus Bars are each isolated in separate compartments.



Reproduction of an actual photograph of a composite SUPERBA Unit illustrating the Flexibility and Accessibility for inspecting, replacing or interchanging Toggle Switches, Fuse Connections or Bus Bar arrangements. This can all be done without removing cabinet door and trim.

BULL DOG SUPERBA PANELBOARDS

Isolated Compartments

The Switches, Fuses and Bus Bars are isolated in separate compartments in the SUPERBA. This construction prevents flashovers and localizes any trouble that might occur in defective fuses or short circuits. Ample ventilation for all parts is assured by vents incorporated in the design.

OMNI-Bus

The OMNI-Bus (variable Bus Bar connection) construction embodied in the SUPERBA introduces a new flexibility in lighting panelboards. With the OMNI-Bus the branch circuit can be connected to any one of the main Bus Bars either before or after the panelboard is installed and without removing the door and trim or disturbing the wiring connections. An interlock that prevents connection to more than one bus at a time is provided, thus obviating all possibility of short circuiting the Bus Bars.

The circuit is complete through the OMNI-Bus to the end wire with the fewest connections possible to minimize voltage drop and contact heating.

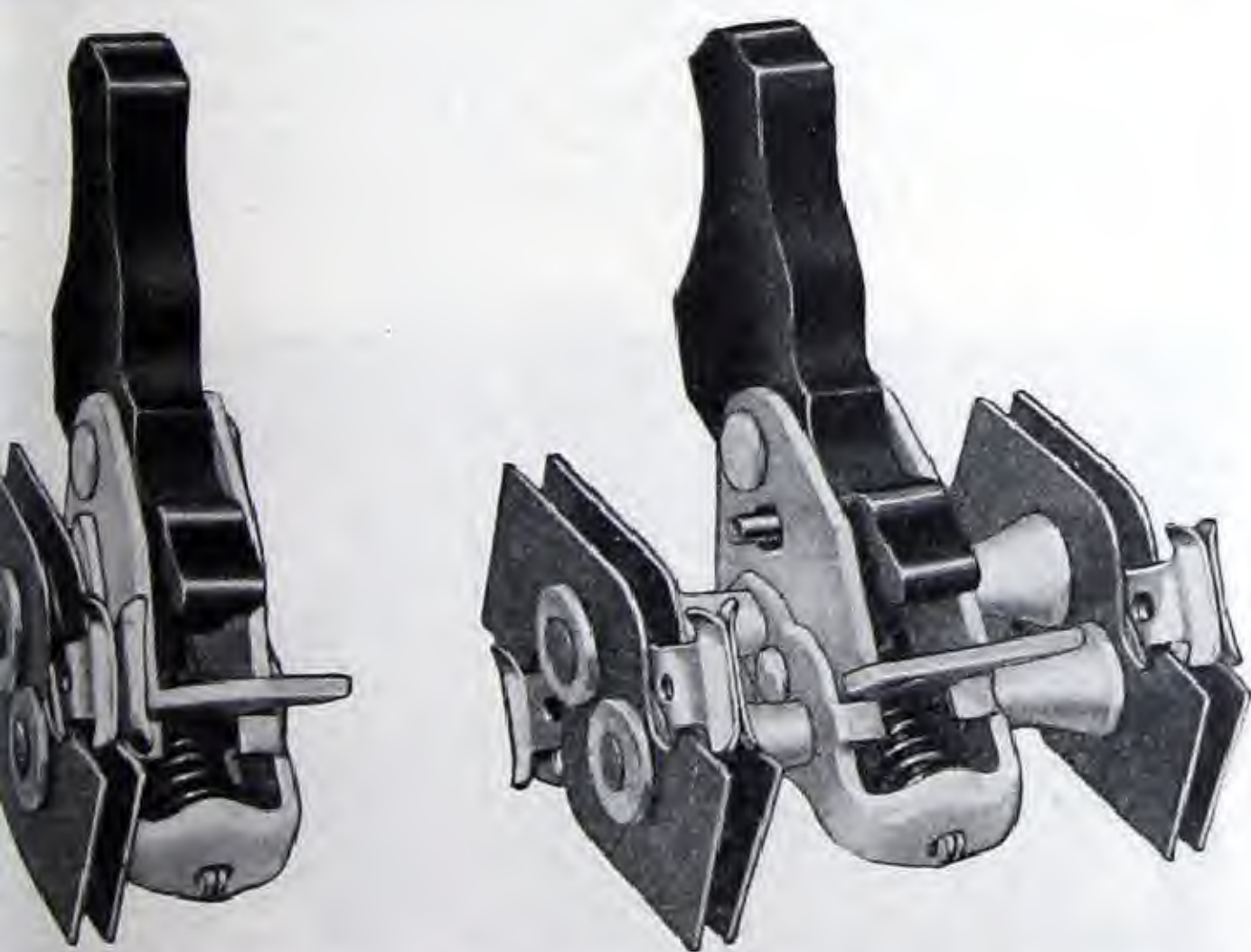
Positive Operating Toggle Switches

Toggle Switches in the SUPERBA are of the BULL DOG heavy duty type, bearing H.E.P.C. of Ontario rating of 30 Amp. 250 V.-60 Amp. 125 V. They operate positively in both the "on" and "off" positions independently of the compressed spring which accelerates the positive motion, giving positive quick-make and positive quick-break switching.

This positive operating feature ensures full switch contact when the switch is in the "on" position and makes it particularly suitable for Type C lamp loads.

The handles are moulded of a special Bakelite having a glass base and are practically unbreakable.

The frame is of steel, cadmium plated, to prevent rust or corrosion.



S.P. and 2 P. Bull Dog SUPERBA Toggle Switches
30 Amp. 250 V., 60 Amp. 125 V.

Blades are of a special spring bronze and are equipped with chokers.

Single and double pole toggle switches are interchangeably mounted in the SUPERBA Unit.

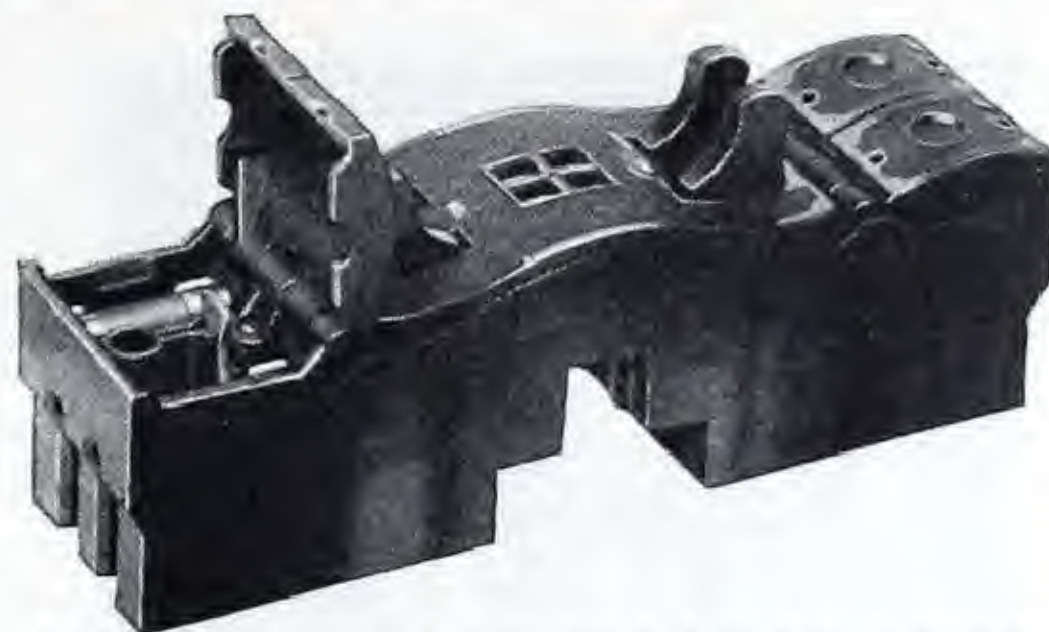
BULL DOG SUPERBA PANELBOARDS

Interlocked Doors over Fuses

The SUPERBA requires no unsightly, dangerous and unsatisfactory door-in-door construction.

The separate bakelite doors over the fuses, interlocked with the toggle switches for safety, secure a more satisfactory result in a practical, safe and more pleasing manner.

In cases where it is desired to lock fuses against theft, an artistic locking arrangement is available.



SUPERBA Unit adapted for Four Single Pole Circuits, and either Cartridge or Plug Fuses.

Fine Cabinet Appearance

The SUPERBA is mounted in a Cabinet having a neat Door and Trim of either Flush or Surface type, made of the finest code gauge furniture steel, having the door blanked out of the centre. The door is hinged to the trim with concealed type hinges and is locked by a handsome BULL DOG Flush type Lock of the automatic spring bolt type.



Bull Dog Flush Lock

A graceful moulding welded to the door serves as a rabbet. For larger doors a three point chute bolt operated by a vault handle and dead lock, is provided.

Directory

Located on the inside of the door is a neat Directory Frame with a circuit number directory card.

SCIENTIFIC DESIGN

The SUPERBA is not only a beautiful article, but represents the acme of engineering skill. Careful attention has been given to details heretofore generally overlooked in all previous Panelboard designs, such as protection against electrical creepage, dust collection and moisture; the isolation of switches, fuses and bus bars in separate compartments for better operation; and many other refinements.

Electrical characteristics and mechanical proportions have also received careful study. Before any radical departure from well established conventional design was attempted, numerous tests were made to satisfy BULL DOG Engineers of the correct scientific design of such parts.

Access to the interior compartments of the Unit is gained by removing the sectional unit cover to which is hinged the separate fuse doors over the fuse compartments. These doors besides being interlocked with the switches are snapped to the open or closed position by means of rustproofed steel springs riveted to the cover. Reinforcing ribs are carefully placed on the sectional cover, fuse doors and unit to give additional mechanical strength to the Bakelite and to provide further barriers against creepage.

All current carrying parts are aligned and secured in the Unit by grommets and inserts in addition to the connecting and supporting screws.

BULL DOG SUPERBA PANELBOARDS

CIRCUIT NUMBERS

The Circuit Numbers are indicated through a neat little window frame in the center of the Unit—the black circuit numbers on a white field being readily visible even in dim locations.



Framed Circuit Numbers lend a neat effect and are readily visible.

BLANK SECTIONS



Bakelite filler sections to cover the Busbars for split bus or pending installation of future circuits.

Handsome moulded bakelite sections, in keeping with the contour and general appearance of the other Units, are employed to cover the bus bars for split bus or pending future circuit additions.

The ends of the Panel terminate with attractive end sections shown, which gracefully blend the curved sections of the circuit units, with the straight lines of the housing frame.



Bakelite end sections make attractive terminations at top and bottom of the SUPERBA Panel.

BULL DOG SUPERBA PANELBOARDS

The Bull Dog SUPERBA offers:

Beautiful Appearance.

Correct Engineering and Scientific Design.

Complete Safety.

Extreme Flexibility to meet changing conditions of installation as well as to insure against obsolescence.

Easy and Economical Installation.

Simple Maintenance Facilities.

Heretofore, the conventional design of Electric Panelboards has been staid straight lines and this in addition to fuses of all sizes, types and colours standing out like so many excrescences, has rendered the Panelboard far from "a thing of Beauty."

Compared with these, the SUPERBA will be readily conceded a work of art.

Its ornamental appearance facilitates its installation as a Distribution Centre in locations where it is most convenient for use—for it will prove an adornment to any background and need not be relegated to a back-stairs location as with the homely panelboard.

GRACEFUL BAKELITE UNITS

The Units of which the SUPERBA is composed are of the highest grade bakelite, the surface or face plates having a beautifully curved design with a variegated grain finish, highly polished.



SUPERBA Unit adapted for Two Double Pole Circuits and either Cartridge or Plug Fuses.

There are no unsightly screws or other metal parts on the face of the Unit to mar the fine effect or constitute a danger from electric contact.

No fuses either are visible to mar the symmetry or detract from its artistic appearance. The covers or face plates of the circuit Units terminate in gracefully curved doors over the fuse compartment thus avoiding the unsightly appearance and obvious danger of fuse shells or fuse connections.

Fuses of either the Cartridge or Plug type may be tested while in circuit by inserting the leads of a tester through the holes provided for that purpose in the fuse compartment door.



If desired Knockouts in the doors over the fuse compartments may be removed to provide a window through which the plug fuse elements may be viewed.

BULL DOG SUPERBA PANELBOARDS

EASY AND ECONOMICAL INSTALLATION

The Installer reaps the benefit of the flexible features of SUPERBA Panelboards, whereby changes in Fuses, Voltage Phase may be made to meet changes in requirements that have developed between the time Panelboard is ordered and time of installation.

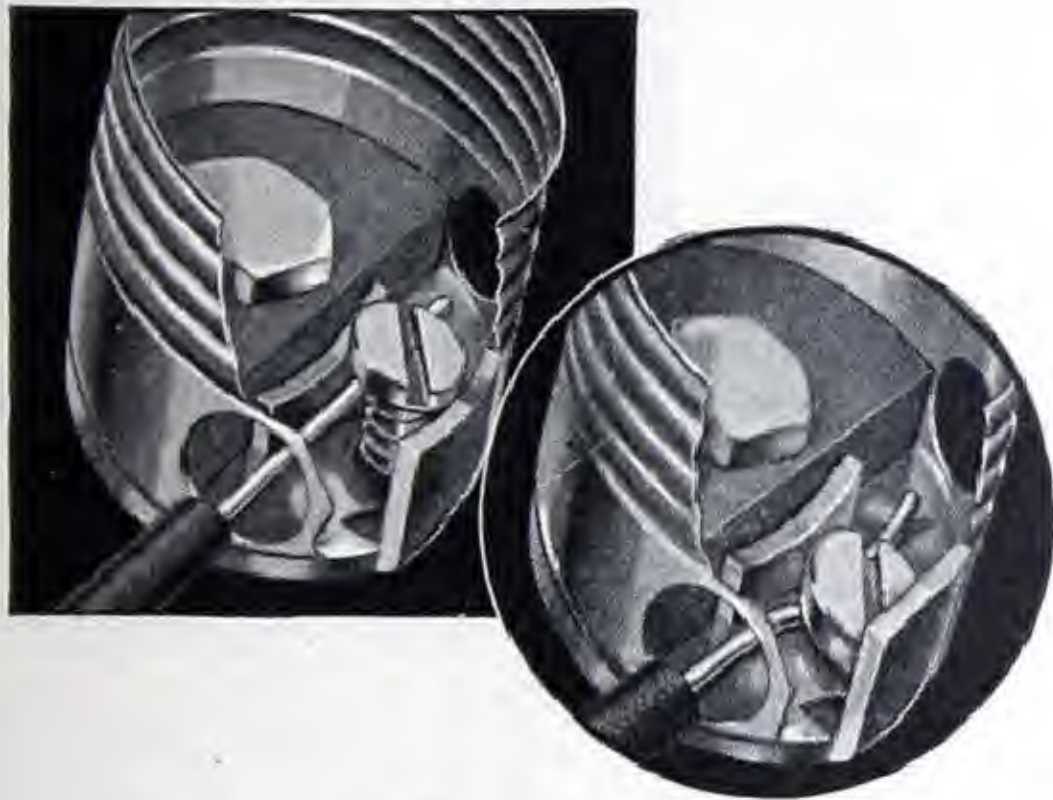
Other advantages of SUPERBA Panelboards from an installation viewpoint, may be enumerated:

Boxes

Immediate delivery of Boxes for SUPERBA Panelboards can be secured from stocks.

Standard Boxes are 19" wide x 5½" deep, providing approximately 4" wiring gutters on sides, top and bottom.

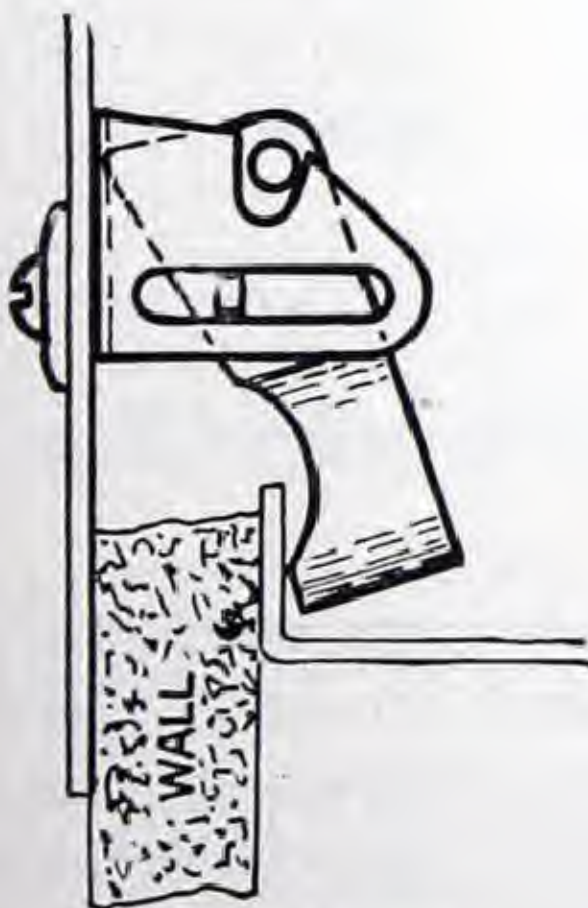
The SUPERBA is mounted in the box by means of adjustable supports allowing variations of the Panel in both horizontal or vertical planes.



Quick and Easy Wiring facilities applying to both Plug and Cartridge Fuse Panels.

Easy Wiring Method

Wire terminal connections are of the standard BULL DOG Type which merely require that end of wire be stripped insulation for about ¾", inserted under the screw and tightened down; no kinking or looping of the wire is necessary. The tightening of the screw forces the wire into a recess which prevents its withdrawal.



Trim Clamp

The patented adjustable BULL DOG trim clamp makes installation of the Door and Trim an easy one-man job.

Trim Clamp with Box recessed over ¾" in wall. The clamp always rests against the trim, regardless of position. This removes the strain from other parts.

BULL DOG SUPERBA PANELBOARDS

FULL SAFETY TYPE. INTERCHANGEABLE FOR CARTRIDGE OR PLUG TYPE FUSES

3 Wire Mains 2 Wire Branches Grounded Neutral with Single Pole Fusible Toggle Switches and Neutral Connections for 125-250 Volts AC Single Phase or DC Edison System Grounded Neutral.

Amp. Cap'y No. of Cir. Mains	Combined Panelboard, Box and Front* List Numbers		List Price	Cabinet Data (Inside Dimensions) Gutters 4"		
	Cartridge Fuse Type	Plug Fuse Type		Appr. Wt.	Hgt. Ins.	Wd. Ins.

Mains: LUGS ONLY

4	30	SNTC304LD	SNTP304LD	\$50.00	40	14 x 19 x 5½
8	60	SNTC308LD	SNTP308LD	60.00	50	17 x 19 x 5½
12	60	SNTC312LD	SNTP312LD	70.00	55	20 x 19 x 5½
16	100	SNTC316LD	SNTP316LD	86.00	75	23 x 19 x 5½
20	100	SNTC320LD	SNTP320LD	96.00	82	26 x 19 x 5½
24	100	SNTC324LD	SNTP324LD	106.00	115	29 x 19 x 5½
28	100	SNTC328LD	SNTP328LD	116.00	122	32 x 19 x 5½
32	100	SNTC332LD	SNTP332LD	126.00	128	35 x 19 x 5½
36	200	SNTC336LD	SNTP336LD	152.00	150	41 x 19 x 5½
40	200	SNTC340LD	SNTP340LD	162.00	168	44 x 19 x 5½

Mains: DISCONNECT SAFtoFUSE (Fusible Switch) 2 Poles and Neutral Lug

4	30	SNTC304FD	SNTP304FD	\$62.00	55	23 x 19 x 5½
8	60	SNTC308FD	SNTP308FD	74.00	65	26 x 19 x 5½
12	60	SNTC312FD	SNTP312FD	86.00	70	29 x 19 x 5½
16	100	SNTC316FD	SNTP316FD	102.00	90	32 x 19 x 5½
20	100	SNTC320FD	SNTP320FD	114.00	105	35 x 19 x 5½
24	100	SNTC324FD	SNTP324FD	126.00	118	38 x 19 x 5½
28	100	SNTC328FD	SNTP328FD	138.00	138	41 x 19 x 5½
32	100	SNTC332FD	SNTP332FD	150.00	156	44 x 19 x 5½
36	200	SNTC336FD	SNTP336FD	178.00	192	56 x 19 x 5½
40	200	SNTC340FD	SNTP340FD	190.00	204	59 x 19 x 5½

Mains: OPERATING SAFtoFUSE (Fusible Switch) 2 Poles and Neutral Lug

4	30	SNTC304BSFD	SNTP304BSFD	\$80.00	60	23 x 19 x 5½
8	60	SNTC308BSFD	SNTP308BSFD	90.00	70	26 x 19 x 5½
12	60	SNTC312BSFD	SNTP312BSFD	102.00	78	29 x 19 x 5½
16	100	SNTC316BSFD	SNTP316BSFD	122.00	95	32 x 19 x 5½
20	100	SNTC320BSFD	SNTP320BSFD	134.00	110	35 x 19 x 5½
24	100	SNTC324BSFD	SNTP324BSFD	146.00	123	38 x 19 x 5½
28	100	SNTC328BSFD	SNTP328BSFD	158.00	143	41 x 19 x 5½
32	100	SNTC332BSFD	SNTP332BSFD	170.00	161	44 x 19 x 5½
36	200	SNTC336BSFD	SNTP336BSFD	218.00	197	56 x 19 x 5½
40	200	SNTC340BSFD	SNTP340BSFD	230.00	210	59 x 19 x 5½

*FLUSH Fronts furnished unless SURFACE Type specified on order

BULL DOG SUPERBA PANELBOARDS

FULL SAFETY TYPE. INTERCHANGEABLE FOR
CARTRIDGE OR PLUG TYPE FUSES.

3 Wire Mains 2 Wire Branches Solid Neutral with Double
Pole Fusible Toggle Switches for 125-250 Volts AC Single
Phase or DC Edison System.

No. of Cir. Mains	Amp. Cap'y	Combined Panelboard, Box and Front*		List Price	Appr. Wt.	Cabinet Data (Inside Dimensions) Gutters 4"		
		Cartridge Fuse Type	Plug Fuse Type			Hgt.	Wd.	Dp.

Mains: LUGS ONLY

4	30	STC304LD	STP304LD	\$58.00	50	17 x 19 x 5½		
6	60	STC306LD	STP306LD	68.00	55	20 x 19 x 5½		
8	60	STC308LD	STP308LD	78.00	75	23 x 19 x 5½		
10	60	STC310LD	STP310LD	88.00	82	26 x 19 x 5½		
12	60	STC312LD	STP312LD	98.00	115	29 x 19 x 5½		
14	100	STC314LD	STP314LD	106.00	122	32 x 19 x 5½		
16	100	STC316LD	STP316LD	116.00	128	35 x 19 x 5½		
18	100	STC318LD	STP318LD	126.00	140	38 x 19 x 5½		
20	100	STC320LD	STP320LD	140.00	150	41 x 19 x 5½		

Mains: DISCONNECT SAFtoFUSE (Fusible Switch) 2 Poles and
Neutral Lug

4	30	STC304FD	STP304FD	\$68.00	65	26 x 19 x 5½		
6	60	STC306FD	STP306FD	78.00	70	29 x 19 x 5½		
8	60	STC308FD	STP308FD	88.00	90	32 x 19 x 5½		
10	60	STC310FD	STP310FD	98.00	105	35 x 19 x 5½		
12	60	STC312FD	STP312FD	108.00	118	38 x 19 x 5½		
14	100	STC314FD	STP314FD	128.00	138	41 x 19 x 5½		
16	100	STC316FD	STP316FD	138.00	156	44 x 19 x 5½		
18	100	STC318FD	STP318FD	148.00	168	47 x 19 x 5½		
20	100	STC320FD	STP320FD	158.00	175	50 x 19 x 5½		

Mains: OPERATING SAFtoFUSE (Fusible Switch) 2 Poles and
Neutral Lug

4	30	STC304BSFD	STP304BSFD	\$86.00	70	26 x 19 x 5½		
6	60	STC306BSFD	STP306BSFD	96.00	78	29 x 19 x 5½		
8	60	STC308BSFD	STP308BSFD	106.00	95	32 x 19 x 5½		
10	60	STC310BSFD	STP310BSFD	116.00	110	35 x 19 x 5½		
12	60	STC312BSFD	STP312BSFD	126.00	123	38 x 19 x 5½		
14	100	STC314BSFD	STP314BSFD	146.00	143	41 x 19 x 5½		
16	100	STC316BSFD	STP316BSFD	156.00	161	44 x 19 x 5½		
18	100	STC318BSFD	STP318BSFD	166.00	173	47 x 19 x 5½		
20	100	STC320BSFD	STP320BSFD	182.00	180	50 x 19 x 5½		

*FLUSH Fronts furnished unless SURFACE Type specified on order.

BULL DOG SUPERBA PANELBOARDS

FULL SAFETY TYPE. INTERCHANGEABLE FOR
CARTRIDGE OR PLUG TYPE FUSES.

2 Wire Mains 2 Wire Branches with Double Pole Fusible
Toggle Switches for 125 or 250 Volts AC Single Phase
or DC.

No. of Cir. Mains	Amp. Cap'y	Combined Panelboard, Box and Front*		List Price	Appr. Wt.	Cabinet Data (Inside Dimensions) Gutters 4"		
		Cartridge Fuse Type	Plug Fuse Type			Hgt.	Wd.	Dp.

Mains: LUGS ONLY

4	60	STC204LD	STP204LD	\$62.00	50	17 x 19 x 5½		
6	100	STC206LD	STP206LD	68.00	55	20 x 19 x 5½		
8	100	STC208LD	STP208LD	78.00	75	23 x 19 x 5½		
10	100	STC210LD	STP210LD	88.00	82	26 x 19 x 5½		
12	200	STC212LD	STP212LD	98.00	115	29 x 19 x 5½		
14	200	STC214LD	STP214LD	110.00	122	32 x 19 x 5½		
16	200	STC216LD	STP216LD	120.00	128	35 x 19 x 5½		
18	200	STC218LD	STP218LD	130.00	140	38 x 19 x 5½		
20	200	STC220LD	STP220LD	140.00	150	41 x 19 x 5½		

Mains: DISCONNECT SAFtoFUSE (Fusible Switch) 2 Pole

4	60	STC204FD	STP204FD	\$74.00	65	26 x 19 x 5½		
6	100	STC206FD	STP206FD	86.00	70	29 x 19 x 5½		
8	100	STC208FD	STP208FD	96.00	90	32 x 19 x 5½		
10	100	STC210FD	STP210FD	106.00	105	35 x 19 x 5½		
12	200	STC212FD	STP212FD	126.00	156	44 x 19 x 5½		
14	200	STC214FD	STP214FD	136.00	168	47 x 19 x 5½		
16	200	STC216FD	STP216FD	146.00	175	50 x 19 x 5½		
18	200	STC218FD	STP218FD	156.00	180	53 x 19 x 5½		
20	200	STC220FD	STP220FD	166.00	192	56 x 19 x 5½		

Mains: OPERATING SAFtoFUSE (Fusible Switch) 2 Pole

4	60	STC204BSFD	STP204BSFD	\$88.00	70	26 x 19 x 5½		
6	100	STC206BSFD	STP206BSFD	108.00	78	29 x 19 x 5½		
8	100	STC208BSFD	STP208BSFD	118.00	95	32 x 19 x 5½		
10	100	STC210BSFD	STP210BSFD	128.00	110	35 x 19 x 5½		
12	200	STC212BSFD	STP212BSFD	160.00	161	44 x 19 x 5½		
14	200	STC214BSFD	STP214BSFD	170.00	173	47 x 19 x 5½		
16	200	STC216BSFD	STP216BSFD	190.00	180	50 x 19 x 5½		
18	200	STC218BSFD	STP218BSFD	200.00	184	53 x 19 x 5½		
20	200	STC220BSFD	STP220BSFD	210.00	197	56 x 19 x 5½		

*FLUSH Fronts furnished unless SURFACE Type specified on order.

BULL DOG PANELBOARDS

Lighting Panelboards

LIST PRICE ADDITIONS FOR SPECIAL FEATURES
(Applying to all types of Lighting Panelboards)

These list additions are per Panelboard (less fuses) and include increasing size of cabinets to accommodate the addition of these features.

INCREASED CAPACITY MAINS

(Including Heavier Busbars)

For all Panelboards having two "live" mains—2 wire or 3 wire
(with or without neutral bar)

Increased Capacity		Lugs	Mains	Fusible
From	To	Only	SAFtoFUSE Fuse	Switch
Amp.	100 Amp.	\$4.00	\$ 4.00	\$ 6.00
"	200 "	6.00	16.00	30.00
"	200 "	5.00	12.00	26.00

For all Panelboards having three "live" mains—3 wire or 4 wire (with or without neutral bar)

Amp.	60 Amp.	\$0.00	\$ 2.00	\$ 3.00
"	100 "	5.00	8.00	10.00
"	100 "	5.00	6.00	8.00
"	200 "	8.00	20.00	34.00
"	200 "	7.00	16.00	32.00

SUB FEEDS

When Sub Feeds increase capacity of mains over standard capacity, List Price Additions for Increased Mains must be added.)

For all 2 fuse circuits—2 wire or 3 wire
(with or without neutral bar)

All Types

Capacity of Sub Feed	Lugs	SAFtoFUSE	Fusible
	Only		Switch
30 Amp.	\$2.00	\$16.00	\$30.00
60 "	2.00	18.00	32.00
100 "	3.00	20.00	36.00
200 "	4.00	32.00	60.00

For all 3 fuse circuits—3 wire or 4 wire
(with or without neutral bar)

All Types

30 Amp.	\$3.00	\$18.00	\$32.00
60 "	3.00	20.00	34.00
100 "	4.00	22.00	40.00
200 "	6.00	40.00	70.00

Special Additions

For meter loop lugs only—or for double Main Lugs—use column of Sub Feeds—List Price Additions column headed "Lugs Only" opposite correct ampere capacity in first column. Where Panelboards are split in two or more sections, figure each section as a separate Panelboard with its individual meter and main connection.

For 3-2 wire Tumbler Switch Panelboards used for 3 phase service with single phase, 125 volt 2 wire branch circuit, add 5% to List Prices types TP-3; TP-3D; STP-3D; STP-3D and STC-3D, and then, in accordance with table above, add the necessary amount for Increased Capacity Mains, if required.

For 2-2 wire Tumbler Switch Panelboards used for 220 volt service, use same price as corresponding 125 volt Panelboard. (Panelboards with plug fuse branch circuits cannot be used on 220 volt services).

To obtain price for Panelboards having combinations of single and 2 pole Tumbler Switches, all fed from the same main, add to the number of single pole circuits the total number of double pole circuits multiplied by two. With this equivalent number of single pole circuits, price in the regular column and add 5%. For Panelboards having combinations of single and 2 pole circuits but fed from separate buses, use same price as regular two section Panelboards mentioned above. For unfused Main Switches or Sub Feed Switches—use same price as for Fusible Switch.

BULL DOG PLUG FUSE
PANELBOARDS

SINGLE POLE PLUG FUSES ONLY IN BRANCHES



No. 8110



No. 8204

List No.	Branches	Mains	Outside Dimensions of Box, Inches			List Price Each
			Height	Wd.	Depth	
8102	2	30	8 $\frac{3}{4}$	7 $\frac{3}{4}$	3	\$ 3.00
8104	4	30	8 $\frac{3}{4}$	7 $\frac{3}{4}$	3	4.30
8106	6	60	10 $\frac{1}{2}$	7 $\frac{3}{4}$	3	5.70
8108	8	60	12 $\frac{1}{4}$	7 $\frac{3}{4}$	3	7.00
8110	10	60	13 $\frac{3}{4}$	7 $\frac{3}{4}$	3	8.90
8112	12	60	15 $\frac{1}{4}$	7 $\frac{3}{4}$	3	10.50

Mains, 2 or 3 Wire Grounded Neutral; Branch Circuits, 2 Wire Single Pole Plug Fuse.

Fronts Finished in Aluminum Weatherproof Metallic Paint; Tubs Galvanized.

Ample Number and Suitable Arrangement of Knockouts for Loom and Conduit.

WITH DEAD FRONT 60 AMP. RANGE CIRCUIT

List No.	Lighting Circuits	60 Amp. Circuits	Mains	Outside Dimensions of Box, Inches			List Price Each
				Height	Wd.	Depth	
8200	0	1	60	9 $\frac{3}{4}$	7 $\frac{3}{4}$	2 $\frac{13}{16}$	\$ 5.90
8202	2	1	60	12 $\frac{1}{4}$	7 $\frac{3}{4}$	3	6.30
8204	4	1	60	13 $\frac{3}{4}$	7 $\frac{3}{4}$	3	7.60
8206	6	1	100	17 $\frac{1}{2}$	10 $\frac{5}{8}$	3	9.50
8208	8	1	100	12 $\frac{1}{4}$	16 $\frac{1}{2}$	3	11.60
8210	10	1	100	15 $\frac{3}{4}$	16 $\frac{1}{2}$	3	15.20
8212	12	1	100	15 $\frac{3}{4}$	16 $\frac{1}{2}$	3	17.10

Mains, 3 Wire Grounded Neutral; Lighting Circuits, 2 Wire Single Pole Plug Fuse; Range Circuit, 31-60 Amperes 3 Wire Grounded Neutral.

Fronts Finished in Aluminum Weatherproof Metallic Paint; Tubs Galvanized.

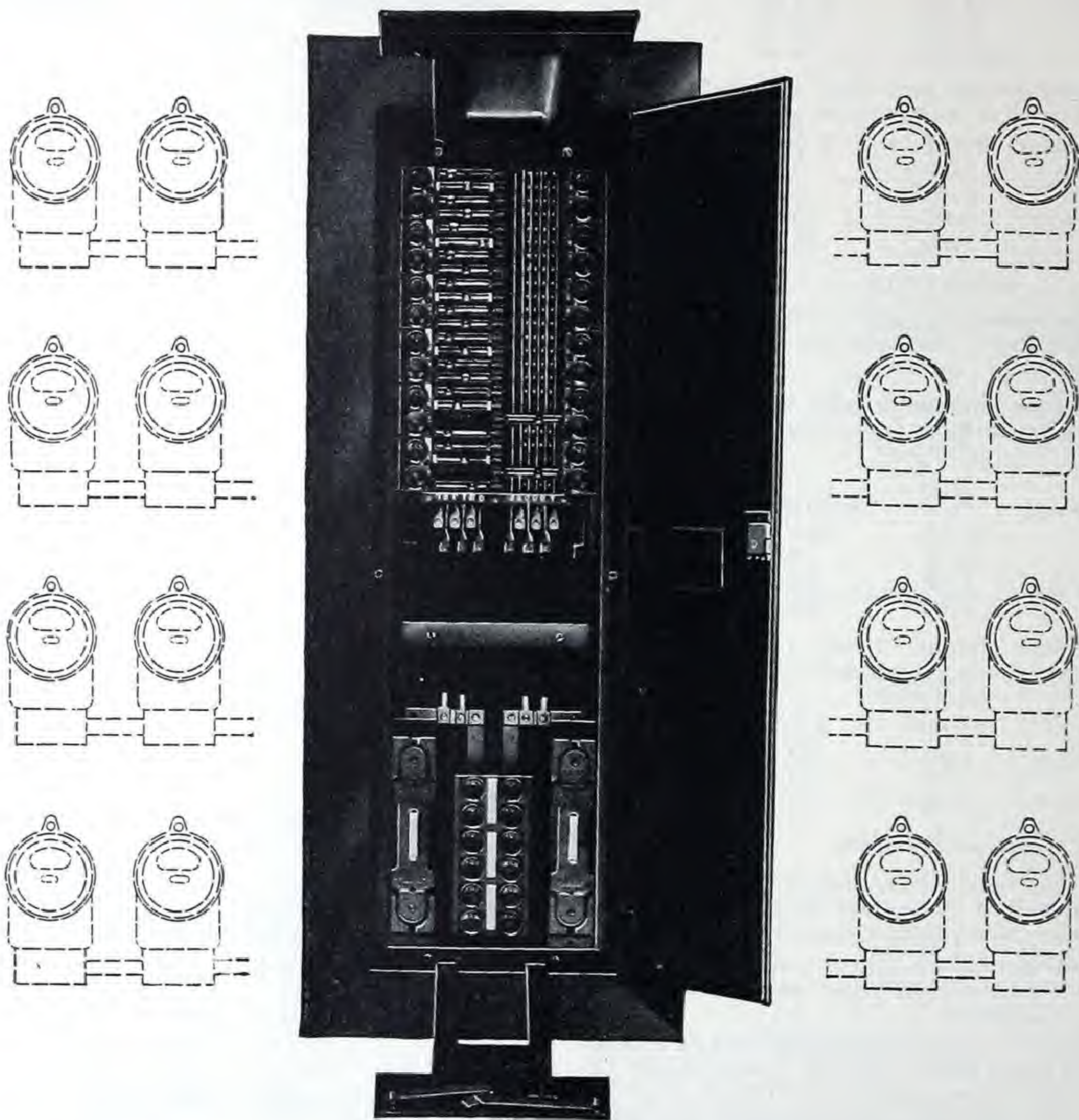
Ample Number and Suitable Arrangement of Knockouts for Loom and Circuit.

BULL DOG PANELBOARDS**Unit-Versal Metering Type**

FLEXO CONNECTOR STYLE

METER BUSBAR TYPE

TYPE MFNTF



TYPE MFNTF

Mains: SAFtoFUSE (Fusible Switch).

Meter Connections: 30 Amp. Plug Fuse Connections.

TYPE MFNTS

Mains: Lugs only.

Meter Connections: 30 Amp. Toggle Switches and Plug Fuse Connections

We are in a position to supply Bull Dog Meter Control Panelboards, which include many different features of design, and will be glad to furnish prices on request.

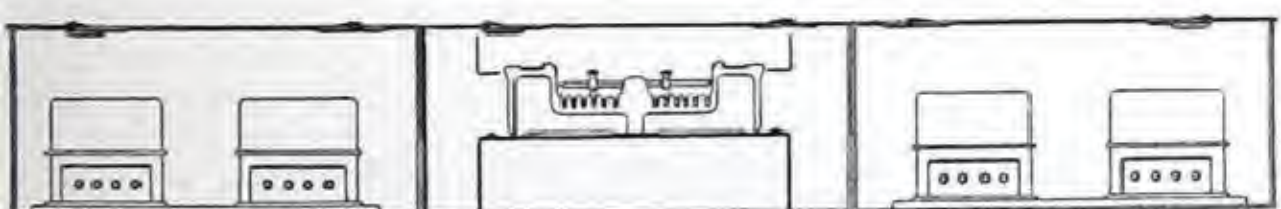
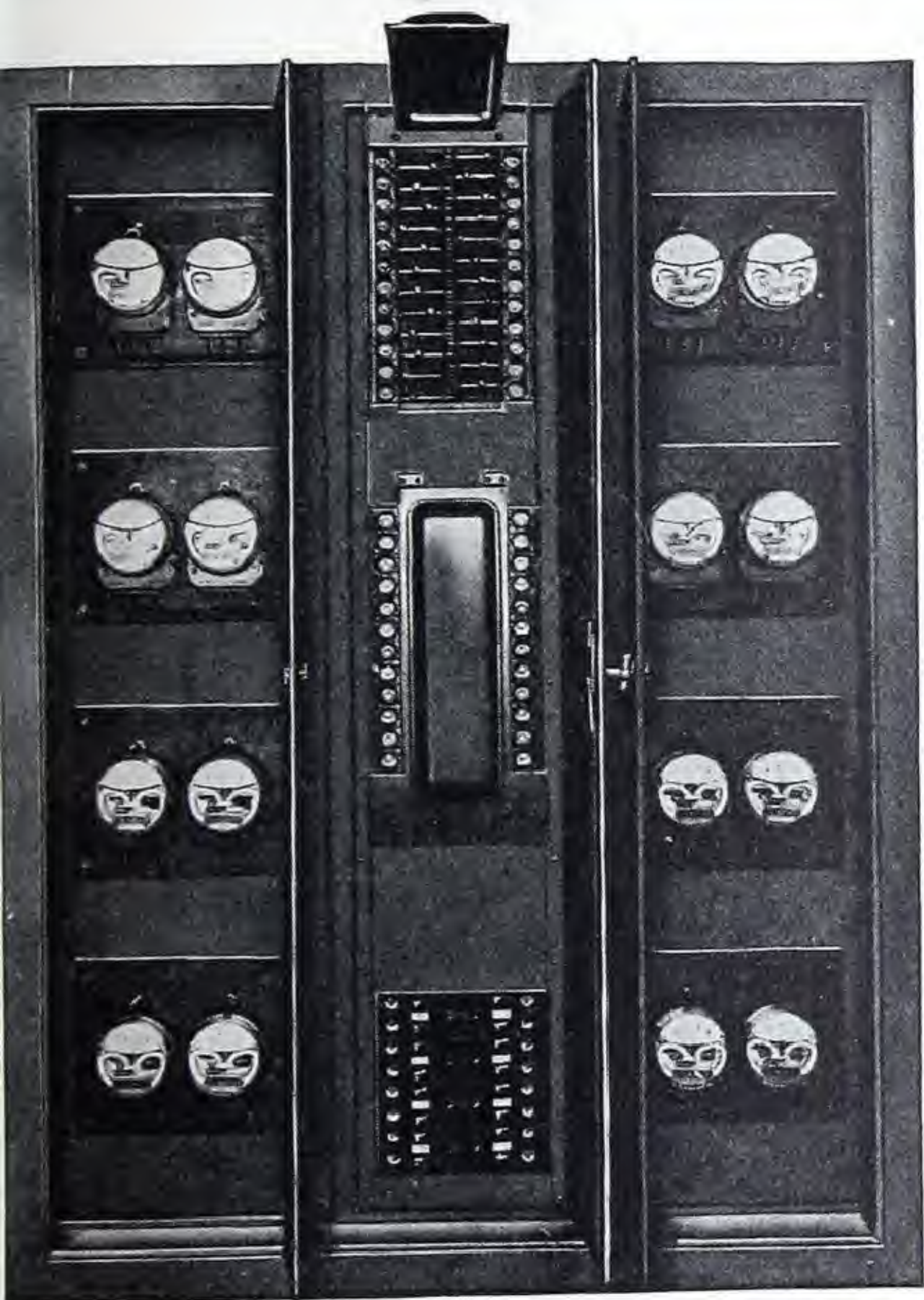
BULL DOG PANELBOARDS

Unit-Versal Metering Type

Rigid Connector Style

Meter Busbar Type

TYPE MBNCS



Mains: Lugs only.

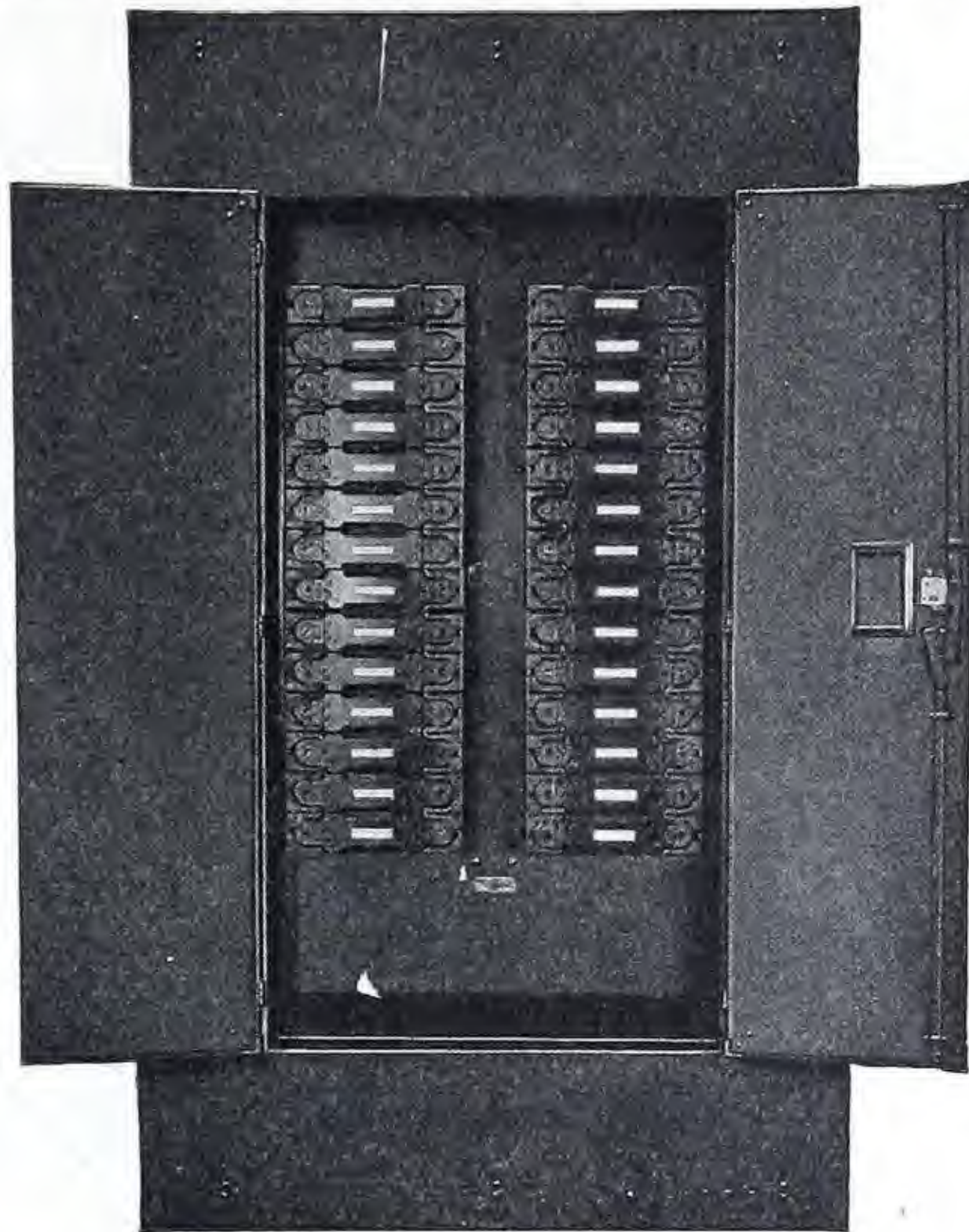
Meter Connections: 30 Amp. Toggle Switches and Plug Connections.

We are in a position to supply Bull Dog Meter Control Panelboards, which include many different features of design, will be glad to furnish prices on request.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts.

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.



Double Row Type

Assembled complete in cabinet for flush installation.

It shows the handsome appearance of these Panelboards with Flush Type Fronts for Cabinets mounted flush in the wall.

UNIT-VERSAL SAFtoFUSE Units may be assembled into combinations to meet almost any condition.

30 Ampere and 60 Ampere, 250 Volt, Double Branch Units may be installed in our Standard UNIT-VERSAL Lighting Panelboard Boxes. 5½" deep.

They may also be assembled with our UNIT-VERSAL Lighting and Metering Panelboard Units and serve as Mains or sub-feeds.

Width is the vital dimension. UNIT-VERSAL Units are based on 11" width, and allowing 4" on each side for Wiring Gutters makes the width of the Cabinet Box 19", except where 6 inch wiring gutters are desired.

A Feeder Panelboard is rarely used to throw "on" or "off" light or power. Its function is to be a centre for distribution in the reduction from larger to smaller cables or wires and in emergencies, or for repairs, to disconnect these cables "for safety" and to localize line trouble.

The Dangerous Condition incidental to the operation, maintenance and fuse replacement of fuses in Live Face or Open Type Power and Light Feeder (Distributing) Panelboards has long been recognized.

The Problem was to Design a Safety Type Panel that would incorporate the following essential features:

1. Narrowness—To Meet Space Limitations. The width should be kept to the minimum, as these Panels are generally installed on the side walls or on columns and pilasters, particularly so in Industrial Plants and modern types of buildings where natural lighting is desired, and on pilasters or columns which rarely exceed 24" in width, and generally are 18" to 20" in width. Wide Cabinets that extend over traffic aisles are often damaged and cause congestion.

2. Switch Ahead of the Fuse so that the fuse may not be touched when it is alive.

- a—It is essential in fuse replacements that a Switch should be provided ahead of fuses.

- b—Means should be provided for the convenient testing of fuses by recognized methods so as to determine which fuse in the Circuit has blown.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

3. Convertibility—Convenient changing of fuse sizes.

In modern Industrial Plants conditions often require a complete rearrangement of machines so as to secure continuous sequence of production. Ofttimes the number of operations is decreased or increased, thereby requiring a change of Motor size on the Circuits. To meet these conditions it is essential to change and re-change the size of the Branch Circuit fuses so as to properly protect the Line or the Apparatus on the Line. Frequently smaller fuses are desired—sometimes larger fuses. This should be accomplished without interfering with other circuits.

4. Motor Readings—To determine proper size of Motor.

Modern Industrial Plants also increase their power factor and avoid Motor burn-outs and shut-downs by constantly testing the load on these motors. It was essential that these tests be made without shutting down the motor or interfering with production and oftentimes desirable that the machine operators did not know that the tests were being conducted so as to insure a true reading of the Motor Load.

5. Emergency Disconnecting.

It should be practical with the greatest safety to disconnect the Circuits in case of emergencies or for repairs or extensions to the Line, and to provide against accidental or unintentional throwing of current on that line.

6. Provision for Future Circuits.

The rapid growth of most well managed factories could not be anticipated. Ofttimes before the original electrical installation is completed, provisions for additional motors are required. In the past, attempts were made to meet these conditions by providing one or two additional circuits. Frequently they were not used or were of the wrong capacity.

It is desirable to be able to install larger cabinet boxes so that at any time in the future as conditions warrant, additional circuits may be installed. Or in the event that more circuits were installed in a panel than are required, that these Circuits could readily be transferred to another cabinet by any qualified electrician.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

7. Changes in Line Voltage or from D.C. to A.C.

Changing from 125 Volt, 250 Volt to 440 Volt and 600 Volts.

Many factories from time to time found it desirable and economical to change to higher or lower voltage, or from Direct Current to Alternating Current. It was desirable to have an arrangement in Panelboards that would make this change convenient and inexpensive.

8. Liability and Compensation.

There are in most Provinces compulsory workmen's compensation laws. The cost of carrying this insurance represents a heavy overhead. To many concerns the ratio of cost of Liability Insurance to Fire Insurance is more than eight to one. It is necessary that this overhead be kept to a minimum by preventing accidents, thereby decreasing the compensation costs accordingly.

9. Maximum Safety—in fuse replacements.

Naturally, to secure the maximum safety it is essential that all Live Metal parts be covered, and that in the replacement of fuses, means be provided so that "fuses cannot be touched while they are alive." This requires a switch interlocked with the fuse so that the switch would first have to be thrown "off" before the fuse could be handled.

10. Economy or Low Cost.

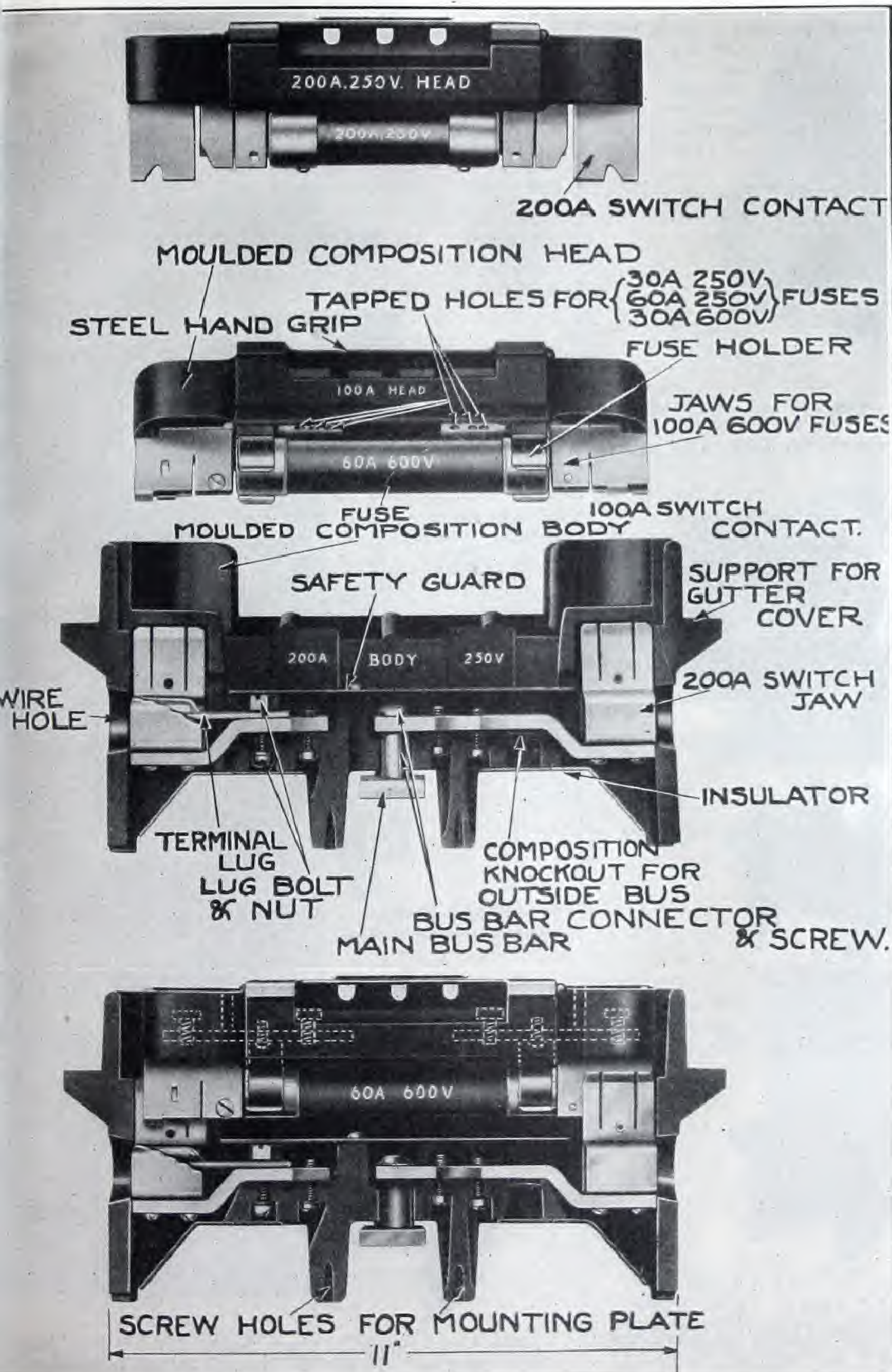
Commercial Buildings or Industrial Plants represent an investment on which returns, dividends, are expected, therefore, the products must not alone incorporate the features above mentioned, but must be economical to install and maintain.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

The Construction of the BULL DOG UNIT-VERSAL SAFtoFUSE is graphically explained in the cut below. SAFtoFUSE its consist of Bodies and Heads.



The Photograph shows cross section of 200 Ampere Body which is designed to accommodate 200 Ampere 250 Volt Head, but it will also accommodate a 100 Ampere Head, which Head has metal parts designed to receive the following sizes of fuses:

30, 60, 100 Ampere—250 Volt.

30, 60, 100 Ampere—600 Volt.

All that is necessary is to use the proper type Fuse Holders in this Head.

The 200 Ampere Body is therefore convertible for the 7 sizes of fuses.

The 100 Ampere Body has metal parts to receive the 100 Ampere Head and all the fuses that will fit into the 100 Ampere Head, but the metal parts on the body are not of the proper capacity for the 200 Ampere Head. Units are, therefore, listed with both 100 Ampere Bodies and 200 Ampere Bodies and 100 Ampere Heads and 200 Ampere Heads.

The SAFtoFUSE is listed as standard by the Hydro Electric Power Commission of Ontario Laboratories as a combination Switch and Cut-out, and in fact, is a Double Break fusible Safety Type Switch.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

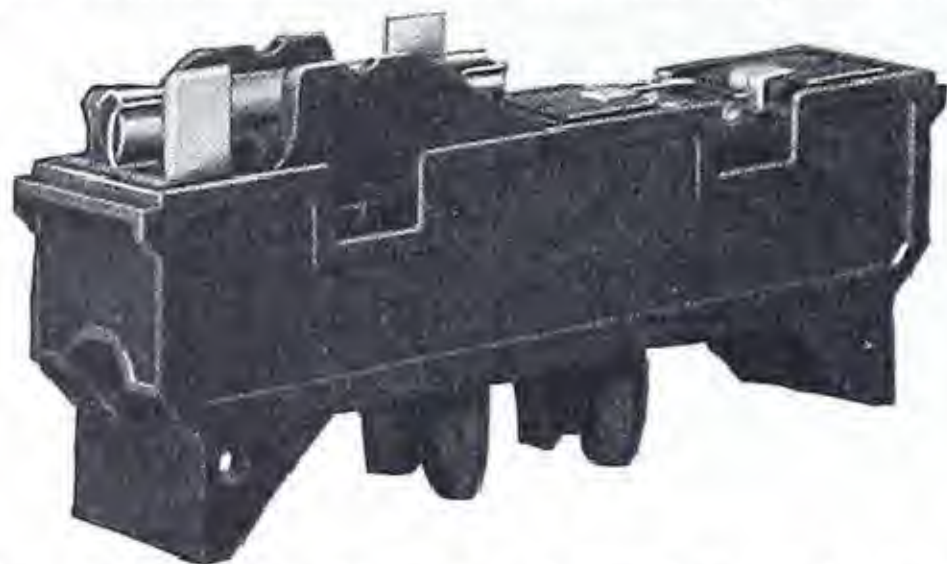
125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

The SAFtoFUSE is a "Combination Switch and Cut Out"—Fusible Switch

"Bull Dog" Unit-Versal SAFtoFUSE Units are made of Asbestos with a binder material cold moulded or pressed in dies to shape and then through a curing process which gives a high di-electric and mechanical strength, also arc resisting qualities.

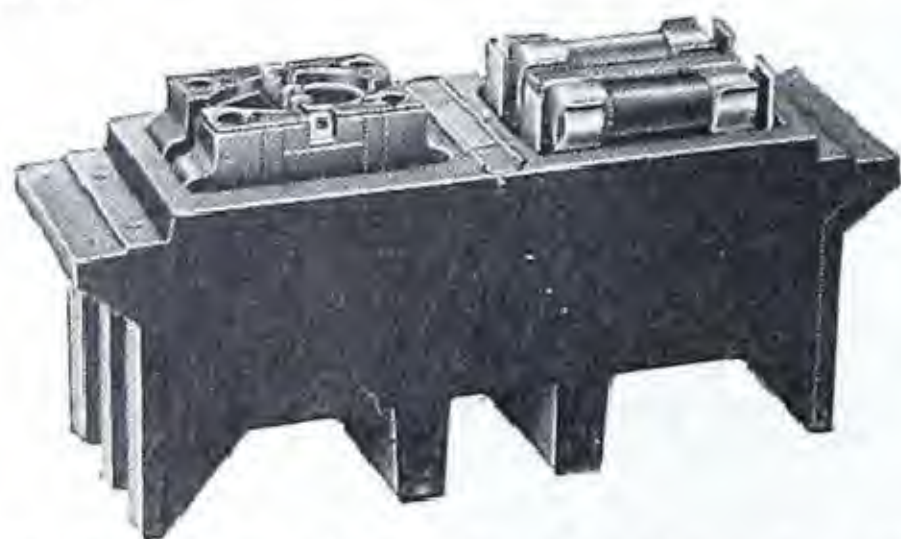
They are artistic and of uniform appearance. Each unit comprises a Body which contains current carrying parts directly connected to the Bus Bars, and the Head into which the Switch Blades and the Fuse Holders are mounted. Exceptionally Heavy Current Carrying copper parts are provided. These Units are standardized and interchangeable and may be combined to meet almost any condition.



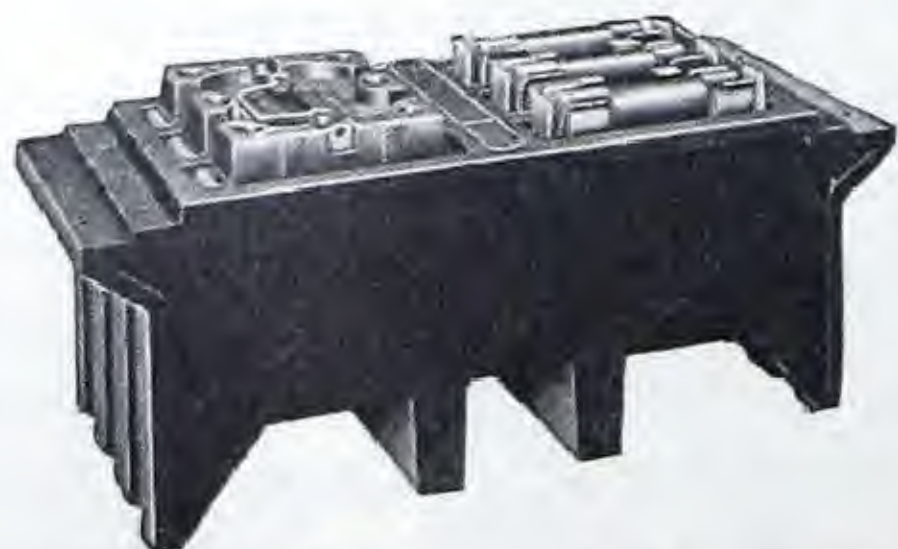
Single Pole, Double Branch, Bakelite Unit Left Head in "off" position. Heads are convertible for Fuses, 30 Amp. and 60 Amp., 600 Volt and 30 Amp. 60 Amp., 100 Amp., 250 Volts.



The above illustration shows heads fastened together for three pole use.



60 Ampere, 3-2 Wire Body Double Branch with one Head in "on" position, the Head in "off" position containing 60 Amp., 250 Volt Fuses—30 or 60 Amp. Fuse Heads fit into this body.

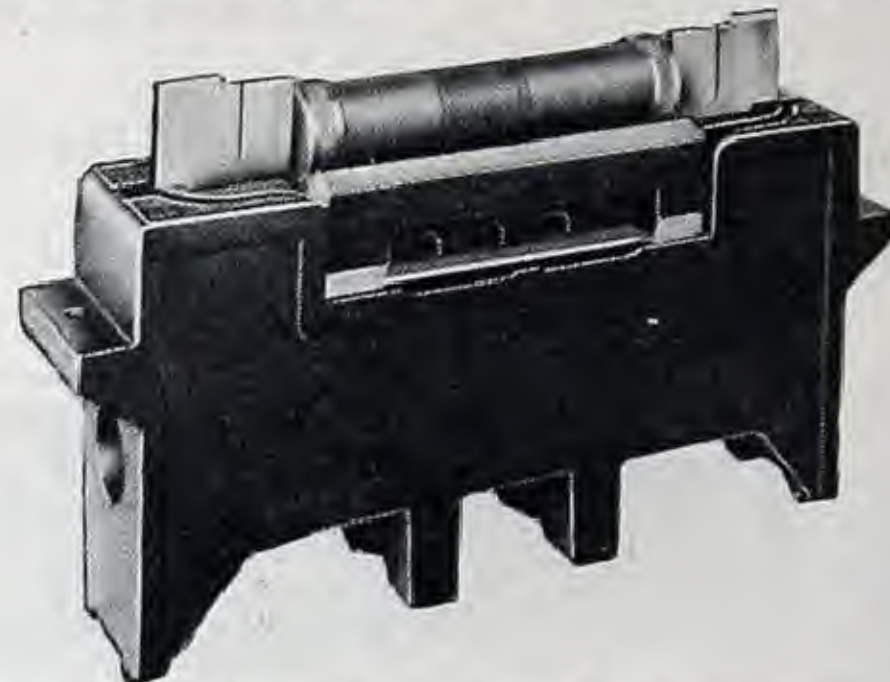


60 Ampere, 3-3 Wire Body Double Branch with one Head in "on" position, the Head in "off" position containing 60 Amp., 250 Volt Fuses—30 or 60 Amp. Fuse Heads fit into this body.

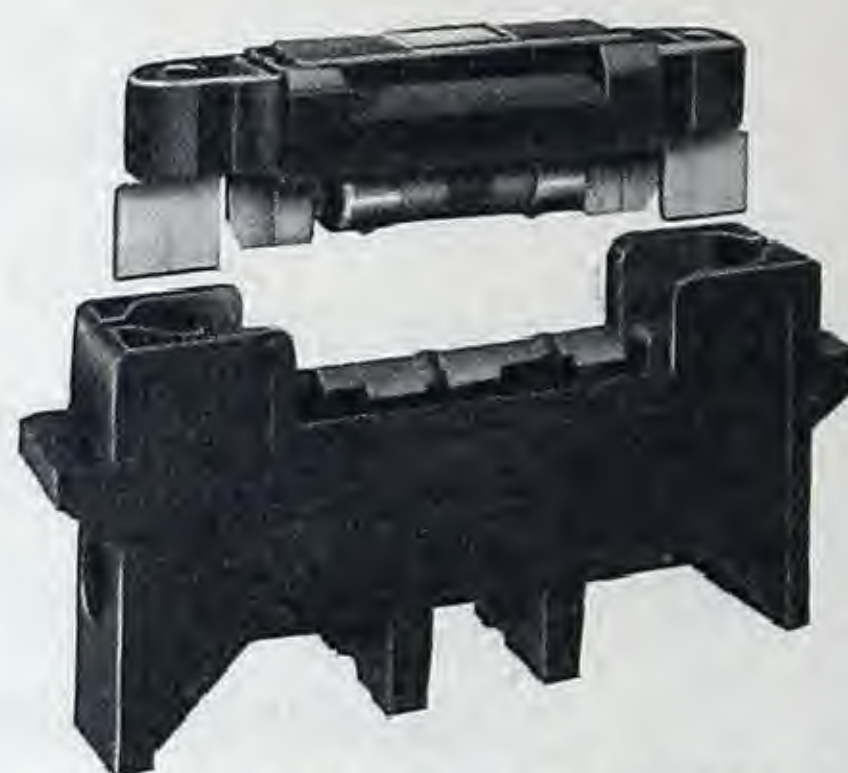
BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts.

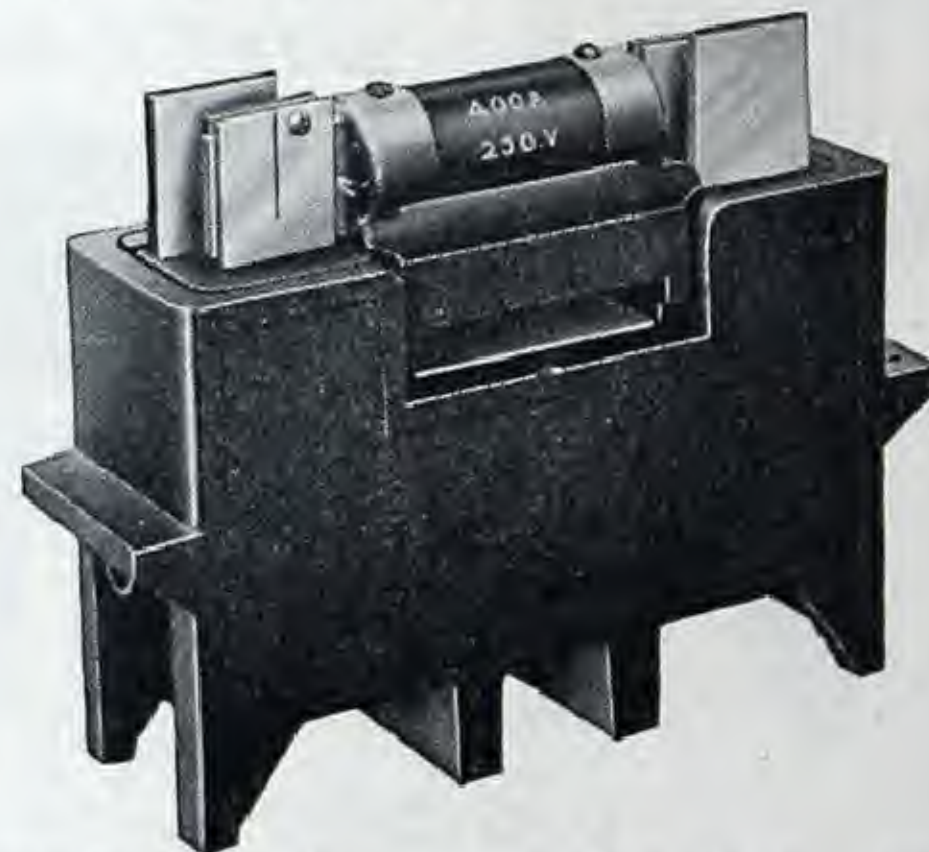
3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.



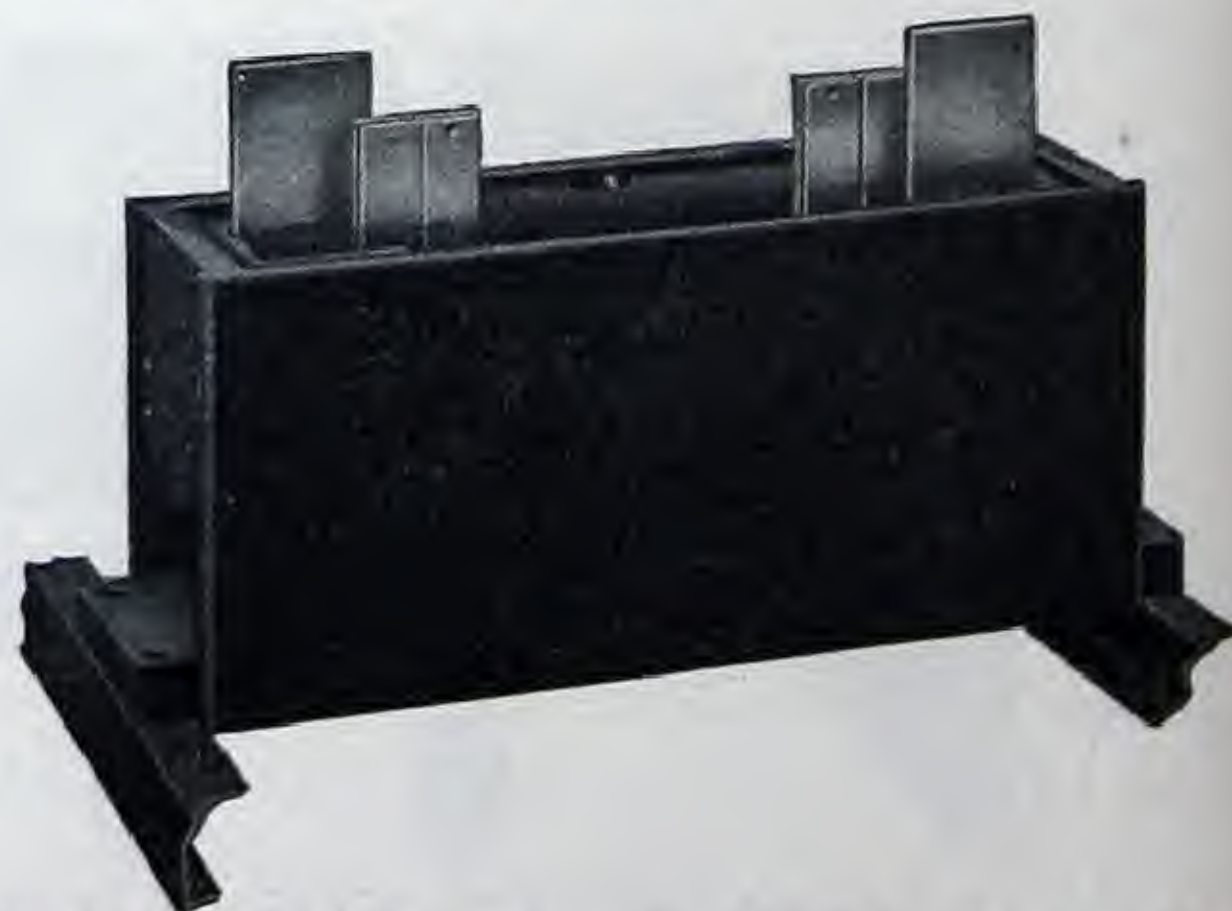
100 Amp. Single Pole Bus Bar Type Body, showing 100 Amp., 600 Volt Fuse mounted in head in "off" position.



200 Ampere Single Pole Body with 200 Amp. Fuse in Head. Head in "going on" position.



400 Ampere Bus Bar Type Single Pole Body with 400 Amp., 250 Volt Fuse in Head. Head in "off" position.



600 Amp. Bus Bar type, Single Pole Body. Head in "off" position. Head is convertible for 600 Amp., 250 Volt and 400 Amp. and 600 Amp., 600 Volt.

BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

COMPOSITE PANEL OF VARIOUS SAftoFUSE UNITS
The SAftoFUSE is a "Combination Switch and Cut Out"—
Fusible Switch

"Bull Dog" Unit-Versal SAftoFUSE Feeder Panels
showing Standardized and interchangeable Units mounted
on a composite Panel with Standard Busbars and mounting
hardware.



Composite Picture

It is impractical, without deliberate intent, to touch live metal parts of the middle section of the SAftoFUSE.

Versatility of SAftoFUSE Units is illustrated in the composite picture at left.

From bottom to top, 30, 60, 100, 200 and 400 Ampere, 250 Volt Fuses.

3-2 Wire Unit, 250 Volt, 30A and 60A.

3-3 Wire Unit, 250 Volt, 30A and 60A.

30, 60, 100 and 200 Ampere, 600 Volt Fuses.

Single Pole, Double Branch Bakelite Unit 30 Amp. and 60 Amp., 600 Volts and 30-60-100 Amp., 250 Volts.

The Body for 30, 60, 100 and 200 Ampere, 250 Volt Fuses, and 30, 60, 100 Ampere, 600 Volt Fuses, will take heads for any of these sized fuses.

The Head for 100 Ampere Fuse will take 30, 60 and 100 Ampere, both 250 Volt and 600 Volt Fuses.

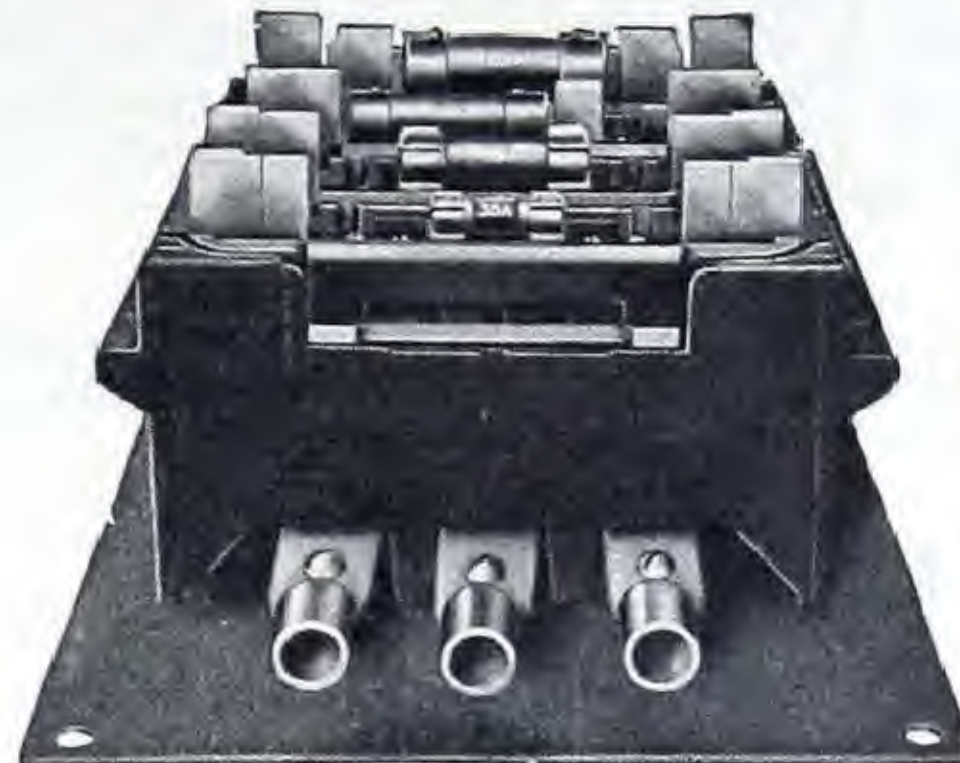
The 2 and 3 Pole Double Branch Units will take either 30 or 60 Ampere Fuses, and the S. P. Bakelite Double Branch Unit 30-60-100 Amp., 250 Volts.

Cabinets are 19" wide with 4" wiring gutters and 23" wide with 6" wiring gutters.

BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

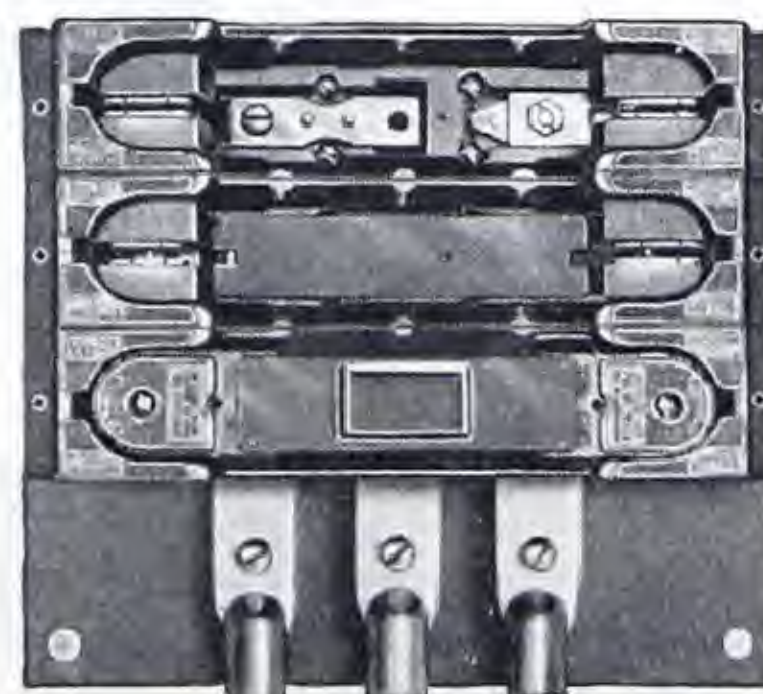
3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.



End view of the Units in the "off" position. All current carrying parts are dead when they are exposed.



End view of the Units in the "on" position. Fuses may be tested when Heads are in this position.



200 Ampere Unit with Head in place showing holes for testing fuses. Middle Body Head removed, showing all Live Metal Parts covered and guarded. Top Body, showing Guard in bottom of Unit removed, exposing Busbar connection and mounting screws, also Terminal Lug Bolt.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.

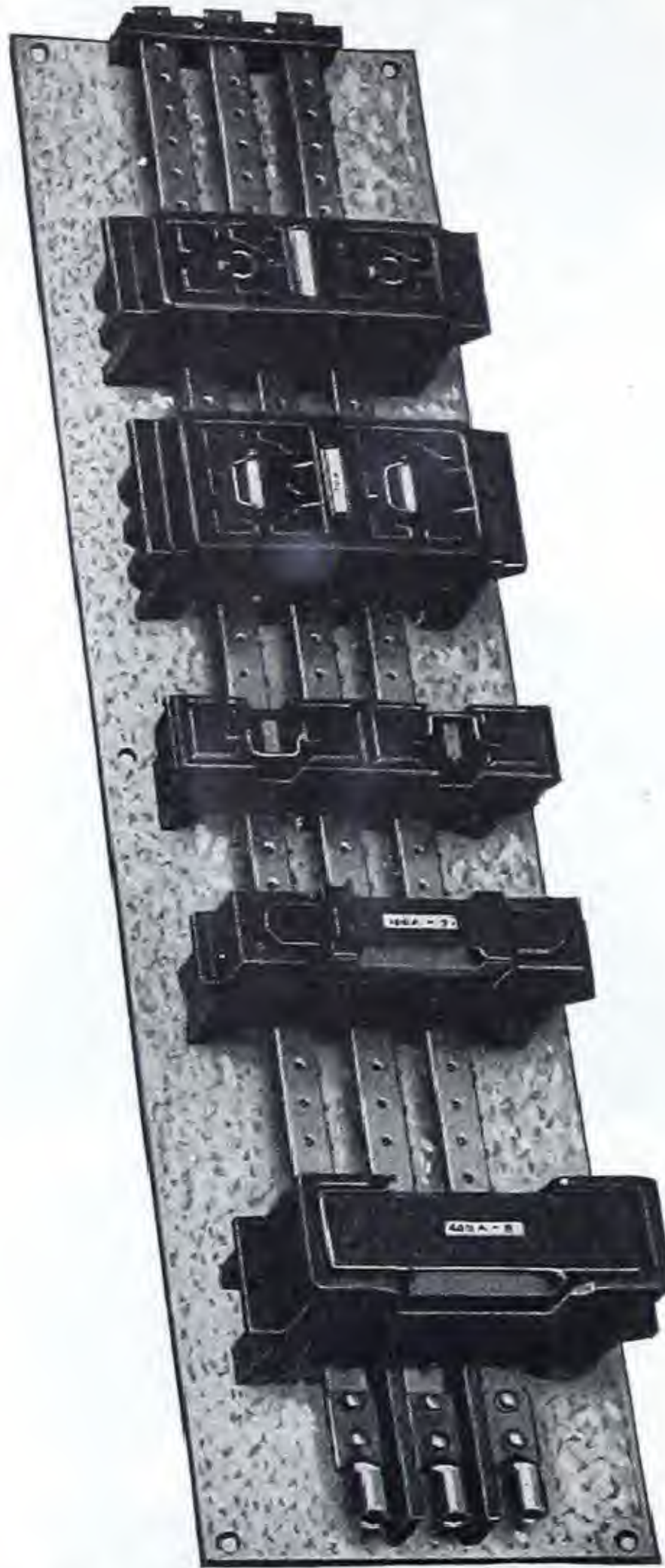
Method of Assembling SAFtoFUSE Units in
Standardized Cabinets

The SAFtoFUSE is a "Combination Switch and Cut Out"
—Fusible Switch.

These cuts graphically illustrate the Safety, Flexibility
and Economy of BULL DOG UNIT-VERSAL SAFtoFUSE
Panels. Main Busbars and Mounting Plates have standard
holes on $1\frac{1}{4}$ " centres tapped ready to receive any Busbar
type BULL DOG SAFtoFUSE UNITS.

Reduce First Cost

Order Cabinets sufficiently large for spare circuits. Spare
circuit units may later be ordered and installed as required
without removing or disturbing other units.



Shows convertible and interchangeable BULL DOG SAFtoFUSE Units
assembled on Busbars and steel mount-
ing plate.



BLANK FILLER UNITS of varying
widths to cover unused Busbar space
pending installation of future circuits.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

125, 250, 440 and 600 Volts

3-3 wire; 3-2 wire; 2-2 wire; two phase; and 4 wire, 3 phase.



An 8 Circuit 3 Wire 600 Volt SAFtoFUSE Panel cor-
pletely assembled on mounting plate (but without Cabine-
t) consisting of:

- 6— 60 Amp. 600 Volt 3 Pole Circuits.
- 1—100 Amp. 600 Volt 3 Pole Circuit.
- 1—400 Amp. 600 Volt 3 Pole Circuit.

Note—Blank Filler Unit at top covering unused Bus-
space pending installation of additional Circuits—Units
which may be added at any time. Main Lugs are also cover-
ed by Blank Filler Units making the entire Panel dead front
safety type.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

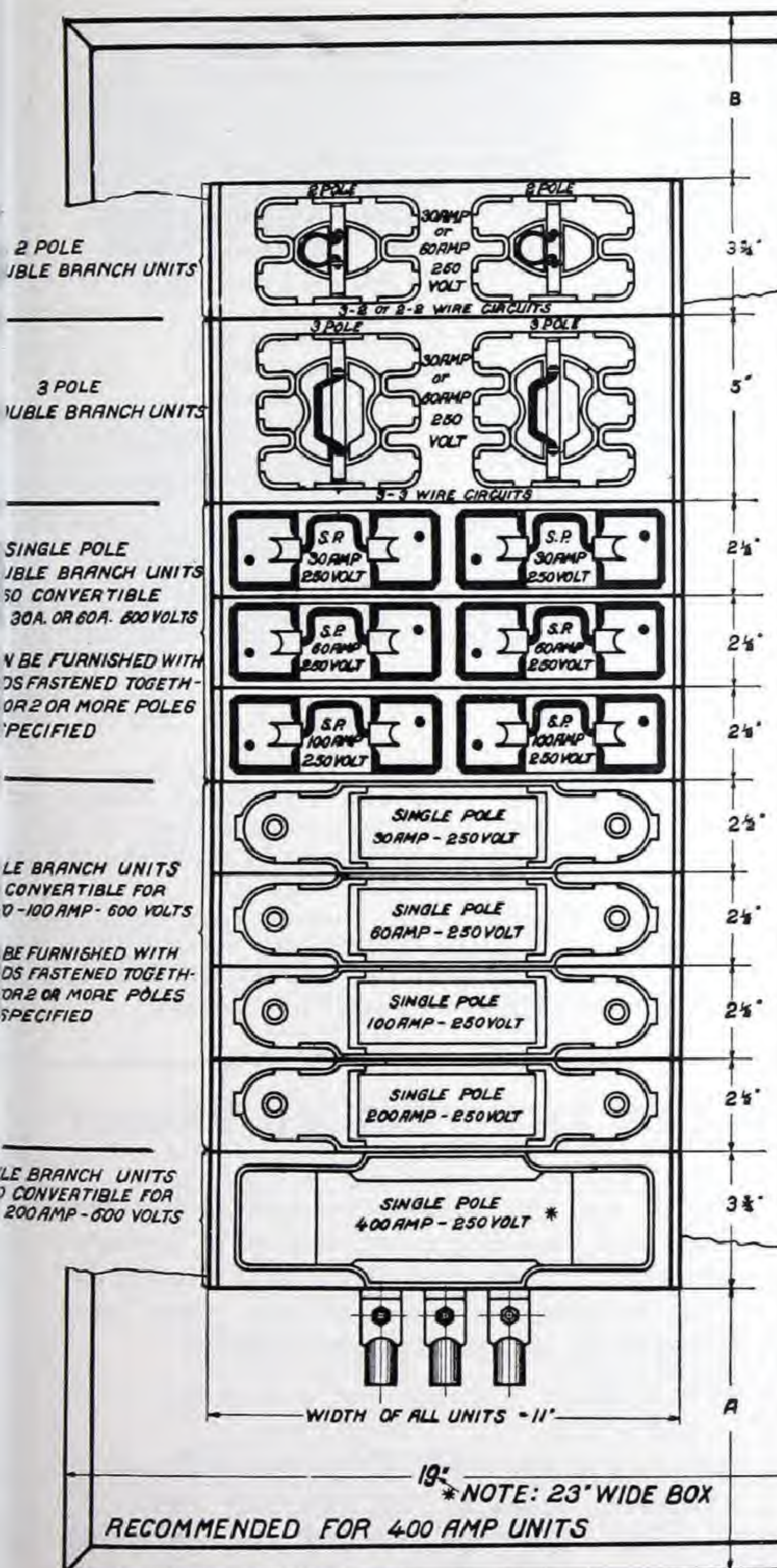
Standard Steel Cabinet Dimensions

For 250, 440 or 600 Volt Circuit Panels

The following Dimension Data will enable Engineers and installers to readily determine height of Cabinets required to meet their installation conditions and thus ascertain the best standard size Cabinet to fit the purpose, as listed.

Reduce First Cost

Order Cabinets sufficiently large for spare circuits with blank Filler Plates to cover unused Busbar space. Spare circuit units may later be ordered and installed as required without disturbing other units.

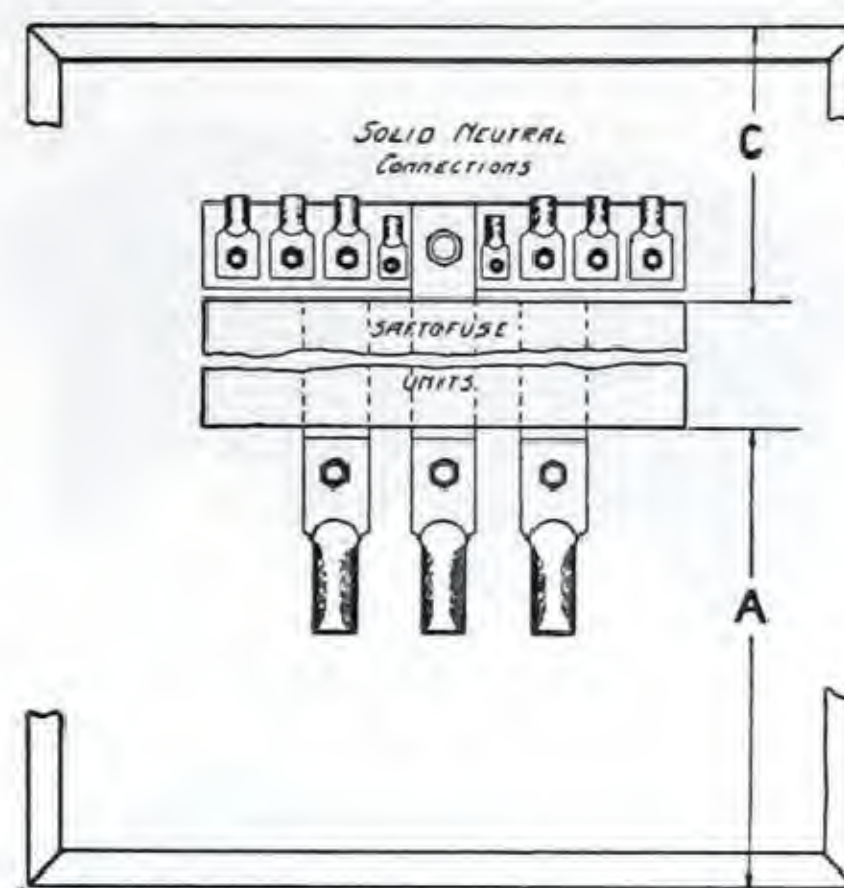


Use Blank Filler Plates to cover unused Busbar space, allowing installation of future Circuits.

For 30 Ampere 250 Volt 2 pole and 3 pole only—height required 2 1/2\".

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

Standard Steel Cabinet Dimensions



To the Unit dimensions add the following dimensions to determine height of cabinet required. Then use nearest standard cabinet.

Lugs Only Mains

19" Wide Cabinets

Top or Bottom

Amp.	Cap.	of	Main	"A"	"B"	"C"	Neutral Bar and Gutter	Single Phase 3 Wire	200 A. or 400 A.	For 3
Lugs	Mains									Phase
200	6 1/2"	4"	6 1/2"							4 Wire
400	10 1/2"	4"	6 1/2"							Panels
600	13 1/2"	4"	6 1/2"	10 1/2"						the "C"
800	16"	4"	6 1/2"	10 1/2"						Dimension
1200	18 1/2"	4"	6 1/2"	10 1/2"						is the
										same as
										Main Lugs
										"A"
										Dimension
200	8 1/2"	6"	8 1/2"							
400	12 1/2"	6"	8 1/2"							
600	15 1/2"	6"	8 1/2"	12 1/2"						
800	18"	6"	8 1/2"	12 1/2"						
1200	20 1/2"	6"	8 1/2"	12 1/2"						

23" Wide Cabinets

Above dimensions are approximate minimums.

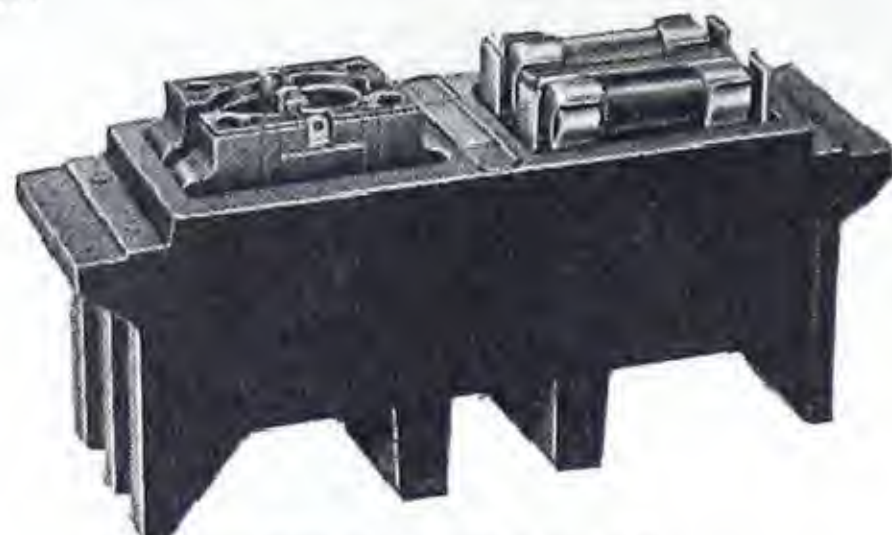
Use "B" dimensions when Solid Neutral is not required.

Use "C" dimensions when Solid Neutral is required. Never use both.

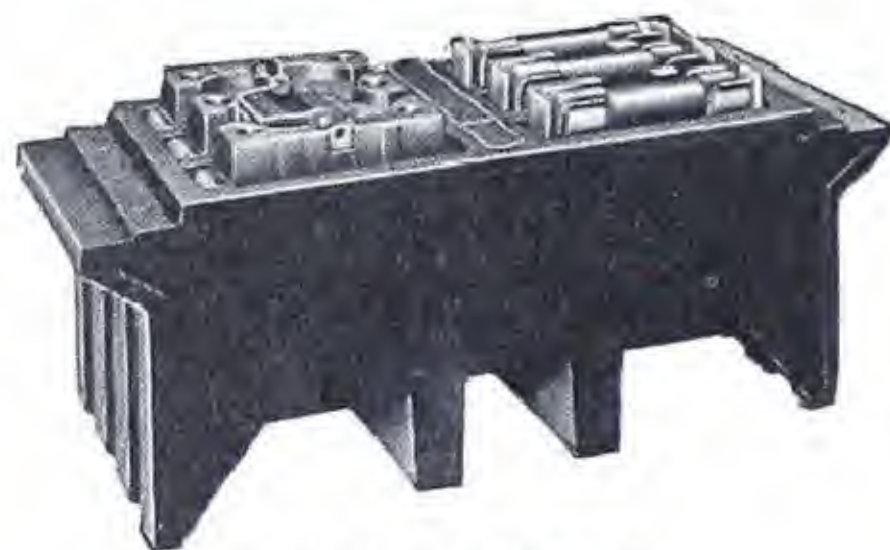
**BULL DOG UNIT-VERSAL SAFtoFUSE
POWER AND LIGHT DISTRIBUTION
PANELBOARDS
SAFtoFUSE UNITS
250 Volts**

Body and Heads Complete Ready to Attach to Busbars

All Units have a common width of 11 inches, except 600 Amp. List No. US316 Unit which is 17 inches wide. Face Heights of Units (for computing total panel height) are given below.



US 321-322-3212



US 331-332-3312

30 Amp. and 60 Amp.,
250 Volt Branches

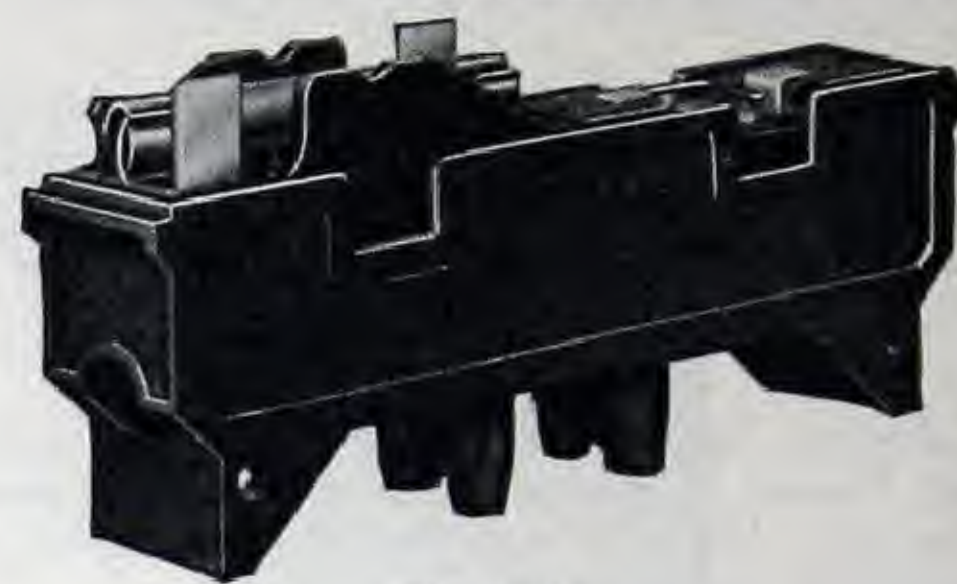
Double Branch Units—
Busbar Type

1 Unit Required
for each
2 Circuits

Used for 3-2 Wire,
2-2 Wire or 3-3 Wire Panels.

List No.	Branch Poles	Heads Fitted for Fuses	Fuse Voltage	Face Height, Inches
US321	2	4—30 A.	250 V.	2½
US322	2	4—60 A.	250 V.	3¾
US3212	2	{2—30 A. 2—60 A.}	250 V.	3¾
US331	3	6—30 A.	250 V.	2½
US332	3	6—60 A.	250 V.	5
US3312	3	{3—30 A. 3—60 A.}	250 V.	5

**BULL DOG UNIT-VERSAL SAFtoFUSE
POWER AND LIGHT DISTRIBUTION
PANELBOARDS
SAFtoFUSE UNITS
250 Volts**



US 3121

Double Branch—Single Pole
—Bakelite Units
30-60-100 Amp.

US3121	1	2—30 A.	250 V.	2½
US3122	1	2—60 A.	250 V.	2½
US3123	1	2—100 A.	250 V.	2½
US31212	1	1—30A. & 1—60A.	250 V.	2½
US31213	1	1—30A.—1—100A.	250 V.	2½
US31223	1	1—60A.—1—100A.	250 V.	2½

2 Units
required for
Circuit for
2-2 W.
or 3-2 W.

*Single Branch Units—
Busbar Type
100 Ampere Bodies with
100 Ampere Heads fitted
with Fuse Holders for

3 Units
required per
Circuit
for 3-3 Wire

US311	1	1— 30 A.	250 V.	2½
US312	1	1— 60 A.	250 V.	2½
US313	1	1—100 A.	250 V.	2½

2 Units
required for
Circuit for
2-2 W.
or 3-2 W.

**Single Branch Units—
Busbar Type
200 Ampere Bodies with
100 Ampere Heads fitted
with Fuse Holders for

3 Units
required per
Circuit
for 3-3 Wire

US3141	1	1— 30 A.	250 V.	2½
US3142	1	1— 60 A.	250 V.	2½
US3143	1	1—100 A.	250 V.	2½

Fuses Not Included

*Single Branch Units with 100 Amps. Bodies and 10 Amp. Heads, have 100 Amps. contacts only in both Bodies and Heads, and are convertible for 30 A., 60 A., and 100 A. both 250 Volt and 600 Volt Fuses.

**Single Branch Units, Busbar type, with 200 Amp Bodies and 100 Amps. Heads each convertible for 30 A., 60 A., and 100 A., both 250 Volt and 600 Volt Fuses, and will take standard 200 Amp. 250 Volt Head.

THREE NORTHERN ELECTRIC RULES THAT INSURE PROFIT

1. Know your overhead. All operating expenses, rent, bad accounts, clerical salaries—everything except time and material is overhead. Divide this expense by the amount of business you do and you have your overhead percentage.

2. Get your materials from Northern Electric.

3. Use the table below to figure your price.

Example:—

Your overhead is 30% and you wish to make 10% net on this job. 67 is the factor

shown by the intersection of these two lines and you, therefore, add 67% to your estimated prime cost (time and material). This establishes your selling price and brings you the profit you desire.

Per Cent
of

Net Profit Desired	Per Cent of Overhead Expense						
	15	20	25	30	35	40	45
5	25	33	43	54	67	82	100
10	33	43	54	67	82	100	122
15	43	54	67	82	100	122	150
20	54	67	82	100	122	150	185
25	67	82	100	122	150	185	233

ALL DOG UNIT-VERSAL SAFtoFUSE
POWER AND LIGHT DISTRIBUTION
PANELBOARDS
SAFtoFUSE UNITS

440-600 Volts

(also convertible for 250 Volts)

and Heads Complete Ready to Attach to Busbars
Units have a common width of 11 inches except 400
and 600 Amp. which are 17 inches wide. Face Heights
of Units (for computing total panel height) are given below.



US3161



US3136

30 Amp. and 60 Amp.
Double Branch—Single Pole
Bakelite Units

Branch Poles	Heads Fitted for Fuses	Fuse Voltage	Face Height, Inches
1	2—30 A.	600 V.	2 1/2
1	2—60 A.	600 V.	2 1/2
1	1—30 & 1—60 A.	600 V.	2 1/2

Units required for 2 W. -2 W.	*Single Branch Units— Busbar Type 100 Ampere Bodies with 100 Ampere Heads fitted with Fuse Holders for	3 Units required per Circuit for 3-3 Wire
1	1— 30 A.	600 V.
1	1— 60 A.	600 V.
1	1—100 A.	600 V.

Units required for 2 W. -2 W.	Single Branch Units— Busbar Type 200 Ampere Bodies with Heads fitted with Fuse Holders for	3 Units required per Circuit for 3-3 Wire
1	1— 30 A.	600 V.
1	1— 60 A.	600 V.
1	1—100 A.	600 V.

Fuses not Included

Single Branch Units with 100 Amp. Bodies and 100 Amp.
have 100 Amp. contacts only in both Body and
and are convertible for 30 A., 60 A., and 100 A., both
lt and 600 Volt Fuses.
es on application.

BULL DOG UNIT-VERSAL SAFtoFUSE
POWER AND LIGHT DISTRIBUTION
PANELBOARDS
SAFtoFUSE UNITS

440-600 Volts

(also convertible for 250 Volts)

Body and Heads Complete Ready to Attach to Busbars
All Units have a common width of 11 inches except 400
Amp. and 600 Amp. which are 17 inches wide. Face Heights
of Units (for computing total panel height) are given below.

Single Branch Units—Busbar Type
Bodies with Heads fitted with Fuse
Holders for

US3146	1	1—200 A.	600 V.	3 3/4
US3156	1	1—400 A.	600 V.	5
US3166	1	1—600 A.	600 V.	5

Extra Heads Only—Per Head

US116	1	1— 30 A.	600 V.
US126	1	1— 60 A.	600 V.
US136	1	1—100 A.	600 V.
US146	1	1—200 A.	600 V.
US156	1	1—400 A.	600 V.
US166	1	1—600 A.	600 V.

Extra Heads only for Bakelite S.P. Double Branch Units

Capacities	Single Pole List No.	Two Pole List No.	Three Pole List No.
30 A. 600 V.	US2116	US2216	US2316
60 A. 600 V.	US2126	US2226	US2326

US2316
Three Pole Head



Wherever you may be located in
Canada, the Northern Electric Com-
pany is equipped to serve you in the
prompt delivery of Wiring Devices
and Electrical Supplies. Warehouses
are conveniently located in the prin-
cipal cities.

An order placed with the Northern
Electric Company assures you that
you will receive quality goods, proper
packing, prompt deliveries from large
stocks, and fairly priced.

You have also at your call an
experienced and trained staff, whose
duty it is to serve you satisfactorily.

It is because of this sound policy
that the business of the Company
has grown to its present large pro-
portions.

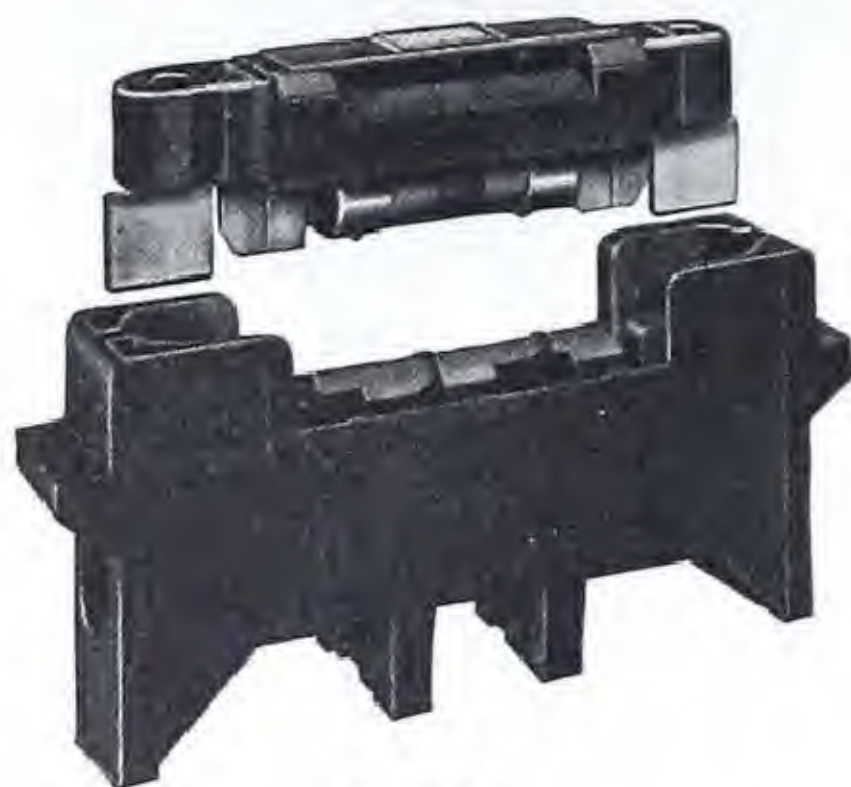
BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

SAftoFUSE Units

250 Volt

Body and heads complete ready to attach to busbars.

All units have a common width of 11 inches, except 600 Amp. List No. US316 Unit which is 17 inches wide. Face heights of units (for computing total panel height) are given below.



US314

*Single Branch Units—Busbar Type
Bodies with Heads fitted with Fuse Holders for

List No.	Branch Poles	Heads Fitted for Fuses	Fuse Voltage	Face Height Inches
US314	1	1—200 A.	250 V.	2½
US315	1	1—400 A.	250 V.	3¾
US316	1	1—600 A.	250 V.	5

Extra Heads only—per Head

US21	2	2—30 A.	250 V.	...
US22	2	2—60 A.	250 V.	...
US31	3	3—30 A.	250 V.	...
US32	3	3—60 A.	250 V.	...
US11	1	1—30 A.	250 V.	...
US12	1	1—60 A.	250 V.	...
US13	1	1—100 A.	250 V.	...
US14	1	1—200 A.	250 V.	...
US15	1	1—400 A.	250 V.	...
US16	1	1—600 A.	250 V.	...

Extra Heads only for Bakelite S.P. Double Branch Units

Capacities	Single Pole List No.	Two Pole List No.	Three Pole List No.
30 Amp. 250 V.	US211	US221	US231
60 Amp. 250 V.	US212	US222	US232
100 Amp. 250 V.	US213	US223	US233

Fuses not Included

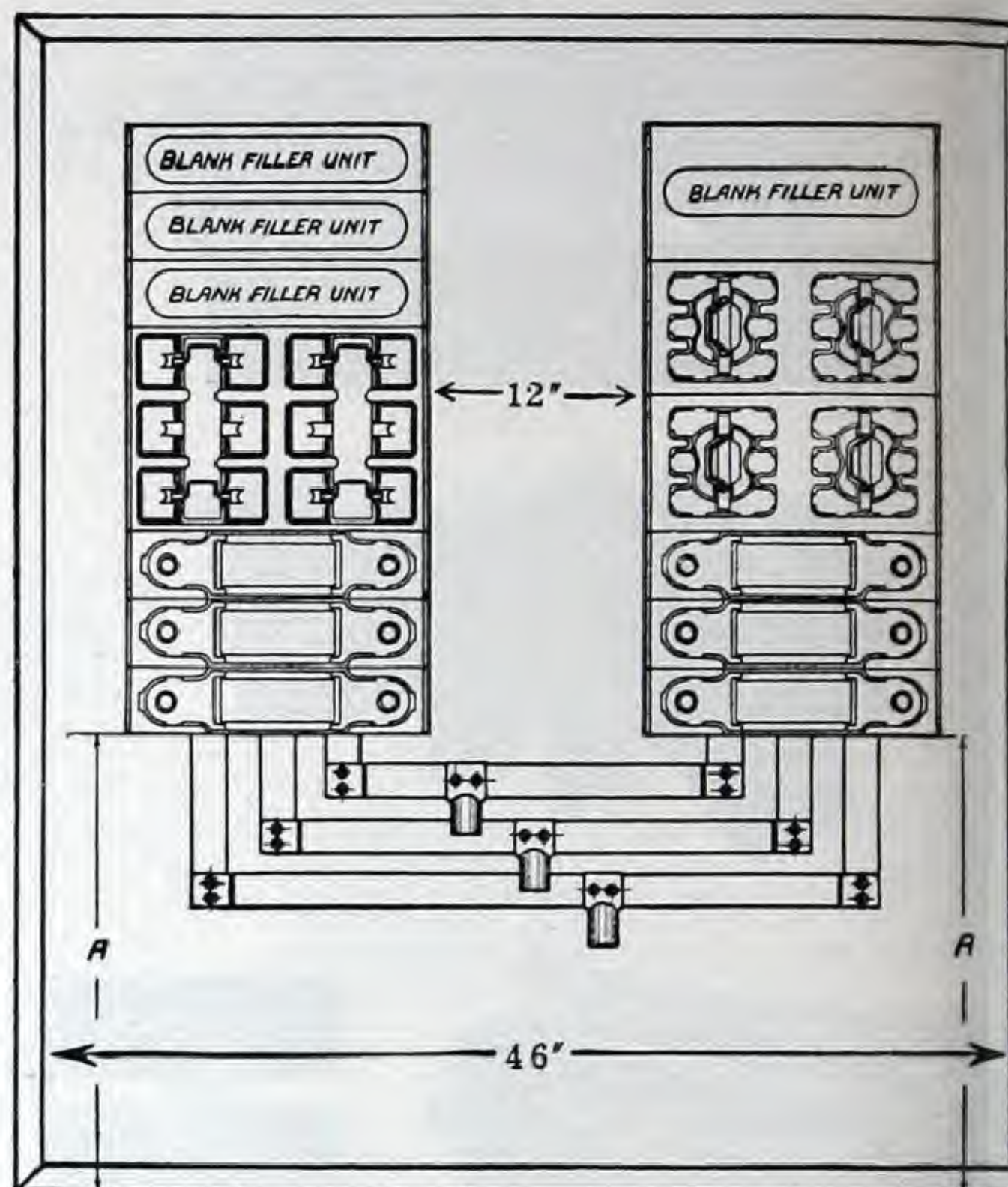
*Single Branch Units with 100 Amp. bodies and 100 Amp. heads, have 100 Amp. contacts only in both body and heads, and are convertible for 30 A., 60 A., and 100 A., both 250 Volt and 600 Volt Fuses.

Single Branch Units, Busbar type, with 200 Amp. bodies and 100 Amp. heads, each convertible for 30 A., 60 A., and 100 A., both 250 Volt and 600 Volt Fuses, and will take standard 200 Amp. 250 Volt head.

Prices on application.

BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

Double Row Type



DOUBLE ROW TYPE SAftoFUSE Panelboards are finished where the height of a single row would be too great for practical manipulation or where the available installation height is not sufficient to accommodate a single row panelboard.

The method used in obtaining the dimensions of double row panelboards is as follows:—

1. Divide up the circuits so that the total height of each of the double rows is approximately the same and so that total amperage of each of the double rows is approximately the same.

CAUTION: Do not add up height of circuits and divide in half to obtain height of each row.

2. Determine the size of Main Lugs to feed all the circuits.
3. Take the height of the larger of the two rows, add the dimensions given below for "A" as determined by capacity of main lugs just found, and the dimensions of preceding columns for "B" or "C". This will give total height of the boxes required.
4. Add up the amperage in each of the double rows. The larger of the two determines the capacity of the busbar used in each of the rows.

Dimensions of Main Lugs and Cross Connections in Double Row SAftoFUSE Panelboards

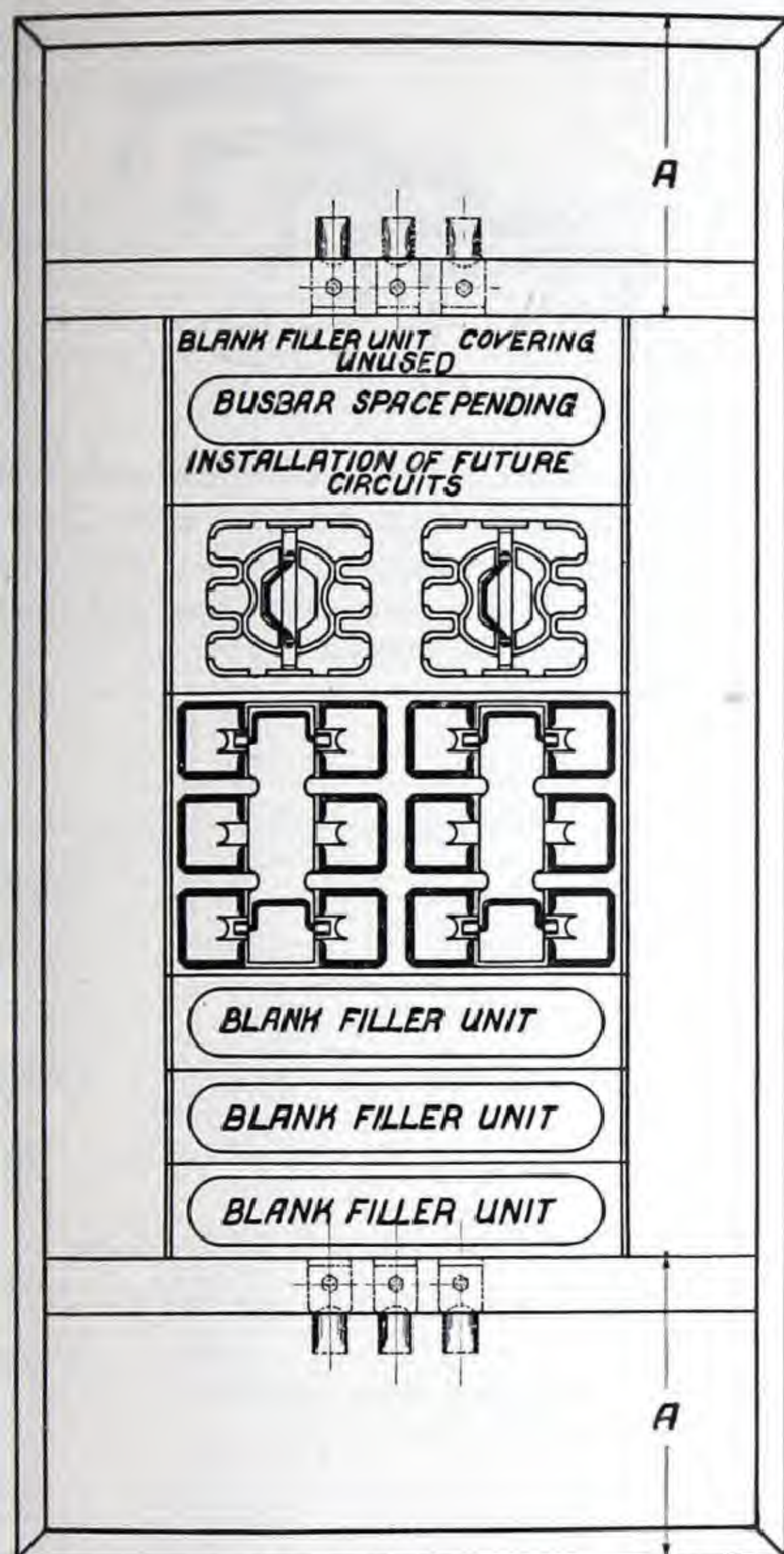
Amperage of Main Lugs	Dimension "A"
400	18"
600	21"
800	22½"
1,200	25"

The dimension "A" represents the distance, including gutter, from the edge of the last unit to the end of the panelboard.

Prices on application.

BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

Lugs-at-both-ends Type



toFUSE Panels are furnished with lugs at both ends through Feeds are desired.

arrive at the dimensions of the Lugs-at-both-Ends of Panel it is only necessary to list down the SAftoFUSE in the customary manner and use Dimension "A" of "B" or "C" as Lugs will be placed at both ends Panel.

dimensions of the Units would be added up in the manner and Dimension "A" would be applied twice. determines the size of Box.

toFUSE Panels are also provided with Lugs at both when it is desired to increase capacity of Main Busbars e care of additional loads.

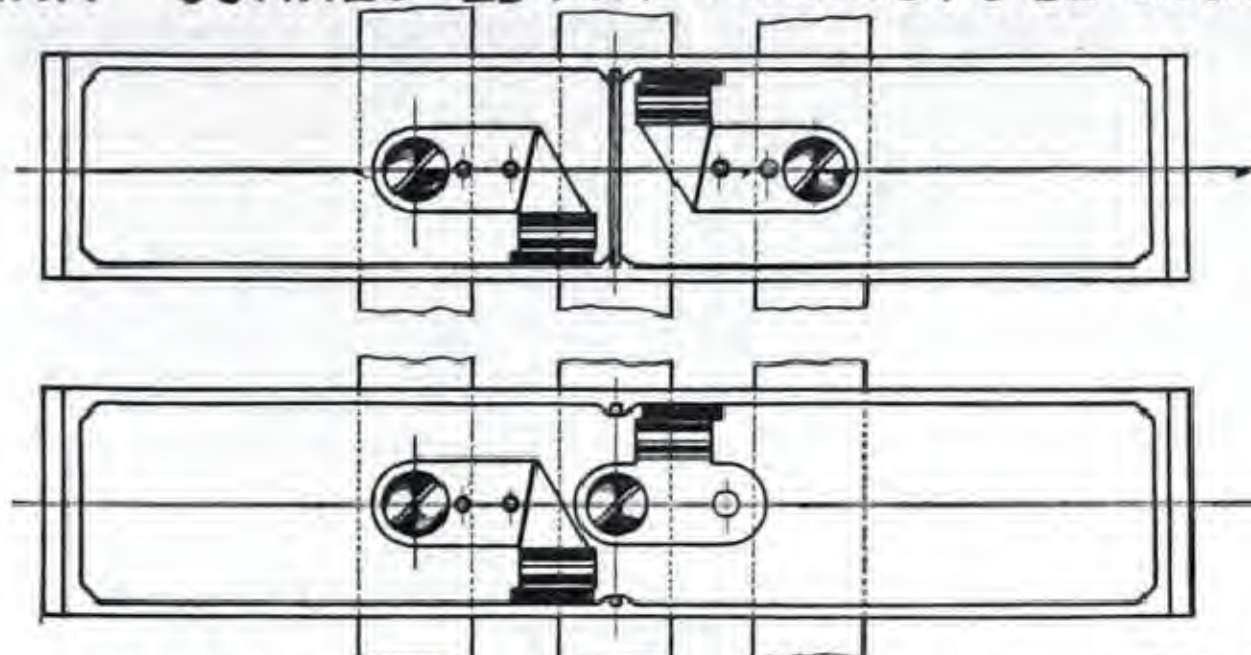
method of increasing the Mains would be to run r set of feeders to the other end of the Panel, thus ng the capacity of the Busbars installed.

BULL DOG UNIT-VERSAL SAftoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

SAftoFUSE Units—Busbar Connections

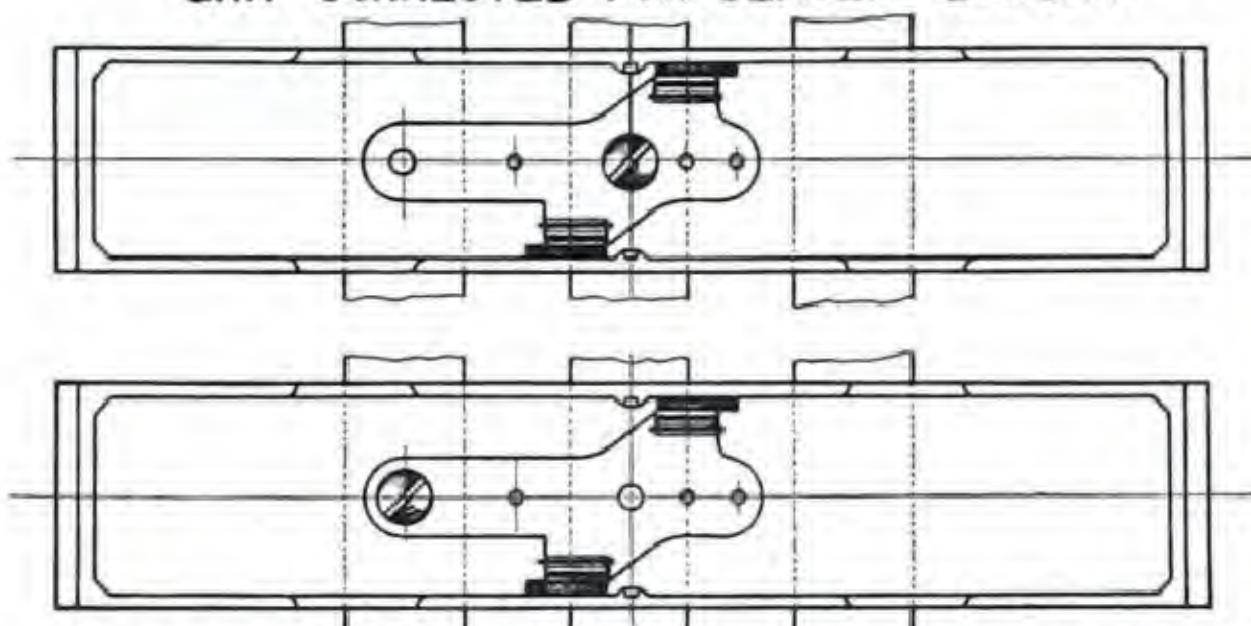
Single Pole Double Branch Bakelite Units
30-60-100 Amp. 250 V.—30-60 Amp. 600 V.

UNIT CONNECTED FOR TWO OUTSIDE BUSBARS



UNIT CONNECTED FOR OUTSIDE (RIGHT or LEFT) AND CENTER BUSBARS

UNIT CONNECTED FOR CENTER BUSBAR

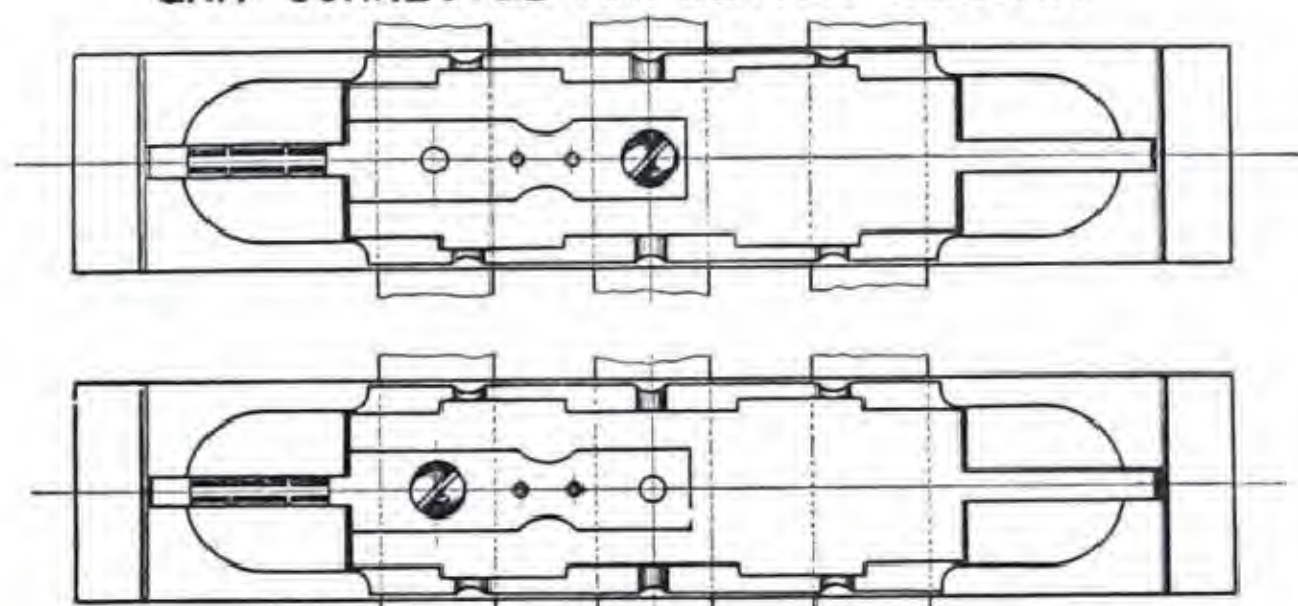


UNIT CONNECTED FOR OUTSIDE (RIGHT or LEFT) BUSBAR

List Nos. US 3161-3162-3121-3122-3123-3112-31213-31223.

Single Branch Single Pole Units
30-60-100-200 Amp. 250 Volts.
30-60-100 Amp. 600 Volts.

UNIT CONNECTED FOR CENTER BUSBAR

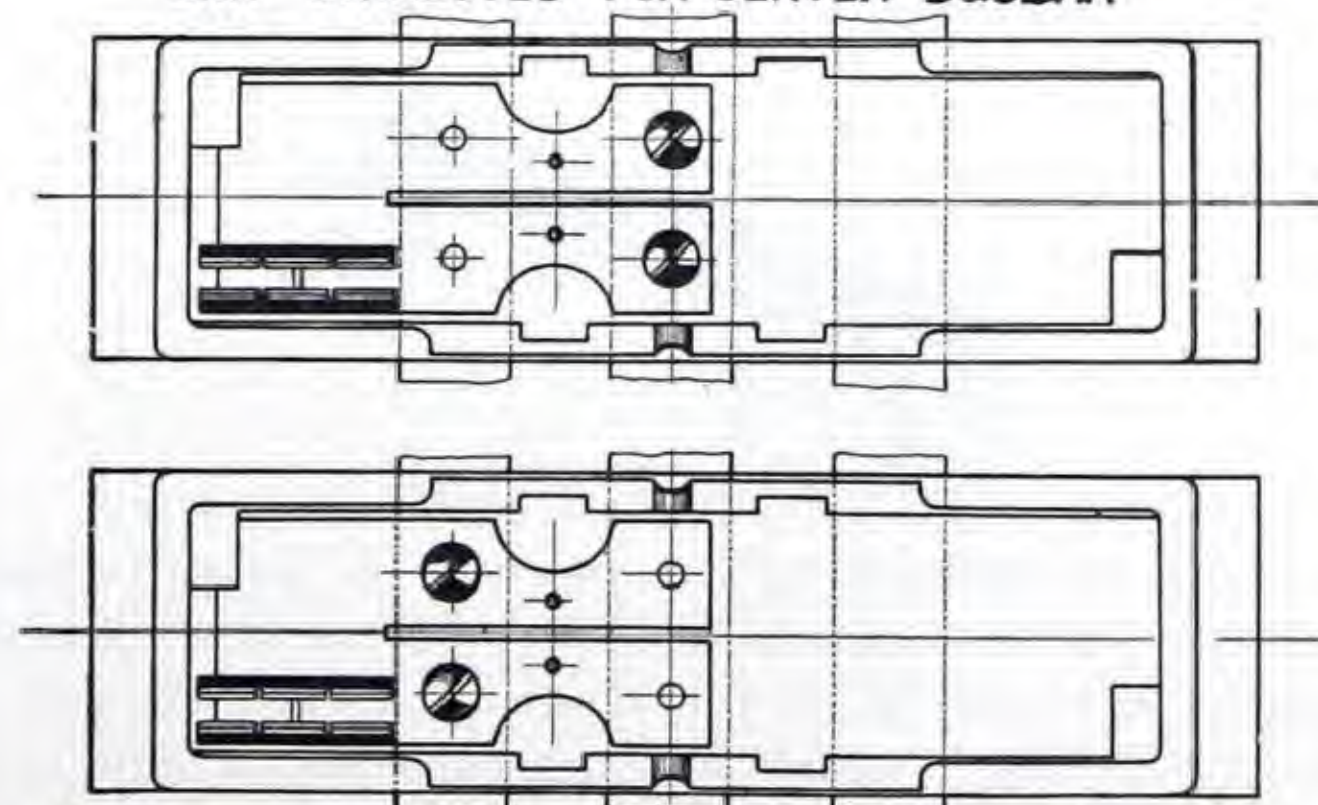


UNIT CONNECTED FOR OUTSIDE (RIGHT or LEFT) BUSBAR

List Nos. US 311-312-313-3116-3126-3136-3141-3142-3143-31416-31426-31436-314.

Single Branch—Single Pole Units
200 Amp. 600 V.—400 Amp. 250 V.

UNIT CONNECTED FOR CENTER BUSBAR



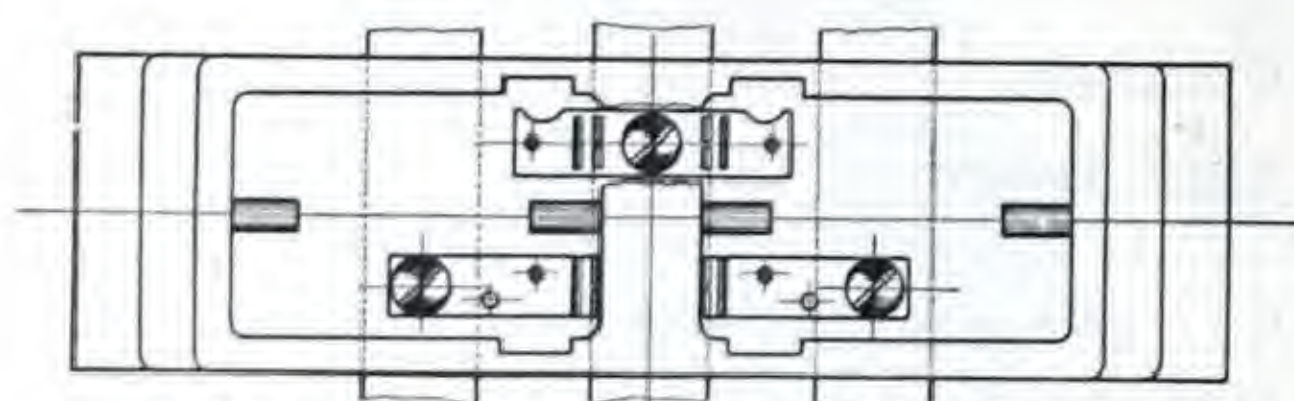
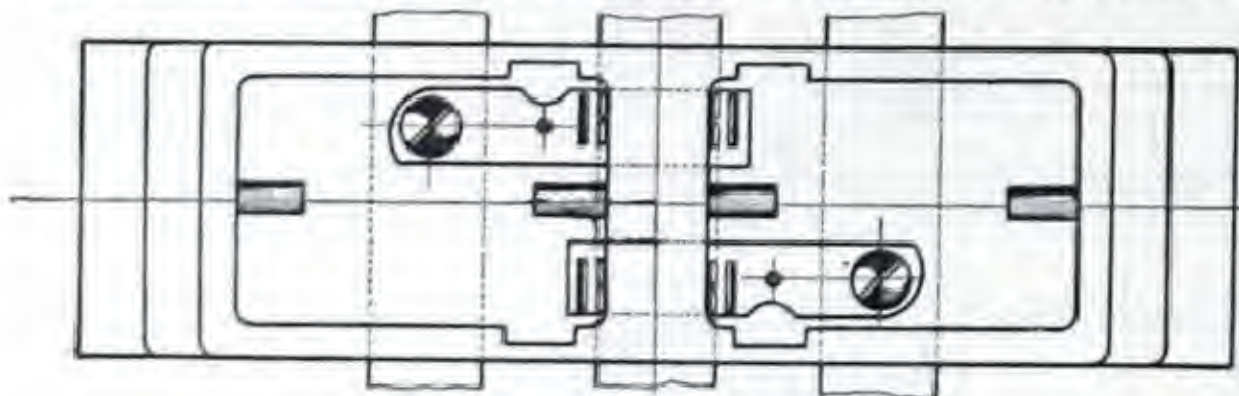
UNIT CONNECTED FOR OUTSIDE (RIGHT or LEFT) BUSBAR

List Nos. US3146-315

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

SAFtoFUSE Units—Bus Bar Connections

UNIT CONNECTED FOR TWO OUTSIDE BUSBARS



UNIT CONNECTED FOR THREE BUSBARS

2 Pole Double Branch Units

List Nos. US321-322-3212

Note—3 Pole Double Branch Units. List No. 331-332-3312 being for 3 wire use only, are always connected for three busbars and are therefore not illustrated here.

Accessories and Parts

These Accessories are sold only to users of or in connection with "BULL DOG" SAFtoFUSE Feeder Panelboards.

Convertible (Fuse) Adapters



List No.	Amp.	Volts
USA12	30	250
USA22	60	250
USA32	100	250
USA16	30	600
USA26	60	600

"BULL DOG" SAFtoFUSE Limiter



The use of this accessory in place of the guard regularly furnished over the copper parts in the SAFtoFUSE body and changing the location of the Finger Brackets will prevent the use of a larger size of fuse than the size of the Circuit Wire for which it is arranged.

Prices on application.

BULL DOG UNIT-VERSAL SAFtoFUSE POWER AND LIGHT DISTRIBUTION PANELBOARDS

SAFtoFUSE Accessories and Parts

BLANK FILLER UNITS (MADE OF STEEL)



Cut illustrates Blank Filler Units which are furnished to fill up space and cover Main Busbars when Cabinets are ordered for a larger number of Circuits than immediate requirements, or to fill additional space provided in standard Cabinets. They may be slipped on or off without disturbing the other units.

List Prices

	List No.		List No.
2"	USF200	2 1/2"	USF250
3"	USF300	3 3/4"	USF375
5"	USF500	7 1/2"	USF750

MOTOR TEST HEADS AND JACK

100 A or less—250 V. and 600 V.

Jack and Head List Price

List No.		List No.	
USTH	Head	USTJ	Jack

Cables and Fuses not included.

These Heads may be substituted for the regular Head or if small quantity only is required, they may be ordered in addition to the regular units to test one panel only at a time and moved from panel to panel as desired.



BULL DOG SAFtoFUSE DISTRIBUTION PANELBOARDS

Combined Switch and Cartridge Fuse Type
With Enclosing Steel Cabinets

Panelboards requiring less than 26" in height must have
spare space added to equal at least 26")

3 Wire Mains—125 or 250 Volts Only

These panelboards may also be used for 4 wire, 120-208
ts by adding neutral bar.

Base List Price*

Includes main lugs, top and bottom gutters, and portion
of busbars, box and trim.

Main Lugs and Busbars					
Branch Circuits	200 Amp.	400 Amp.	600 Amp.	800 Amp.	1200 Amp.
Height Required.....	10½"	14½"	17½"	20"	22½"
	List Price	List Price	List Price	List Price	List Price
0 A. or less	\$20.00	\$30.00	\$50.00	\$80.00	\$125.00
0 A. or less	....	50.00	70.00	110.00	150.00
er 400 A.	....	....	100.00	150.00	190.00

Circuit List Price

Includes circuit sections complete and portion of busbars,
k and trim.

List Price List Price Height of Ampere Complete Space Only Section Capacity Section for Section SAFtoFuse				
For 2 circuits—double branch				
Single	30-30 A.	\$18.00	\$5.80	2½"
Fuse	60-60 A.	18.00	5.80	2½"
	100-100 A.	18.00	5.80	2½"
For 1 circuit—single branch				
Branch	200 A.	\$21.00	\$5.80	2½"
	400 A.	49.00	8.75	3¾"
Circuits	600 A.	110.00	56.00	5 "
For 2 circuits—double branch				
Two	30-30 A.	\$17.00	\$5.80	2½"
Fuse	60-60 A.	24.00	8.75	3¾"
	100-100 A.	36.00	11.50	5 "
For 1 circuit—single branch				
Branch	200 A.	\$42.00	\$11.50	5 "
	400 A.	97.00	16.75	7½"
Circuits	600 A.	160.00	56.00	10 "
For 2 circuits—double branch				
Three	30-30 A.	\$17.00	\$ 5.80	2½"
Fuse	60-60 A.	33.00	11.50	5 "
	100-100 A.	54.00	16.75	7½"
For 1 circuit—single branch				
Branch	200 A.	\$63.00	\$16.75	7½"
	400 A.	146.00	25.50	11¼"
Circuits	600 A.	210.00	56.00	15 "

For SAFtoFUSE Distribution Panelboards with 30 and
ampere circuits only, which Panelboards ordinarily re-
quire cabinets not greater than 6" deep and which have
maximum 4" gutters and not exceeding 73" in height, mains
over 600 amperes, deduct \$10.00 list from base list price.

List Prices do not include fuses.

BULL DOG SAFtoFUSE DISTRIBUTION PANELBOARDS

Combined Switch and Cartridge Fuse Type

With Enclosing Steel Cabinets
(Panelboards requiring less than 26" in height must have
spare space added to equal at least 26")

2 Wire Mains—600 Volts (or less)

Base List Price

Includes main lugs, top and bottom gutters, and portion
of busbars, box and trim.

Main Lugs and Busbars					
Branch Circuits	200 Amp.	400 Amp.	600 Amp.	800 Amp.	1200 Amp.
Height Required.....	10½"	14½"	17½"	20"	22½"
	List Price	List Price	List Price	List Price	List Price
200 A. or less	\$37.00	\$47.00	\$67.00	\$93.00	\$137.00
400 A. or less	....	69.00	87.00	124.00	162.00
Over 400 A.	....	....	110.00	162.00	200.00

Circuit List Price

Includes circuit sections complete and portion of busbars,
box and trim.

List Price List Price Height of Ampere Complete Space Only Section Capacity Section for Section SAFtoFuse				
For 2 circuits—double branch				
Single	30-30 A.	\$25.00	\$5.80	2½"
Fuse	60-60 A.	25.00	5.80	2½"
For 1 circuit—single branch				
Branch	100 A.	\$25.00	\$5.80	2½"
	200 A.	51.00	8.75	3¾"
Circuits	400 A.	103.00	56.00	5 "
For 2 circuits—double branch				
Two	30-30 A.	\$37.00	\$11.50	5 "
Fuse	60-60 A.	37.00	11.50	5 "
For 1 circuit—single branch				
Branch	100 A.	\$37.00	\$11.50	5 "
	200 A.	81.00	16.75	7½"
Circuits	400 A.	152.00	56.00	10 "

List Prices do not include fuses.

If you have a special Panelboard pro-
blem to be worked out, then let us plan it
for you, with your consulting electrical
engineer. This will enable us to give you
just the right answer.

BULL DOG SAFtoFUSE DISTRIBUTION PANELBOARDS

LIST PRICES—DISTRIBUTION PANELBOARDS

Combined Switch and Cartridge Fuse Type
With Enclosing Steel Cabinets

(Panelboards requiring less than 26" in height must have
spare space added to equal at least 26")
3 Wire Mains—600 Volts (or less)
Base List Price

Includes main lugs, top and bottom gutters, and portion
of busbars, box and trim.

Branch Circuits	Main Lugs and Busbars				
	200 Amp.	400 Amp.	600 Amp.	800 Amp.	1200 Amp.
Height Required.....	10½"	14½"	17½"	20"	22½"
	List Price	List Price	List Price	List Price	List Price
200 A. or less	\$37.00	\$47.00	\$67.00	\$93.00	\$137.00
400 A. or less	....	69.00	87.00	124.00	162.00
Over 400 A.	....	....	100.00	162.00	200.00

Circuit List Price

Includes circuit sections complete and portion of busbars,
box and trim.

	Ampere Capacity	List Price Complete Section	List Price Space Only for Section	Height of Section SAftoFuse
For 2 circuits—double branch				
One Fuse	30-30 A.	\$25.00	\$ 5.80	2½"
	60-60 A.	25.00	5.80	2½"
For 1 circuit—single branch				
Branch	100 A.	\$25.00	\$5.80	2½"
	200 A.	51.00	8.75	3¾"
Circuits	400 A.	103.00	56.00	5 "
For 2 circuits—double branch				
Two Fuse	30-30 A.	\$37.00	\$11.50	5 "
	60-60 A.	37.00	11.50	5 "
For 1 circuit—single branch				
Branch	100 A.	\$37.00	\$11.50	5 "
	200 A.	81.00	16.75	7½"
Circuits	400 A.	152.00	56.00	10 "
For 2 circuits—double branch				
Three Fuse	30-30 A.	\$48.00	\$16.75	7½"
	60-60 A.	48.00	16.75	7½"
For 1 circuit—single branch				
Branch	100 A.	\$48.00	\$16.75	7½"
	200 A.	95.00	25.50	11¼"
Circuits	400 A.	190.00	56.00	15 "

List prices do not include fuses.

List Price Additions for Special Features

Main Switches (Safety Fuse Type)—figure same as a
branch circuit from Circuit List Prices after adding Base
List Price.

Neutral Busbars—3 wire single phase 110-220 volt solid
neutral service or 4 wire 3 phase 120-208 volt solid neutral
service:

Capacity of Main Lug	List Additions Panelboards complete with Cabinets	Panelboards increase height of cabinet	
		3 wire Solid Neutral	4 wire Solid Neutral
200 Amp.	\$14.00*	2½"	2½"
400 Amp.	25.00*	2½"	4½"
600 Amp.	30.00*	2½"	5½"
800 Amp.	40.00*	2½"	6 "
1200 Amp.	63.00*	2½"	6½"
Unfused Meter Loop or Split Bus			
200 Amp.	\$21.00*		
400 Amp.	23.00*		
600 Amp.	30.00*		
Sub Feed, Through Feed or Double Lugs (Lugs Only)			
200 Amp.	\$12.00**		
400 Amp.	24.00**		
600 Amp.	36.00**		
800 Amp.	48.00**		
1200 Amp.	60.00**		

*List price includes neutral bar, main lug, lug for each
branch circuit, and portion of back plate, box and trim.

**List price includes lugs and portion of busbars, back
plate, box and trim that may be necessary.

PR BELLS AND BUZZERS



Nos. 500 and 600
Bell



Nos. 507 and 607
Buzzer



No. 501

Non-adjustable

Bells, Buzzers and Bell Buzzers have large double magnets,
non-adjustable side contacts and fully-enclosed mechanisms,
binding posts and gongs, no part being exposed. They are
dust-proof, bug-proof and rust-proof.

These bells, buzzers and bell-buzzers operate perfectly on
small door-bell transformers or on one cell dry battery—
although two cells, of course, give more satisfactory results.
Standard Finish: Satin-Cadmium.

Special Finishes: (Covered patterns only) ivory, blue, jade-
green, jet-black and polished cadmium.

COVERED PATTERNS

With fully-enclosed mechanisms, binding posts and gongs.

List No.	Description	Dimensions Inches			Std. Pkg.	List Price Each (Schedule "E")
		Height	Width	Depth		
500	2½" Bell	5⅜	2⅛	1⅜	100	\$.58¾
501	Small Buzzer	2¾	2	1⅜	100	.50
507	Large Buzzer	5⅜	2⅛	1⅜	100	.55
502	Bell-Buzzer	5⅜	2⅛	1⅜	50	1.02½

EXPOSED PATTERNS

With exposed gongs, but fully enclosed mechanisms and
binding posts.

List No.	Description	Height	Width	Depth	Std. Pkg.	List Price Each
509	2½" Bell	5⅜	2⅛	1⅜	100	\$.52½
503	3" Bell	5¾	3	1⅜	25	.67½
504	4" Bell	6⅝	4	1¾	25	.92½
505	Cow-Bell	5⅜	2⅛	2⅜	*25	1.35
506	Sleigh-Bell	5⅜	2⅛	2	*25	1.35

Adjustable

Bells, Buzzers and Bell-buzzers have large double magnets
and adjustable side contacts, otherwise they are the same as
non-adjustable line, described above.

Standard Finish: Satin-Cadmium.

Special Finishes: (Covered patterns only) ivory, blue, jade-
green, jet-black and polished-cadmium.

COVERED PATTERNS

With fully-enclosed mechanisms, binding posts and gongs.

List No.	Description	Height	Width	Depth	Std. Pkg.	List Price Each
600	2½" Bell	5⅜	2⅛	1⅜	100	\$1.10¼
601	Small Buzzer	2¾	2	1⅜	100	1.02
607	Large Buzzer	5⅜	2⅛	1⅜	100	1.08¼
602	Bell-Buzzer	5⅜	2⅛	1⅜	50	1.59

EXPOSED PATTERNS

With exposed gongs but fully-enclosed mechanisms and
binding posts.

List No.	Description	Height	Width	Depth	Std. Pkg.	List Price Each
609	2½" Bell	5⅜	2⅛	1⅜	100	\$1.04
603	3" Bell	5¾	3	1⅜	25	1.18
604	4" Bell	6⅝	4	1¾	25	1.53
605	Cow-Bell	5⅜	2⅛	2⅜	*25	1.83
606	Sleigh-Bell	5⅜	2⅛	2	*25	1.83

For Colored Bells, Buzzers and Bell-Buzzers (Std. Pkg.
25 of each color) add to list price each.....\$.20

For Polished Cadmium Bells, Buzzers and Bell-Buzzers
(Std. Pkg. 25) add to list price each..... .25

Only Covered Patterns can be furnished in colors and
polished-cadmium.

*Cow and Sleigh-Bells, both non-adjustable and adjustable,
may be assorted to make a standard package.

PR IRON-BOX BELLS AND BUZZERS

SCHEDULE "E"

PR "MARLO" IRON
BOX BELLS—CLASS "A"

Double-Magnets

For 6 Volt Transformer or
6-8 Volt Battery Circuits



No. 221



No. 220

PR "Marlo" Iron box Bells—Class "A"—have pivoted armatures, double lock adjustable side contacts, back tension adjustments, inside and outside binding posts, and full insulated mechanisms. Can be used on 6 volt AC Bell ringing transformer or Battery circuits. Standard resistance $3\frac{1}{2}$ ohms. Wound to special resistance up to 200 ohms at list additions shown below. Finish: Black with nickel gongs and binding posts. Will be furnished when so specified, with polished nickel covers at no additional cost. Black finish, however, will be furnished unless otherwise specified.

Size Gong In.	2½	3	4	Cow	Sleigh	Dome
List No.	221	222	223	227*	228*	229*
Std. Pkg.	100	100	25	25	25	25
List Price ea.	\$1.64	\$1.81	\$2.19	\$2.50	\$2.50	\$2.50

*Standard package quantity of fancy gongs may be assorted.

"Marlo" Bells are furnished wound to any special resistance desired at the following list additions:

PR "MARLO" IRON BOX BUZZERS—CLASS "A"
Double Magnets

For 6 Volt Transformer or 6-8 Volt Battery Circuits
PR "Marlo" Iron Box Buzzers have pivoted armatures, double-lock adjustable side contacts, back tension adjustments, inside and outside binding posts, and full insulated mechanisms. Can be used on 6 volt AC Bell ringing transformer or Battery circuits. Standard resistance $3\frac{1}{2}$ ohms. Wound to special resistance up to 200 ohms at list additions shown below.

Finish: Black with nickel binding posts. Will be furnished when so specified, with Polished Nickel Covers at no additional cost. Black finish, however, will be furnished unless otherwise specified.

List No.	Type	Std. Pkg.	List Price
20	Buzzer—Black Covers	100	\$1.63 each
20-N	Buzzer—Nickel Covers	100	1.63 each



Model "O"

Faraday Skeleton Bell

FARADAY SKELETON
BELL MODEL "O"

Vibrating Type—For Battery
Circuits

Faraday Model "O" Skeleton Bells meet the requirement of a good signal gong with exposed mechanism. Faraday Skeleton Bells have "high-power" patented pivoted armatures giving twice the volume of sound that ordinary construction affords. Breakage of tension springs cannot disable gong. Contacts regularly platinoid, but will be furnished pure platinum if specially ordered.

List No.	and Size	Resistance	List Price	List No.	and Size	Resistance	List Price
Gong In.	Ohms	Each	Gong In.	Ohms	Each		
2½	3	\$ 5.70	O-10	5	\$ 24.85		
3	3	6.05	O-12	5	31.00		
4	3	7.10	O-14	5	62.00		
5	4	9.35	O-16	8	123.70		
6	4	10.55	O-18	8	143.25		
8	5	16.00	Standard package 5 assorted.				

PR TRANSFORMER BELLS

SCHEDULE "E"



No. 231



No. 260

PR "MARLO" VIBRATING TRANSFORMER BELLS
Double Magnets

For 6 Volt Transformer Circuits

(Furnished also at no extra charge to operate on 12-18 volt circuits, if so specified)

PR "Marlo" Transformer Iron Box Bells are extra heavy in construction throughout, and are so superior to the ordinary battery bell that they are coming into very general use on Bell ringing transformer circuits where first class, dependable service is required. They are regularly furnished to operate in multiple on 6 volt (or 12-18 volt if specified) AC Bell ringing transformer circuits, 50-60 cycles standard—25, 30 and 40 cycles to order. Each gong carries nameplate showing voltage and cycles on which bell is designed to operate. They have laminated magnet cores, carbon contacts, reed type armatures, insulated mechanisms, back tension adjustments, adjustable side-contacts and inside and outside binding posts.

Finish: Black with polished nickel gongs and binding posts.

(Specify if 6 or 12-18 volt are desired)

Size Gong In.	2½	3	4
List No.	231	232	233
Std. Pkg.	6	6	6
List Price Each	\$6.15	\$6.30	\$6.75

PR "MARLO" TRANSFORMER PRESSED STEEL
CASE BUZZERS

Double Magnets—For 6 Volt Transformer Circuits

(Furnished also at no extra cost to operate on 12-18 volt AC Transformer Circuits, if so specified)

PR "Marlo" Transformer Pressed steel case Buzzers are extra heavy in construction throughout and are so superior to the ordinary battery buzzer that they are coming into very general use on Bell ringing transformer circuits, where first-class, dependable service is required. They are regularly furnished to operate in multiple on 6 volt (or 12-18 volt if specified) AC Bell ringing transformer circuits, 50-60 cycles standard—25, 30 and 40 cycles to order. Have laminated magnet cores, carbon contacts, reed type armatures, insulated mechanisms, back tension adjustments, adjustable side-contacts and inside and outside binding posts.

List No.	Type	Std. Pkg.	List Price
260	Buzzer	5	\$6.00 each

TRANSFORMER OR BATTERY, VIBRATING
COVERED CLAPPER-TYPE, NON-WEATHERPROOF,
MODEL "EA"

Faraday-Ekla Model "EA" are moderate priced bells for Transformer or Battery circuits. Reed-type armatures with back tension adjustments and adjustable side contacts. Heavy pressed steel frames and covers. Have extra large double magnets. Bakelite insulation throughout.

List No.	List Price	List No.	List Price
and Size Gong	Each	and Size Gong	Each
EA-4	\$6.60	EA-10	13.00
EA-6	7.80	EA-12	21.20
EA-8	11.40	Standard package 5 assorted.	

Note—"Yard Type" Protective Hoods furnished for all Faraday Ekla Model "EA" Bells at \$25.00 addition to list.

FARADAY A. C. SIGNAL GONGS

Vibrating Enclosed Type

SCHEDULE "T"



Model No. "AT"
Non-Guarded Gong

Designed for operation on 12-18 volt AC Bell-Ringing Transformers, and 100-110 volt and 220-250 volt A.C. light and power circuits, 50-60 cycles standard—25, 30 and 40 cycles to order.

Mechanisms are dust and weather-proof with heavy soft rubber gaskets between cover and base casting; they have renewable carbon contacts, laminated magnet core, sturdy pivoted armatures and double-locked back tension adjustment, that cannot change after being set.

All steel parts are rust-proofed; gongs are best grade extra-heavy, hot-pressed, rust-proofed steel, finished in bauer-barff.

Mechanism is different in design and operation from ordinary signal gongs. Extreme rapidity of vibration gives a sound satisfactory even for code signalling.

Furnished to operate in multiple only—without external resistance.

List No. and Size Gong	12-18V Trans. Each	100-110 Volts AC Each	220-250 Volts AC Each
AT- 4	\$13.40	\$23.45	\$32.75
AT- 5	22.10	36.00	49.20
AT- 6	24.20	38.85	52.75
AT- 8	29.55	46.75	63.05
AT-10	51.00	70.60	88.55
AT-12	58.15	77.80	95.75

Half-Grids or Full-Grids furnished at the following addition to list prices of "AT."

Size	6"	8"	10"	12"
	\$8.00	\$9.00	\$10.00	\$12.00

FARADAY A. C. SIGNAL BUZZERS



Enclosed
Type

SCHEDULE "T"



Model Nos. 89 and 91
Open Types

Model Nos. 93-T, 99-T,
101-T, 93, 99, 101
Enclosed Types

Faraday Signal Buzzers are superior to the ordinary commercial buzzer because of their unfailing dependability, due to scientific design and construction; they fully justify their somewhat higher cost because they never fail to give a signal. Close fitting rubber gasketed covers protect mechanisms against moisture, dust and mechanical injury; all current-carrying parts are mounted on Bakelite pads, completely insulating same from frame. Contacts regularly Platinoid. Pure Platinum at additional price when specially ordered.

List No.	12-18V Trans. Each	110-125V AC List Price Each	220-250V AC List Price Each
93-T	\$ 7.75	Not Made	Not Made
99-TD Diaphragm-Type No-Contacts	3.50	4.00	Not Made
99-T	8.75	Not Made	Not Made
101-T	10.00	13.00	15.50
94-T	12.00	15.00	17.50
94-TB Buzzer with 1 3/4" Gong	14.00	17.00	19.50
Without Covers			
89-T	7.25	Not Made	Not Made
91-T	8.25	Not Made	Not Made

Standard package 1.

FARADAY-MARLO A. C. TRANSFORMER VIBRATING SIGNAL GONGS

SCHEDULE "T"

Weatherproof and Non-Weatherproof
Patterns

For Transformer and AC Light and
Power Circuits



Model "ATN"
Non-Guarded-Gongs
Non-Weatherproof

Vibrating Faraday-Marlo Transformer Gongs are furnished for both regular (non-conduit) as well as conduit work. They have extra-heavy cast housings for protection of mechanisms, laminated magnet cores, pivoted armatures with substantial back tension adjustments and carbon contacts. They are designed for operation on 12-18 volt AC Bell-Ringing Transformer (or Battery) and 100-110 volt and 220-250 volt AC light and power-circuits, 50-60 cycles standard—25, 30 and 40 cycles to order.

Finish

Black-enameled cases with bauer-barff finished gongs and polished nickel binding posts.

List No. and Size Gong	6-9V Trans. Non-Conduit Non-Weatherproof List Price Each	110-125V AC with Adapter- Plate for Conduit Non- Weatherproof List Price Each	220-250V AC with Adapter- Plate for Conduit Non- Weatherproof List Price Each
ATN- 3	\$11.00	\$14.00	Not Made
ATN- 4	12.00	15.00	"
ATN- 6	15.00	19.00	21.50
ATN- 8	19.00	23.00	25.50
ATN-10	30.00	35.00	37.50
ATN-12	38.00	43.00	45.50
ATN-B Buzzer	10.00	13.00	15.50

Standard Package 5.

A. C. FARADAY SIGNAL GONGS AND BUZZERS

SCHEDULE "T"

AC VIBRATING POLARIZED
PLUNGER TYPE, DUST-PROOF,
ENCLOSED NO CONTACT—
NON-SPARKING

High-grade no contact (non-sparking) vibrating Polarized mechanisms; not as powerful or as loud a signal as "ATX" models, but will stand up under practically continuous AC-service of the most severe sort. Bakelite insulation throughout.



Model No. "ATL"
Non-Guarded
Polarized Gong

Neck-Pattern—Non-Weatherproof

List No. and Size Gong	12-30V Trans. List Price Each	110-125 Volts AC List Price Each	220-250 Volts AC List Price Each
ATL- 3	\$11.00	\$14.00	\$16.50
ATL- 4	12.00	15.00	17.50
ATL- 6	15.00	19.00	21.50
ATL- 8	19.00	23.00	25.50
ATL-10	30.00	35.00	37.50
ATL-12	38.00	43.00	45.50
ATLB Buzzer	10.00	13.00	15.50

For half-grids and full-grids add to list prices.

Sizes	6"	8"	10"	12"
	\$8.00	\$9.00	\$10.00	\$12.00

Standard Package 1.

A. C. FARADAY SIGNAL GONGS

A. C. Double-Gong Vibrating WEATHERPROOF



Transformer and AC Types
Model "DT" for Non-Conduit Pattern
Model "DTP" for Conduit Work

Double gong vibrating contact pattern bells give an extremely discordant penetrating signal; recommended for use above the noise of machinery, etc. Fully protected from dust, dampness and mechanical injury. Triplex solder contacts. Bakelite insulation throughout.

Schedule "T." Standard package 1.

12-18V AC	110-125V AC	220-250V AC
List Price	List Price	List Price
Each	Each	Each
\$30.60	\$40.85	\$51.15
46.80	62.00	77.10
51.25	67.15	83.05
62.15	80.85	99.55
98.75	121.20	143.60
112.20	134.65	157.10

Conduit-Pattern, add "P" to List No. and \$5.00 to prices shown above.



Model Nos. WA-3 and WTA-3



Model No. WA-Buzzer

Watertight Vibrating Cast Bronze Case Enclosed Type

Designed for marine work, mines, chemical factories and places where it is necessary to protect the contacts of gongs from water, gas fumes, etc.

Standard finish: Boxes: Natural brass; covers and gongs: nickel.

3	\$16.65	\$18.40	\$20.60
4	18.95	20.60	23.00
6	21.25	23.00	25.30
8	25.85	27.60	29.30
10	30.45	32.20	34.50
12	35.05	36.80	39.10
	23.55	25.30	27.60
	16.65	18.40	20.60

Standard package 1.

Single Stroke AC Watertight Gongs deduct \$1.00 from price of AC Vibrating Watertight Gongs shown above. Watertight Gongs are regularly furnished with cast bronze cases. They will be furnished with cast aluminum cases in accordance with U.S. Navy specifications, if so specified, at addition to list price of 15%.

FARADAY A. C. SIGNAL GONGS

Monitor Pattern—Non-Weatherproof

Non-Guarded Gongs
Standard Package 1.
SCHEDULE "T"



Model No. "MTL"
Non-Guarded Monitor Polarized Gong

Monitor-Pattern AC Polarized non-contact non-sparking vibrating signal gongs MTL listed below are most ideal for severe continuous AC service. They are furnished in three types viz: non-guarded non-weatherproof — half grid guarded weatherproof and full screen grid guarded weatherproof. Bakelite insulation throughout with mechanism protected from the weather by strong cast-iron casing. Having no contacts, transformer voltage of 30 volts or 110, or 220 is most satisfactory. Operate equally well on 25-60 cycle circuits. Specify voltage desired.

List No. and Size Gong	12-30V Trans.	110-125V AC	220-250V AC
	List Price Each	List Price Each	List Price Each
MTL- 4	\$12.00	\$15.00	\$17.50
MTL- 6	15.00	19.00	21.50
MTL- 8	19.00	23.00	25.50
MTL-10	30.00	35.00	37.50
MTL-12	38.00	43.00	45.50
MTL-14	55.20	65.20	75.20
MTL-16	122.85	132.85	142.85
MTL-18	140.50	150.50	160.50

For Half grid guarded Weatherproof add to above list prices of Non-guarded Non-Weatherproof

For 4" 6" 8" 10" 12" 14" 16" 18"
\$6.00 8.00 15.00 17.00 19.50 43.40 53.90 68.90

For Full screen guarded Weatherproof add to above list prices of Non-guarded Non Weatherproof

For 4" 6" 8" 10" 12" 14" 16" 18"
‡ ‡ \$33.00 35.00 37.50 72.90 89.90 107.90

‡ 4" and 6" Not made.

Conduit Bells—Adaptor plate allows any bell to be mounted on standard 4" square box or extension cover. Also fits single or double gang conduit. Adaptor plate furnished as standard with 110V. or 220V. bells. On low voltage bells specify "Conduit Bell" if desired and add \$1.25 list. Cast wall box can be furnished if specified at \$1.25 list addition to 110V. or 220V. bells. \$2.50 list addition to low voltage bells.

A. C. FARADAY SIGNAL AND FIRE ALARM GONGS

Monitor Patterns

SCHEDULE "T"

AC SINGLE-STROKE, SOLENOID PLUNGER TYPE, MONITOR, NON-WEATHERPROOF

For General Use and for Paging Systems of the Code-Calling Type.

Not suitable for Closed Circuit Model No. "KTS" Approved Fire Alarm Systems where and "KS" Underwriter's Approved Gongs of 5150 Single-Stroke Plunger or 5120 pattern should be used. Monitor Gong

Non-Guarded Gongs

List No. and Size Gong	12-30V Trans.	110-125V AC	220-250V AC
	List Price Each	List Price Each	List Price Each
KTS- 4	\$12.00	\$15.00	\$17.50
KTS- 6	15.00	19.00	21.50
KTS- 8	19.00	23.00	25.50
KTS-10	30.00	35.00	37.50
KTS-12	38.00	43.00	45.50

Regularly provided—without extra charge—with separable conduit-box backs, adaptable to both surface and flush conduit installations. Boxes regularly have 1/2" "knockouts" but will be furnished 3/4" when specially ordered.

For Full-Grids add to list prices.

Size:	4"	6"	8"	10"	12"
	\$6.00	\$8.00	\$9.00	\$10.00	\$12.00



D. C. FARADAY SIGNAL GONGS

SCHEDULE "T"
Standard Package 1.Model No. "A"
Non-Guarded GongModel "AN"
Non-Guarded Gongs
Non-WeatherproofDC VIBRATING, HIGHEST GRADE CLAPPER,
CONTACT TYPE, WEATHERPROOF, ENCLOSED

Highest grade most powerful vibrating signal gongs for important Battery and DC work; breakage of tension springs cannot disable gong. Clapper-pattern mechanisms—fully protected from dust, dampness and mechanical injury. Have "high-power" pivoted-armatures, fully-insulated mechanisms. Bakelite insulation throughout.

NECK-PATTERNS

Non-Guarded Gongs

List No. and Size Gong	Battery 6-9V List Price Each	110-125 Volts DC List Price Each	220-250 Volts DC List Price Each
A- 1 3/4	\$ 6.60	Not Made	Not Made
A- 2	7.25	"	"
A- 2 1/2	7.80	"	"
A- 3	8.85	"	"
A- 4	10.85	\$19.05	\$27.30
A- 5	15.80	27.00	40.00
A- 6	17.80	30.50	43.25
A- 8	22.00	36.95	51.90
A-10	36.95	54.90	72.85
A-12	49.90	67.80	85.80
A-14	61.60	82.50	103.50
A-16	129.25	159.15	189.10
A-18	146.90	176.85	206.75

With Rectangular and Cow-Gongs

A-112	\$11.35	Not Made	Not Made
A- 23	13.35	\$21.55	\$29.80
A- 35	22.80	35.50	48.25
A- 46	32.00	46.95	61.90

DC VIBRATING, COMMERCIAL GRADE, CLAPPER,
CONTACT TYPE, ENCLOSED

Weatherproof and Non-Weatherproof

First-class dependable clapper pattern vibrating gongs for battery and DC; not so good as Model "A" but high-grade for competitive commercial signal work.

NECK-PATTERNS

List No. and Size Gong	Battery 6-9V Non-Conduit Non-Weatherproof List Price Each	110-125V DC with Adapter- Plate for Conduit Non- Weatherproof List Price Each	220-240V DC with Adapter- Plate for Conduit Non- Weatherproof List Price Each
AN- 3	\$11.00	\$14.00	Not Made
AN- 4	12.00	15.00	"
AN- 6	15.00	19.00	21.50
AN- 8	19.00	23.00	25.50
AN-10	30.00	35.00	37.50
AN-12	38.00	43.00	45.50
AN-B Buzzer	10.00	13.00	15.50

D. C. FARADAY SIGNAL GONGS

(Continued)

For Half-Grids and Full-Grids add to List Prices:

Size:	4"	6"	8"	10"	12"
	\$6.00	\$8.00	\$9.00	\$10.00	\$12.00

For "Yard-type" Protected Hoods add to list price each \$25.00.

Conduit Bells: Adapter-plate permits mounting of any bell on standard 4" square box or extension cover. Also fits single or double-gang conduit. Adapter-plate furnished regularly with 110-125 volt bells.

If desired on low-voltage bells specify "Conduit Bell" and add \$1.25 to list price.

Cast wall box can be furnished if specified with 110 volt bells at \$1.25 addition to list price and low-voltage bells at \$2.50 addition to list price.

For Surface-conduit installation, use List "A" as this bell is ideal for Surface-conduit work.

Rectangular or Cow-Gongs can be furnished on Nos. AN-6, AN-8, YN-6 and YN-8 at following prices: Add \$5.00 to list price of "AN-6" or "YN-6" respectively for 3 1/8 x 5 inch Gong.

Add \$10.00 to list price of "AN-8" for 4 1/4 x 6 inch Gong.

Model "AN" Gongs will be furnished weatherproof at an addition to list price of \$1.25.

Model "AX"
Non-Guarded
GongModel No.
"KS" Single-Stroke
Plunger Monitor
GongDC VIBRATING, HIGHEST GRADE, PLUNGER-TYPE,
WEATHERPROOF, ENCLOSED

High-grade plunger pattern contact type vibrating gongs for Battery and DC; not so desirable as clapper type Model "A," but first-class construction with "high-power" armatures, fully insulated mechanisms. Bakelite insulation throughout. Fully protected from dust, dampness and mechanical injury.

NECK-PATTERNS

Non-Guarded Gongs

List No. and Size Gong	Battery 6-9V List Price Each	110-125 Volts DC List Price Each	220-250 Volts DC List Price Each
AX- 6	\$15.00	\$19.00	\$21.50
AX- 8	19.00	23.00	25.50
AX-10	30.00	35.00	37.50
AX-12	38.00	43.00	45.50
AX-14	61.60	82.50	103.50

D.C. SINGLE-STROKE, MONITOR,
SOLENOID PLUNGER TYPE, NON-WEATHERPROOF

For General Use—Not Suitable for Closed Circuit
Approved Fire Alarm Systems.

Monitor Patterns Non-Guarded Gongs

List No. and Size Gong	Battery List Price Each	110-125 Volts DC List Price Each	220-250 Volts DC List Price Each
KS- 4	\$12.00	\$15.00	\$17.50
KS- 6	15.00	19.00	21.50
KS- 8	19.00	23.00	25.50
KS-10	30.00	35.00	37.50
KS-12	38.00	43.00	45.50

For Half-Grids and Full-Grids add to list prices.

Size	4"	6"	8"	10"	12"
List Price Each	\$6.00	\$8.00	\$9.00	\$10.00	\$12.00

Regularly provided—without extra charge—with separable conduit box backs, adaptable to both surface and flush conduit installations. Boxes regularly have 1/2" "knockouts" but will be furnished 3/4" when specially ordered.

HOSPITAL SIGNAL SYSTEMS

Nurses' Call System

Holtzer-Cabot Nurses' Call System is the development of years of experience in manufacturing signal systems for hospitals. Its advantages over existing systems are so great that its adoption has been almost universal and since that time it has been installed in over 2000 hospitals throughout America.

Patients' Phoncall System can be combined with Locking Button System.

SIMPLE AND COMPLETE OPERATION

Light pressure on the locking button, which lies on the patient's bed and is connected to a wall station by means of a cord, establishes contacts which light lamps in indicators and various types of signaling stations installed throughout the hospital. These signals consist of units which are assembled in different groups on gang plates to fill a variety of signaling requirements.

When the locking button is depressed the signals set up are maintained until the nurse reaches the patient's bedside and releases the calling button. The signals cannot be restored in any other way.

Operating Current—Where alternating current is available, the system is operated from a step-down transformer of proper capacity to operate system without excessive drop in voltage.

HOLTZER-CABOT POSITIVE LOCKING BUTTON

Since Holtzer-Cabot pioneered the locking button, which is the heart of the Nurses' Call System, it has manufactured hundreds of thousands of buttons, constantly improving and strengthening the design in all possible ways.

The new Premier locking button, while unchanged in basic principle, has been entirely redesigned mechanically and incorporates the following features:

Positive Locking—When operated by patient, mechanism is positively locked and cannot be reset by dropping on the floor or any other accidental use.

Non-Metallic—The entire button is completely insulated; patient cannot come in contact with metal.

Unbreakable—The entire button is moulded of special, shock-proof material and is unbreakable.

Cord Grip—The cord is fastened by a special cord grip so there is no strain on the connections.

Easy Reset—The resetting is extremely easy as the new, Premier resetting collar has a broader surface, requiring only light pressure to operate.

Quick Replacements—To facilitate reconnecting of cords, the button may be removed by loosening one screw only, leaving the mechanism a complete assembled, working unit.

PRIVATE ROOM CALLING STATION

Consists of single gang plate with yoke mounted receptacle and easy detachable plug, with 6 ft. Tyrex cord and Premier locking button. Plates may be furnished with extra gangs drilled to accommodate lighting receptacles, radio or telephone jacks as desired. No. 162002.

Prices on application.

HOSPITAL SIGNAL SYSTEMS

WARD CALLING STATION

Consists of single gang plate same as private room station with addition of bullseye signal on plate to indicate from which bed a call originates. Bullseye cap is of translucent moulded material and is easily visible from any angle. No. 162003.



CORDS

All calling stations requiring cords are furnished complete with cord, plug and button. We recommend that a reasonable number of extra cord, plug and button units be provided so that as units wear out in service, extra units will be immediately available for replacement.



WALL TYPE CALLING STATION

Consists of single gang plate with yoke mounted locking button mounted directly on wall. For use in toilets, bathroom or locations where cords are not required. No. 162006.



CORRIDOR LAMP STATION

Consists of two gang plate with receptacle and lamp under a frosted glass dome. These stations are mounted over doors of rooms and wards on the corridor side to indicate room or ward from which a call originates. No. 162026.



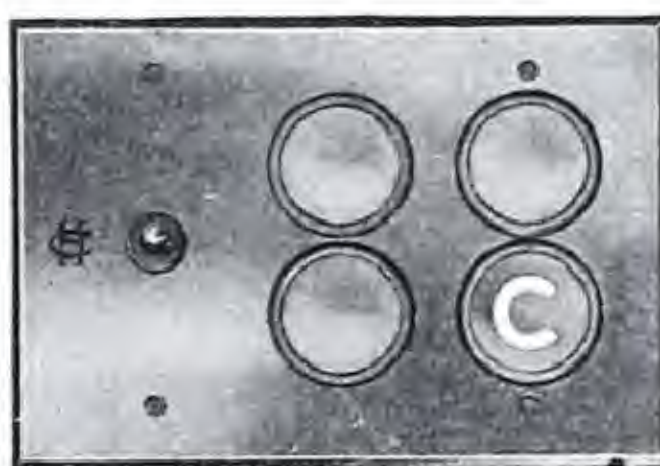
NURSES' PILOT STATION

Consists of three gang plate with receptacles and lamps under glass dome also concealed buzzer and cut-off switch. For use in duty rooms and diet kitchens to indicate call originating on that floor or section. No. 162027.



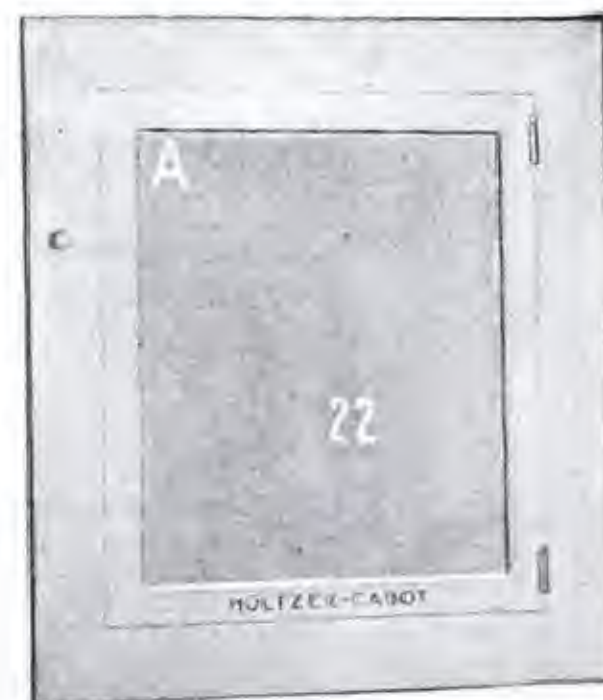
NURSES' SECTIONAL PILOT

Consists of plate with concealed buzzer and cut-off switch also separate bullseyes. For use in duty rooms and diet kitchens to indicate ward or section from which calls originate. No. 162028.



NURSES' LAMP TYPE ANNUNCIATOR

Flush type with brass trim and door with lock and concealed hinges equipped with buzzer and cut-off switch and the necessary number of lamps to provide one indication for each ward or private room on each floor. Indications are on photographic process glass and are invisible except when lamps are lighted. For use at nurses' station on each floor. No. 162052.



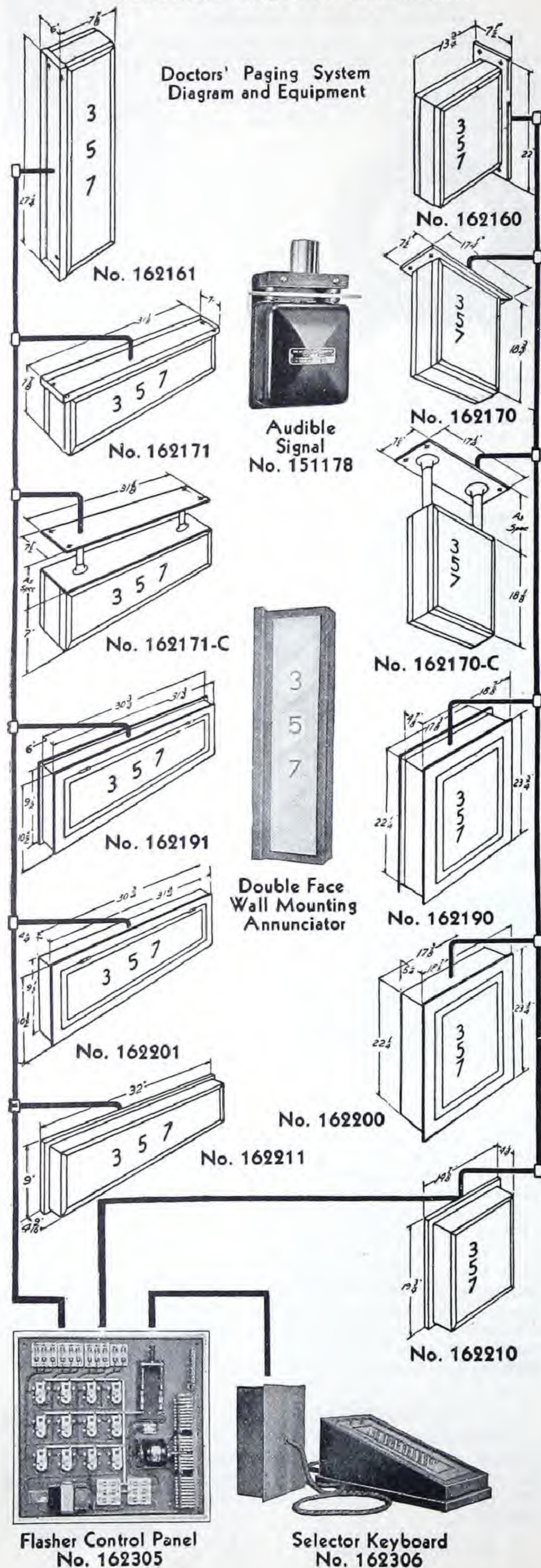
TRANSFORMER

Transformer having a separate insulated primary and secondary and having sufficient capacity to operate one half of the entire lamp load. No. 162080.



Prices on application.

HOSPITAL SIGNAL SYSTEMS



HOSPITAL SIGNAL SYSTEMS

Doctors' Paging System

To meet the need for a system for quickly locating doctors or executives in hospitals, department stores, and similar institutions where noise is objectionable, Holtzer-Cabot has developed and patented the Flashing Lamp Type Paging System. This system was first developed and patented in 1922 by Holtzer-Cabot and stands to-day as the one system proven by the test of time to best meet the requirements of such service.

Operation.—Each doctor is assigned a code number of 3 digits, such as 3-5-7, etc., and directory charts, listing the various doctors and the code numbers assigned to them, are kept at telephone operator's switchboard and at each nurse's station. False calls by burned out lamps, are eliminated by the use of three digits.

To call a doctor, the telephone operator will set up the digits comprising the doctor's code call on the keyboard, which will cause the 3 digits of that code to flash out simultaneously and repeatedly on annunciators located in the corridors throughout the hospital. The code number set up will flash repeatedly until the call is reset by telephone operator. System is so arranged that the operator may set up simultaneously on keyboard 3 distinct and separate doctors' code numbers, which will flash in rotation until all are reset by the operator.

In cases where a doctor is urgently needed the operator may by means of a special key on the keyboard sound audible signals located in corridor near each annunciator—audible signals operating in unison with the flashing of the lights.

Annunciators.—Furnished with either double-row or single-row markings and in various types of cases, both single and double face.

Double face annunciators are furnished for mounting on side wall of corridor, on ceiling, or in partitions with one face showing on each side of partition. Single-face annunciators are furnished for flush or surface mounting, as required.

Double-row annunciators are furnished to read from the top downwards, regardless of the type of case or mounting. Single-row annunciators, however, on account of space limitations, must be arranged to read vertically when mounted on sidewalls and horizontally when mounted on ceilings or in partitions. Single-face single-row annunciators are arranged to read vertically.

The various types of annunciators with dimensions for each are shown.

To learn the many uses for this type of system, as applied to hospitals, department stores, banks, broker's offices, etc. ask for the latest bulletin.

Send for N. H. A. folder for hospitals.

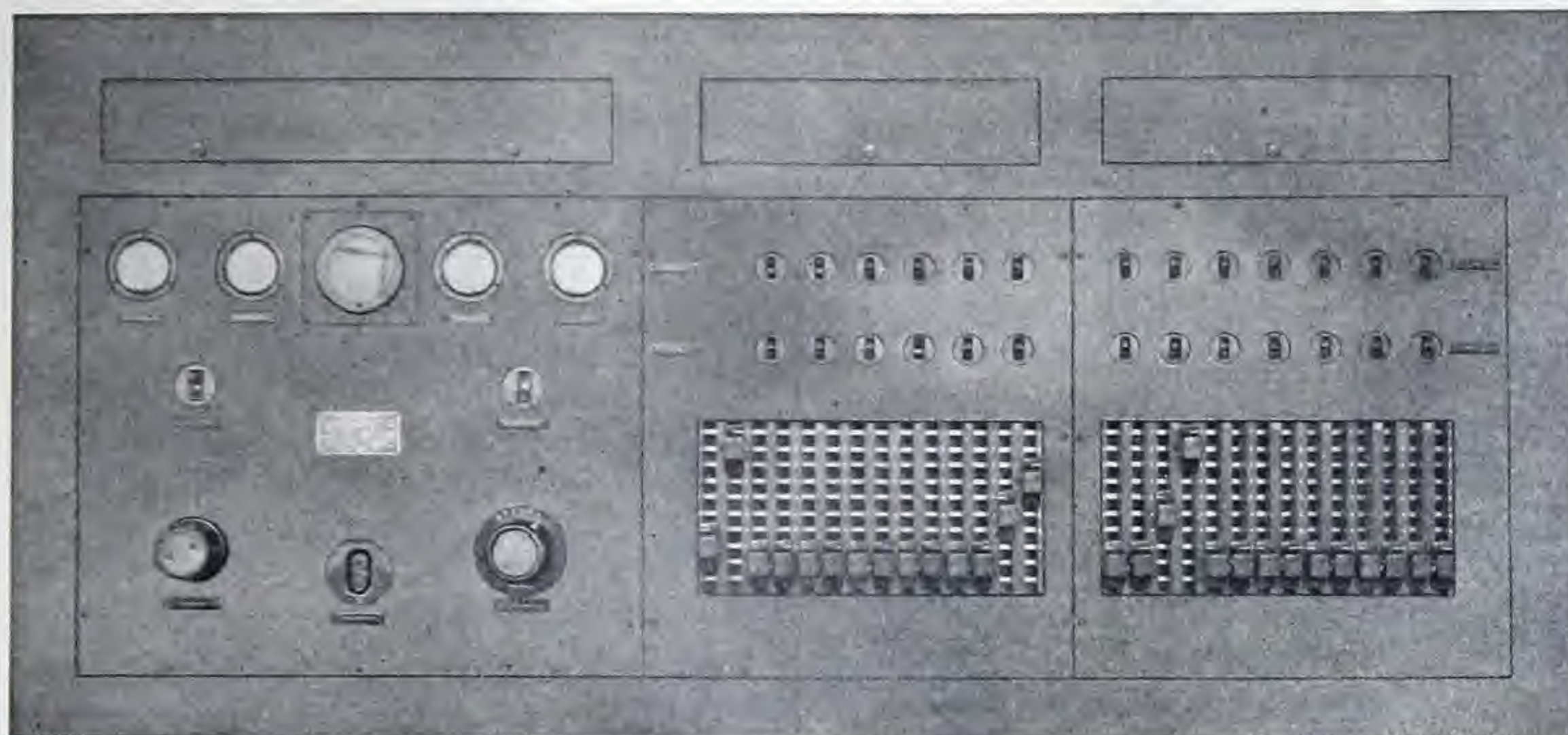
Prices on application.

SCHOOL AND COLLEGE ELECTRICAL DISTRIBUTION SYSTEMS

For twenty years Holtzer-Cabot has been supplying schools and colleges with experimental laboratory equipment. It made the first laboratory distributor panel for conveniently supplying various voltages of both alternating and direct current to work benches in physics, chemical and general science laboratories. Definite, dependable current supply is essential in laboratory experiments. Adequate equipment of the best quality, properly installed is a necessity.

Holtzer-Cabot's latest cordless type panel (patents pending) has eliminated the objectionable features for the high grade installation. It eliminates the cords, trouble of storing, probable loss and keeping in repair these plugs and cords.

However, where the cord type may be preferred or desired, it is still available and the Holtzer-Cabot quality is maintained in either type.



No. 165045 Cordless Panel

In this new type panel the selection of all voltages to be connected to students' tables or instructors' benches is done by switches or sliding plugs which cannot be removed from the panel. Not only does this eliminate all plugs and cords with their inevitable upkeep expense and occasional loss, but by means of careful design the new panel positively eliminates any possibility of wrong connection or reversed polarity. It is not possible by any manipulation of switches or sliders to get more than one voltage on any bench circuit at the same time.

With the elimination of plugs and cords and by improving the motor generator and battery control panel we are now able to install any panel in a case not over 7 in. deep, thus making these panels entirely practical for installing flush in laboratory walls. As these panels are of the dead front type, the glass-enclosed doors usually furnished for cord type panels are unnecessary and are not furnished.

Referring to cut above, it will be seen that there are two sliding plugs for each bench circuit—one colored red and the other green; the red being positive. By sliding the plugs to the upper position plainly marked on panel front and plugging them in, any battery voltage from 2 to 24 can be connected to each circuit. The switches marked "AC" are so connected that in the "up" position they connect the bench circuits to the "AC" line and in the "down" position the bench circuits are transferred to the "DC" switches below. The "DC" switches operate in the same manner, connecting when in the "down" position the bench circuits to the battery voltage section below.

The laboratory equipment described herein when properly installed and connected will provide a most practical and convenient system for quick-connecting to work tables and instructors' benches the various voltages of alternating and direct current required for electrical experiments.

All equipment is listed and approved by the Underwriter's Laboratories.

A typical installation includes:

1. Storage Battery.
2. Motor Generator.
3. Transformers.
4. Motor generator and battery control panel.
5. One or more distribution panels.

"Distribution panels may be added in sections of seven benches. With this section arrangement, any of the sections on the control and charging section may be mounted separately to meet job conditions.

"Control and Charging Section only is No. 165049.

"Distribution Panel only is No. 165047."

Note: It is usual practice to install in the main laboratory the motor generator, the batteries, the motor generator and battery control panel and a distribution panel for connecting the various voltages available to students' and instructors' tables in that laboratory. Where there are other laboratories to be equipped it is only necessary to install a separate distribution panel which is fed from the motor generator and battery control panel in main laboratory.

To conserve space, both the motor generator and battery control panel and the distribution panel in main laboratory are combined in one cabinet.

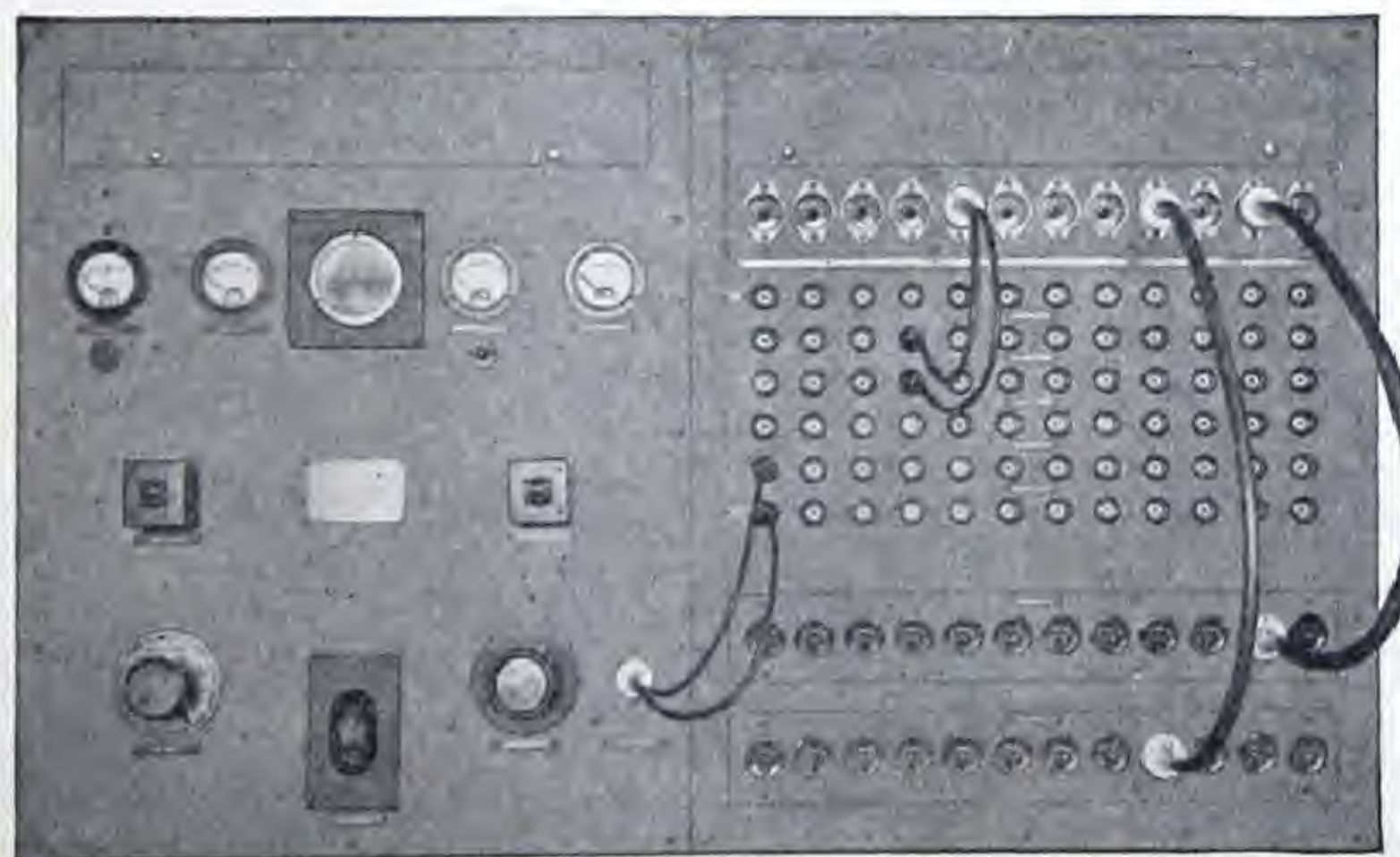
CORD TYPE PANELS

The Cord Type Panels can be furnished with the new improved jacks and plugs, where that type of service is preferred.

Our Engineers will gladly co-operate in the layout of your individual jobs.

Ask for complete bulletins with all details of these panels.

Prices on application.



List No. 165025. Typical Cord Type Panel

WATCHMAN'S TIME DETECTORS

Battery or Magneto Type—With or Without Clock

NATIONAL CODE STANDARD



No. 75 Magneto Type

The Edwards Watchman's Time Detector records accurately and indelibly (by puncture of a paper dial) every visit of the watchman to every station, and the time of the visit.

The magneto type is approved by the National Board of Fire Underwriters and by the Associated Factory Mutual Fire Insurance Companies. No battery type is approved, irrespective of make.

Insurance rates are materially reduced by the installation of a Watchman's Time Detector.

Operation is simple, effective and positive. A paper dial which revolves with the clock movement is inserted each day. It is so set that the time (hour and minute) of insertion is over the indicating point. At each station the watchman visits he cranks the magneto handle (or turns a key if battery type). This generates current for operation of the indicator in the instrument corresponding to the station number. The point of the indicator punches a hole in the paper dial showing exactly the time of the visit. At the end of the tour of duty the dial is removed from the clock by someone with a key, filed and becomes a permanent record of the watchman's movements.

The advantages of the Edwards System are:—

1. A record cannot be made unless the watchman has visited the station.
2. The record cannot be changed. It is a puncture on paper.
3. A special device registers the opening and closing of door. The record cannot be tampered with.
4. Installation is facilitated by plainly marked connections. Wiring is simplest possible, one common wire from instrument to all stations, and an individual wire from each station to the instrument.
5. All factory-made connections are soldered.

The apparatus consists of a heavy brass plate on which are mounted.

1. An arm indicator (magnets and armature) at the end of which is a pin for making record. One for each station in plant.
2. An eight-day clock.
3. Metal disc with guides for holding paper dial and keeping it secure.
4. A guide arm with opening for each pin. Paper cannot be torn.
5. Special device which records opening or closing of door.
6. Binding posts.

The case is simple in design and constructed of heavy oak.

WATCHMAN'S TIME DETECTORS

Battery or Magneto Type—With or Without Clock

SCHEDULE D

No. 75—Time Detector With Clock

No. Station	Dimensions—Inches			Weight Lbs.	List Price
	H.	W.	D.		
4	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	54 $\frac{1}{2}$	\$336.00
6	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	55 $\frac{1}{2}$	348.00
8	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	56 $\frac{1}{2}$	366.00
10	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	57 $\frac{3}{4}$	378.00
12	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	59	414.00
15	33 $\frac{3}{4}$	17 $\frac{1}{2}$	5 $\frac{1}{2}$	61	432.00
20	37 $\frac{3}{4}$	18 $\frac{1}{2}$	5 $\frac{1}{2}$	64 $\frac{1}{2}$	468.00
25	37 $\frac{3}{4}$	18 $\frac{1}{2}$	5 $\frac{1}{2}$	67	500.00
30	42 $\frac{1}{2}$	20 $\frac{3}{4}$	5 $\frac{1}{2}$	86	610.00
40	55 $\frac{3}{4}$	18 $\frac{1}{2}$	5 $\frac{1}{2}$	98	810.00
50	55 $\frac{3}{4}$	18 $\frac{1}{2}$	5 $\frac{1}{2}$	104	882.00

No. 76—Time Detector Without Clock

4	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	34	\$155.00
6	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	34 $\frac{3}{4}$	167.00
8	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	35 $\frac{1}{2}$	190.00
10	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	36 $\frac{1}{4}$	202.00
12	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	37	242.00
15	20	17 $\frac{1}{2}$	5 $\frac{1}{2}$	38 $\frac{1}{4}$	260.00
20	24	18 $\frac{1}{2}$	5 $\frac{1}{2}$	53 $\frac{1}{4}$	301.00
25	24	18 $\frac{1}{2}$	5 $\frac{1}{2}$	56 $\frac{1}{2}$	337.00
30	28 $\frac{3}{4}$	20 $\frac{3}{4}$	5 $\frac{1}{2}$	76 $\frac{1}{2}$	416.00
40	42	18 $\frac{1}{2}$	5 $\frac{1}{2}$	86	442.00
50	42	18 $\frac{1}{2}$	5 $\frac{1}{2}$	90	468.00

List No. 97 Battery Type with clock, same prices and dimensions as List No. 75.

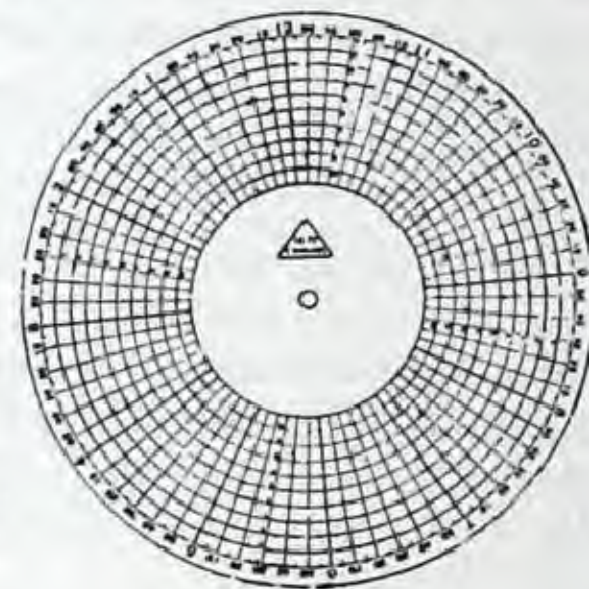
List No. 98 Battery Type without clock, same prices and dimensions as List No. 76.

Where more than 30 stations are required, 2 recording dials will be used. Standard finish, black, oak or mahogany. For any sprayed finish, add to list \$15.00.

Prices include a year's supply of dials, but do not include magneto or battery stations listed below.



No. 163



Dial



No. 162

MAGNETO STATIONS

Flush Type—Metal wall case. Metal face plate, nickel, brass, or bronze finish as specified. Removable crank. Wall cut 4 $\frac{3}{4}$ " wide, 7 $\frac{1}{2}$ " high, 5" deep.

List No. 163 Weight 10 lbs, Schedule D... List Price \$37.08

Surface Type—Weatherproof metal case with removable crank.

List No. 162 Weight 13 lbs, Schedule D... List Price 30.00

Portable Type—With leather carrying strap, three foot cord and plug of type specified.

List No. 161P Weight 7 lbs., Schedule D. List Price \$40.00

Stations for this type consist simply of receptacles, usually EDWARDS 158-235, fitting standard switch box.

Cranks—One furnished for every four stations. Additional each \$1.00 list.

BATTERY STATIONS

Flush Type—Fits standard switch box.

List No. 211 Weight 10 ozs., Schedule D... List Price \$7.00

Surface Type—2 $\frac{1}{2}$ " diameter.

List No. 211A Weight 8 ozs., Schedule D. List Price \$4.00

Keys—One furnished for every four stations. Additional each \$0.50 list.

PAPER DIALS

A year's supply furnished with every instrument. Additional:

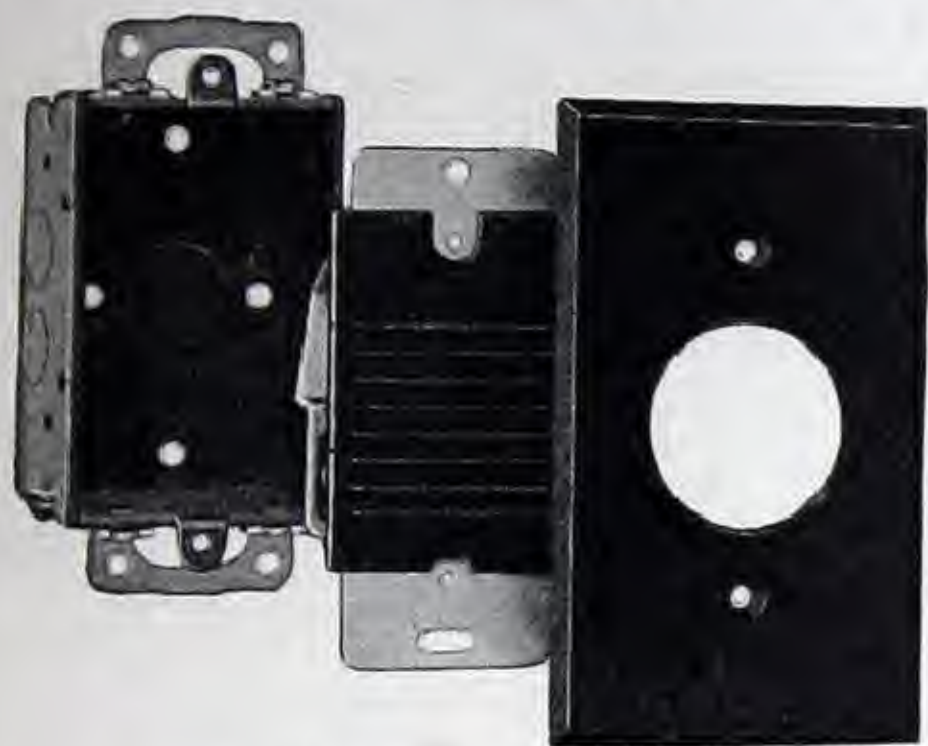
1 to 10 stations, per 1000, Schedule T... List Price \$20.00

11 to 25 stations, per 1000, Schedule T... List Price 28.00

26 to 30 stations, per 1000, Schedule T... List Price 30.00

EDWARDS FLUSHCALL SIGNAL DEVICES

Best Quality Line of Modern, Flush Bells and Buzzers That Fit Standard Boxes and Take Standard Plates



Flushcall Devices Fit Standard Boxes and Take Standard Plates

A complete, new, modernized line of signaling and calling devices for residence, apartment, or any place old-fashioned bells, buzzers, and transformers were heretofore used.

A standardized, flexible, coordinated line of efficient devices in which one fits standard gang boxes and takes standard face or receptacle plates. Can be ganged together with 110-Volt receptacles, etc., in standard box and finished with standard plate.

Each device is designed and built for A.C. operation only on 110-120 Volts—with absolutely no adjustment before, during, or after installation. The uncertainty as to proper resistance, voltage, etc., for various uses has been eliminated. Each device has a specific number for the use you desire.

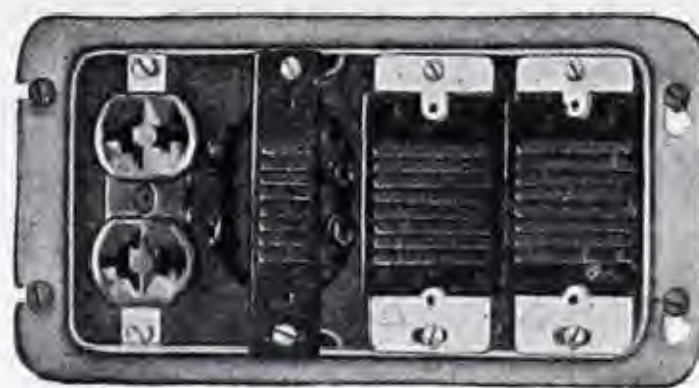
Construction Details: Large, accessible binding posts. The face and louvre front plate combine to completely surround and protect gong and mechanism from wires in box. Inclined construction of frame and shallow design leaves ample room for lock nuts and wires. Elliptical hole permits a plumb line adjustment. Mechanism completely insulated from frame. Made of proof metals or finish throughout.

This is modern, fully approved method of installation centers the complete call system in one standard gang box. In every kitchen it is now customary to install a 110-Volt outlet on the side wall. In the Flushcall Plan this outlet, instead of being single gang, is 3 or 4 gang according to the number of calls desired. In it is combined the 110-Volt outlet with all Flushcall devices—the Tucall and Melocall for front door, back door and dining room signals—(three entirely different signals that leave no doubt as to the origin of each call) and the Powacall for operation of the entire call system. If there is an Annunciator it is installed immediately above the outlet—the Powacall will operate it perfectly too.

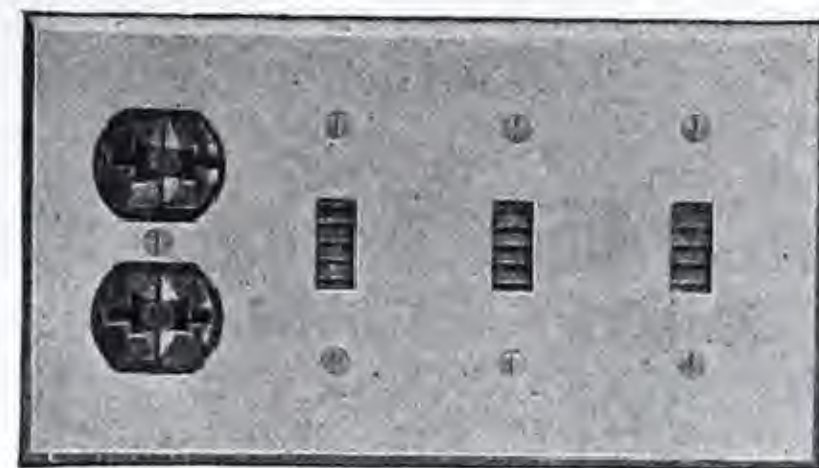
The time-saving, efficiency, and appearance advantages are immediately obvious. From all standpoints of better installation—easier inspection and less fire hazard, the Flushcall Plan is superior to all other methods.

In apartments the Flushcall Plan is even more desirable than in residences since it eliminates long wire runs, which necessitate the use of high wattage transformers, not approved by Underwriters' Laboratories for signaling purposes. It is the Powacall on the suite meter. If the call system of one suite becomes inoperative it does not affect the other systems in the building.

EDWARDS FLUSHCALL SIGNAL DEVICES



A typical Flushcall combination — instead of transformer in cellar, bells high on wall, receptacle low on wall.



Compare fine appearance of Flushcall installation with old-fashioned doorbells, etc.



Buzacall



Powacall



Togelpush

The Nos. 660, 760 and 1060 are Ringcalls that replace the old-fashioned small bell with better tone and more carrying power.

The Nos. 663 and 763 are Melocalls that replace all the clatter and buzz of the old fashioned dining room-kitchen call that was annoying to diners. It gives a soft mellow, momentary "ding"—an entirely different "third call" where such is necessary.

The Nos. 661, 761 and 1061 are Buzacalls that replace the old-fashioned buzzer with far better tone and much more carrying power.

The No. 664 is the Togelpush that fits any standard box and takes any standard toggle switch plate.

The Nos. 662 and 762 are the Tucalls that replace the old-fashioned combination bell and buzzer with both calls far superior in tone and carrying power.

The Nos. 668 and 768 are the Varicalls to replace the old-fashioned adjustable buzzer with far better tone and much more carrying power. Tone can be varied from a loud low tone to a soft high tone.

The No. 666 is the Powacall replacing the old-fashioned "bellringer." This item is approved by the Underwriters. Fits any standard box or outlet box with cover, 2 3/8" deep. Usually placed in second gang of any combination, taking 110 volt from same line as receptacle, switch, etc., in first gang. The Powacall provides its own barrier. Binding posts for easy installation.

List No.	A.C. Volts	Cycles	Description	Weight				List Price
				Std. Pkg.	Std. Pkg.	Schedule		
660	8-12	60	Ringcall	20	6	9	E	\$1.02
760	24	60	Ringcall	1		6	T	1.32
1060	110	60	Ringcall	1		6	T	6.00
663	8-12	60	Melocall	20	7	8	E	1.20
763	24	60	Melocall	1		6	T	1.62
661	8-12	60	Buzacall	20	4	9	E	.96
761	24	60	Buzacall	1		5	T	1.26
1061	110	60	Buzacall	1		5	T	5.85
664			Togelpush	20	1	8	E	.25
662	8-12	60	Tucall	20	7	9	E	1.44
762	24	60	Tucall	1		6	T	1.92
668	8-12	60	Varicall	1		4	T	1.14
768	24	60	Varicall	1		4	T	1.44
666	110-130	†50-60	Powacall	20	23		E	1.12
666	110-130	†25-40	Powacall	20	23		E	2.24

†Primary. Secondary voltage 8 volts. For 220 volt 60 cycle primary, add to 110 volt 60 cycle list 15%.

EDWARDS FLUSHCALL SIGNAL DEVICES

A PUSH, BELL, BUZZER COMBINATION

For "walk-up" apartments, the best and least expensive installation is a two gang box with the Tucall for front door and rear door or dumbwaiter signals, and the Toglepush for door opener operation, using a standard two gang toggle plate. For narrow spaces, however, several different combinations for this type installation can be furnished to fit a single gang box as listed below. A special plate is included.

Schedule E

List No.	Description	List Price
770	Ring and Push (8-12 V. A.C., Gen. Use).....	\$1.72
780	Ring and Push (24 V. A.C., Multiple Use).....	2.02
771	Buzz and Push (8-12 V. A.C., Gen. Use).....	1.66
781	Buzz and Push (24 V. A.C., Multiple Use).....	1.96
772	Ring, Buzz and Push (8-12 V. A.C., Gen. Use).....	2.10
782	Ring, Buzz and Push (24 V. A.C., Multiple Use).....	2.62

Standard Package 20.

MULTIPLE OPERATION OF No. 660

Suitable for operation of not more than two in multiple on 8 Volt A.C., No. 666 Powacall or No. 86 Transformer. Three in multiple on No. 88, 50 watt (8 Volt) Transformer, and four on No. 90, 100 watt (8 Volt) Transformer.

MULTIPLE OPERATION OF No. 661

Suitable for operation of not more than two in multiple on 8 Volt A.C., No. 666 Powacall or No. 86 Transformer. Three in multiple on No. 88, 50 watt (8 Volt) Transformer, and four on No. 90, 100 watt (8 Volt) Transformer.

MULTIPLE OPERATION OF Nos.
760 AND 761

9 in multiple on No. 88, 50-watt trans. 24 Volt
15 in multiple on No. 90, 100-watt trans. 24 Volt
36 in multiple on No. 94, 250-watt trans. 24 Volt
72 in multiple on No. 99, 500-watt trans. 24 Volt

MULTIPLE OPERATION OF No. 763

3 in multiple on No. 88, 50-watt trans. 24 Volt
6 in multiple on No. 90, 100-watt trans. 24 Volt
14 in multiple on No. 94, 250-watt trans. 24 Volt
28 in multiple on No. 99, 500-watt trans. 24 Volt

MULTIPLE OPERATION OF No. 662

Suitable for operation of not more than two in multiple on 8 Volt A.C., No. 666 Powacall or No. 86 Transformer. Three in multiple on No. 88, 50 watt (8 Volt) Transformer, and four on No. 90, 100 watt (8 Volt) Transformer.

MULTIPLE OPERATION OF No. 762

9 in multiple on No. 88, 50-watt trans. 24 Volt
15 in multiple on No. 90, 100-watt trans. 24 Volt
36 in multiple on No. 94, 250-watt trans. 24 Volt
72 in multiple on No. 99, 500-watt trans. 24 Volt

MULTIPLE OPERATION OF No. 668

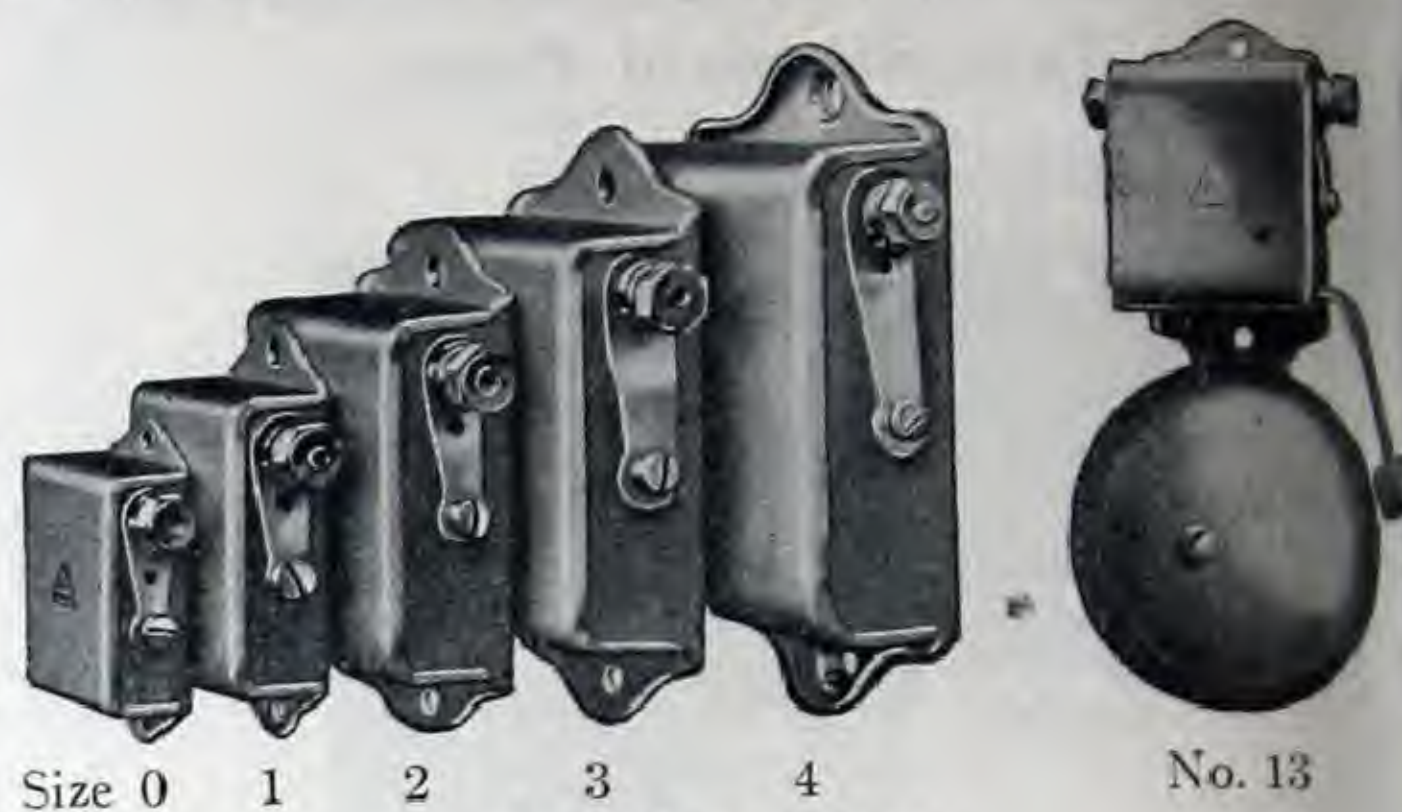
Suitable for operation of not more than two in multiple on 8 Volt A.C., No. 666 Powacall or No. 86 Transformer. Three in multiple on No. 88, 50 watt (8 Volt) Transformer, and four on No. 90, 100 watt (8 Volt) Transformer.

MULTIPLE OPERATION OF No. 768

12 in multiple on No. 88, 50-watt trans. 24 Volt
20 in multiple on No. 90, 100-watt trans. 24 Volt
48 in multiple on No. 94, 250-watt trans. 24 Volt
96 in multiple on No. 99, 500-watt trans. 24 Volt

EDWARDS SIGNAL BELLS & BUZZER

Best Quality Small Bells and Buzzers—For All Better Grade Signaling Work.



Lungen Line

These bells and buzzers are designed for use in better class offices, residences, hospitals, etc., where a best quality device with neater appearance than the ordinary iron box type is desired. Covers fit tightly making them bug and dust proof. They have phosphor bronze springs and double adjustment pure hard-drawn silver contacts. Surface types available in five sizes varying in tone and volume to meet all conditions. Flush type D.C. Buzzer of subplate construction, fits in standard single gang switch box or cover. Has oval holes in sub-plate to permit alignment when switch box is set crooked in wall. Face plate perforated to emit sound. For A.C. flush buzzer see Buzacall or Varicall. Standard finish of Nos. 1 and 15 rust-proof, Polished Cadmium. Standard finish of No. 16 face plate Brush Brass. No extra charge for Nickel when specified.

No. 13 Lungen Bells

List Prices	Schedule E	Standard Package 10 Assorted	For Special Voltage or Resistance up to 48 Volts Specify Exactly When Ordering	Weight
Size	Standard 8-10 V. A.C. 6-8 V. D.C.			
1"	\$2.40	\$3.70		3 ozs.
1 3/4"	2.20	3.50		4 ozs.
2 1/2"	2.30	3.60		8 ozs.
3"	2.40	3.70		11 ozs.
*4"	3.20	4.50		1 lb.
Cow or Sleigh	3.20	4.50		1 1/2 lb.
*4 in. is for D.C. only.				

No. 15 LUNGEN BUZZERS

0 (1 5/8" x 1 1/8")	\$1.90	\$3.20	2 ozs.
1 (2 1/8" x 1 5/16")	1.80	3.10	4 ozs.
2 (2 9/16" x 1 3/4")	1.90	3.20	6 ozs.
3 (3" x 2")	2.00	3.30	8 ozs.
4 (3 1/2" x 2 1/4")	2.70	4.00	10 ozs.

No. 16 FLUSH BUZZER (FOR D.C. ONLY)

For Best Quality A.C. Flush Buzzers—See Flushcall Line

Brass Plate	\$3.00	\$4.30	9 ozs.
Bakelite Plate	3.25	4.55	7 ozs.

No. 750 Bronx Watchcase Buzzer

The smallest round buzzer made, entirely self-contained. It is carried easily in the pocket and is often used as a testing buzzer. The cover fits tightly, making it bug and dust proof. Springs are phosphor bronze, and the contacts pure hard drawn silver. Standard finish—Nickel.



Schedule E

Standard Package—10

For Special Voltage or Resistance up to 48 Volts

No. 750	Standard 8-10 V. A.C. 6-8 V. D.C.	Specify Exactly When Ordering	Weight
Size			
5/8" High—1 3/4" Dia.	\$1.80	\$3.10	1 lb. 2 ozs.

EDWARDS BELLS AND BUZZERS

Specialty Bells, Buzzers, etc.



No. 156



No. 182

No. 156 MONITOR BELL

An entirely self-contained bell that presents a neater appearance than the usual type. The hammer-rod moves in a straight line striking the inside of the gong. This allows the bell to be made bug and dust proof. The springs are phosphor bronze, the contacts pure hard-drawn silver. Nickel gong, all 3" size, base finished Black.

LIST PRICE	SCHEDULE T	SPECIFY VOLTAGE
	For Special Voltage or	
	Standard Resistance up to 48 Volts	
	8-10 V. A.C. Specify Exactly When	
Size	6-8 V. D.C. Ordering	Weight
3"	\$1.80 \$3.10	1 lb., 6 ozs.

No. 182 SURFACE LOUD SIGNAL BUZZER

An entirely self-contained buzzer for use where a noise distinctly different from the usual type of buzzer is desired. Has same mechanism as No. 156 Monitor Bell, the hammer striking the cast metal case. When mounted on a rubber gasket it is weatherproof. Finished Black.

LIST PRICES	SCHEDULE T	SPECIFY VOLTAGE
	For Special Voltage or	
	Standard Resistance up to 48 Volts	
	8-10 V. A.C. Specify Exactly When	
Size	6-8 V. D.C. Ordering	Weight
3" Dia.	\$3.50 \$4.80	1 lb. 4 ozs.



No. 195

No. 195 DESK PUSH WITH BUZZER

Ideal for offices, banks, etc., where user calls several persons but only one calls him. This neat combination unit has an efficient buzzer within the push button block. Eliminates extra wiring for buzzer. No screws to mar desk. Standard finish Black. Mahogany or Oak no extra charge. Furnished complete with 6 feet of cord and connector block for quicker and neater installation.

STANDARD FOR 8-10 VOLTS A.C.—6-8 VOLTS D.C.
Special voltage or resistance, add to list \$1.30

LIST PRICES	SCHEDULE T	SPECIFY TYPE
Number of Buttons	With 6-ft. Cord and Connector	With 6-ft. Cord Only
1	\$11.54	\$10.44
2	13.48	12.32
3	16.00	14.76
4	19.34	18.00
5	23.14	21.64
6	27.34	25.58
8	35.96	33.96
10	44.54	42.34
12	53.00	50.70
Larger Sizes Add per Button	3.00	2.50
		2.00

EDWARDS BELLS AND BUZZERS

Small Iron Box Bells, Buzzers and Combinations For Residence and Apartment Work

CADET LINE

Adjustable—2 Magnet—Black

For many years this has been known as the best quality line of standard double magnet iron box bells and buzzers. By means of a single well placed screw proper adjustments can easily be made, should the devices fail to operate satisfactorily at any time.

The hammer ball is under the gong to prevent disarrangement. Armature is pivoted at the nearest point to the cover, thus requiring a hole in the cover so small as to make the bell practically bug and dust proof.



Cadet Bell

Standard Finish, Black Enamel

Schedule E

List No.	Size	Standard 8-10 V. A.C. 6-8 V. D.C.	For Special Voltage or Resistance up to 24 V. Specify Exactly When Ordering	Std. Pkg.	Weight Lbs. Ozs.
710	2½"	\$104.00	\$234.00	50	27
712	3"	118.00	248.00	10	5 12
714	4"	153.00	283.00	5	4 2
715	Buzzer	102.00	232.00	24	9 2
Cow or Sleighbell		183.00	313.00	†10	6 4

†All Cow and Sleighbells may be assorted to make up Standard Package.

DIXIE LINE

Non-Adjustable—2 Magnet—Black

The same best quality standard double magnet bell and buzzer as the Cadet Line, without the adjustable feature.

The hammer ball is under the gong to prevent disarrangement. Armature is pivoted at the nearest point to the cover, thus requiring a hole in the cover so small as to make the bell practically bug and dust proof.



No. 720

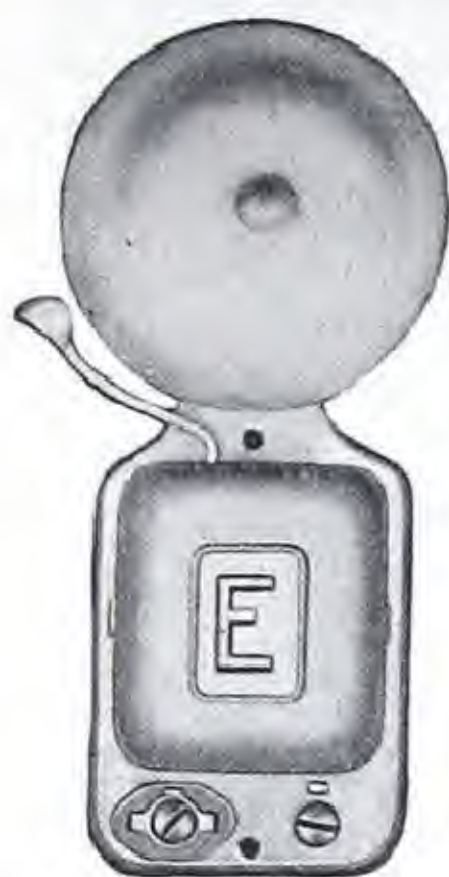
Standard Finish, Black Enamel

Schedule E

List No.	Size	Standard 8-10 V. A.C. 6-8 V. D.C. List Price per 100	Standard Package	Weight
720	2½"	\$92.00	50	27 lbs.
725	Buzzer	89.00	50	19 lbs.

EDWARDS BELLS AND BUZZERS

Small Iron Box Bells, Buzzers and Combinations For Residence and Apartment Work



No. 740



No. 741



No. 742

THE "E" LINE

Non-Adjustable—2 Magnet—Cadmium

Construction and design features, usually found only in the best quality devices, are also incorporated in this new, complete, low cost line.

A double magnet, full 2½" bell and double magnet buzzer. A combination of both on one frame with the complete mechanism except the binding post under a neat cover—an ideal labor saver in installation. Furnished also in 3" and 4" size and cow and sleigh bells. Each device is Cadmium plated—a lustrous, harmonious finish that will not rust or deteriorate.

Far superior to the low quality devices heretofore associated with these prices.

Standard Finish, Rust Proof Cadmium

Schedule E

List No.	Size	Standard 8-10 V. A.C. 6-8 V. D.C. List Price per 100	Std. Pkge.	Weight
740	2½"	\$ 57.50	100	35 lbs.
741	Buzzer	55.00	100	25 lbs.
742	Combination	112.50	50	30 lbs.
743	3"	67.50	25	12 lbs.
744	4"	92.50	25	18 lbs.
745	Cowbell	135.00	*25	10 lbs.
746	Sleighbell	135.00	*25	10 lbs.

*All Cow and Sleighbells may be assorted to make up Standard Package.

EDWARDS BELLS



No. 17

No. 17 ECONOMY A. C. OR D. C. BELL

A Double Magnet Bell for Low Cost Work

A covered two magnet bell. For low cost burglar alarm and similar work it is very satisfactory, and is far more dependable and powerful on either A.C. or D.C. than other skeleton or covered bells in its price range. Adjustable. Bakelite insulation. Finish Black.

List Prices—Schedule E

Standard Package 5—May be Assorted

Size	6-8 V. D.C.	Standard For Special Voltage or Resistance Up to 48 V. Specify Exactly When Ordering	Weight
3"	\$ 5.55	\$ 6.85	1 lb. 3 ozs.
4"	6.60	7.90	1 lb. 7 ozs.
6"	7.80	9.60	2 lbs. 14 ozs.
8"	11.40	13.20	4 lbs. 10 ozs.
10"	15.00	17.30	6 lbs. 11 ozs.



Cow Gong

CAST METAL COW GONGS

Furnished instead of conventional gongs on all types of bells listed. Schedule same as bell. Specify List No. of bell with size cow gong desired.

2" x 3" Cow Gong—Add to price of 3" bell.....	\$ 2.50
3½" x 5" Cow Gong—Add to price of 6" bell.....	5.00
4¼" x 6" Cow Gong—Add to price of 8" bell.....	10.00

EDWARDS ADAPTABEL

Vibrating or Single Stroke Types for All A.C. and D.C. Voltages



Vibrating or Single Stroke Types, both have this same fine appearance.

neat, compact bell of the so-called "Underdome," "Tur- or "Monitor" type, but with none of the disadvantages mon to that type, and with many important advantages all older designs.

Mechanical Superiorities

he movement is completely enclosed in a cast aluminum sing. The Adaptabel is well protected against dirt, bugs, When specified "weatherproof" it is thoroughly pro- d with gaskets.

he A.C. vibrating mechanism is the polarized, no contact . An improved design of that so widely known in the 551 Bell. Two large, correctly proportioned magnets lified with a permanent magnet operate the case hardened ger in a straight line, through an Everdure Bronze ning. There are no coil springs or pivots. No ad- ment ever necessary. Gongs are hot pressed steel, ized to prevent rust.

he D.C. vibrating mechanism is also of the straight line ger type. An improved design of that so widely known he Recti Bell. Powerful magnets, phosphor bronze gs of special type and precision-made parts combine ake it the finest of all D.C. movements. The contacts large and of pure hard-drawn silver. Adjustment (if ed) is made from outside of case without dismantling Gongs are of hot pressed steel, Parkerized to prevent

ngle Stroke Types are of solenoid design, Simple and erful. All parts are thoroughly rustproofed. Gongs are pressed steel, Parkerized to prevent rust.

Approved by National Board of Fire Underwriters.

Installation Advantages

ke the modern switch, this bell fits a variety of standard uit boxes and similar fittings, concealed or surface. For conduit work its mounting is just as simple. It is the bell, consequently, that can be stocked for all conditions installation.

ne gong does not have to be removed for installation— e is no screwing and unscrewing of small cover screws— ugging or one-handed gymnastics—no back connections. he total time saved is appreciable in school work, fire n systems, and installations where a number of bells are lled.

ong waits for special conduit fittings, drilled to order, avoided. Standard boxes, Condulet, and Wiremold type gs are obtainable quickly locally.

ecause the electrical connections are made to the mounting e only, the whole electrical installation can be made, d and completed before painting and finishing. When job is completed, the simple non-electrical hanging of Adaptabel can be done by an inexperienced helper with ear of trouble.

hard service work, like traffic signals, railroads, etc., the tenance problem is greatly simplified with a few spare ptabels. Instead of repairing on the job or the com- e electrical installation of a new bell, anyone can easily ch the Adaptabel and attach a new one. A simple non- rical job.

EDWARDS ADAPTABEL

Vibrating or Single Stroke Types for all A.C. and D.C. Voltages

VIBRATING ADAPTABELS

No. 560 for A.C.—No. 561 for D.C.

All 6" to 12" Vibrating Adaptabels mount directly on wall, or on 4" square box, on standard switch box, or any outlet box with single gang switch cover, on any single gang Condulet or Wiremold type fitting.

All 3" or 4" Vibrating Adaptabels have separable plate for mounting, and will also fit 3 1/4" octagon boxes. Because of small bases, they screw to back plate instead of hanging on lugs as described for 6" and larger sizes. They are much easier to install, however, than old neck-pattern bells and far better in appearance and efficiency.

LIST PRICES—SCHEDULE T—SPECIFY VOLTAGE Standard—non-weatherproof. Fully weatherproofed, if specified, at no extra charge.

	†A.C. 12-30 V. No. 560 D.C. 6-9 V	A.C. 110-130 V. No. 560 D.C. 110-130 V.	A.C. 220-240 V. No. 560 D.C. 220-240 V.	Special Voltage or Resist. Up to 48 Volts D.C.	Add for Brass or Bell Metal Gongs
Sizes	No. 561	No. 561	No. 561	No. 561	
3"	\$11.00	\$14.00	.....	\$12.50	.....
4"	12.00	15.00	.....	13.50	\$ 0.60
6"	15.00	19.00	\$21.50	17.00	2.50
8"	19.00	23.00	25.50	21.00	8.50
10"	30.00	35.00	37.50	32.50	15.00
12"	38.00	43.00	45.50	40.50	16.00

Single Stroke Adaptabels—No. 562 for A.C.—No. 563 for D.C. (For Commercial Use)

All 6" to 12" Single Stroke Adaptabels mount directly on wall, or on 4" square box, or standard switch box, or any outlet box with single gang switch cover, on any single gang Condulet or Wiremold type fitting.

All 4" Single Stroke Adaptabels are furnished with special wall boxes because of small size base.

Specify exact voltage and whether for series or multiple operation. For series operation divide full available voltage by number of bells on circuit to find voltage per bell for pricing and ordering. Standard—non-weatherproof. Fully weatherproofed, if specified, at no extra charge.

List Prices—Schedule T

	A.C. 10-48 V. No. 562 D.C. 10-48 V.	A.C. 110-130 V. No. 562 D.C. 110-130 V.	A.C. 220-240 V. No. 562 D.C. 220-240 V.	Add for Brass or Bell Metal Gongs
Sizes	No. 563	No. 563	No. 563	
4"	\$12.00	\$15.00	\$17.50	\$ 0.60
6"	15.00	19.00	21.50	2.50
8"	19.00	23.00	25.50	8.50
10"	30.00	35.00	37.50	15.00
12"	38.00	43.00	45.50	16.00

†12-30 Volts A.C. is the widest range that can be standard- ized on. Specifying a definite voltage within that range assures a more efficient bell. 8 Volt operation can be furnished, but 12 is more efficient. Unless otherwise specified, standard bells are for 60 Cycles; no extra charge for 25-40 Cycles.



Full Cast Grid for Adaptabel,

Add to List Price.

6".....	\$8.00	10"....	10.00
8".....	9.00	12"....	12.00

EDWARDS BELLS AND BUZZERS



No. 551 A.C. BELLS AND BUZZER

A Best Quality, No Contact, Polarized Bell for All A.C. Voltages—Recommended for Hard Service

The radically different construction of this bell gives far more volume and better quality of sound. The extreme simplicity of the movement so reduces the wearing parts, that its life is many times longer than that of other designs. There are no pivots, coil springs, or points of friction. It has no contacts to wear, stick, or replace. The flat steel spring floats in a keeper without any bends or rivets to weaken it. Efficiently proportioned electro-magnets are augmented with a heavy permanent magnet, which dampens the natural cycle frequency, providing greater power and smoother operation. No adjustment is ever needed. Monel metal, plunger type, hammer rod operates in a straight line, through an Everdure Bronze Bushing with $\frac{1}{2}$ " bearing, and automatically adjusts itself. All gongs are hot pressed steel, Parkerized to prevent rust.

The binding posts and all parts are completely covered, making the bell practically bug and dust proof. Bakelite insulation. Approved by the National Board of Fire Underwriters.

With the sole exception of the Adaptabel, this bell is without equal for traffic signals, mines, warehouses, and all standard signaling purposes. Specify "Weatherproof" for mines and outdoor use.

Sizes 3" standard and 4" standard are most satisfactory for general use. For multiple operation where more than 6 bells are to ring at once, sizes 3" special and 4" special with larger movements are recommended.

EDWARDS BELLS AND BUZZERS



No. 551 Buzzer

Full Grid
No. 551 F.G.Yard Type
No. 551Y

STANDARD No. 551 A.C. BELL

For A.C. Only—For D.C. Operation, See Adaptabel

List Prices—Schedule T—Specify Voltage

Size	Stand. 12-30 V.† A.C. Only Non-conduit Non-wpf.	Stand. 110- 130 V. A.C. Only With Adaptor Plate for Conduit Non-wpf.	Stand. 220- 240 V. A.C. Only With Adaptor Plate for Conduit Non-wpf.	Add for Brass or Metal Gongs	Weight
3"	\$11.00	\$14.00	\$16.50	.....	1 lb. 3 ozs.
4"	12.00	15.00	17.50	\$.60	1 lb. 8 ozs.
6"	15.00	19.00	21.50	2.50	3 lbs. 10 ozs.
8"	19.00	23.00	25.50	8.50	9 lbs. 15 ozs.
10"	30.00	35.00	37.50	15.00	11 lbs. 10 ozs.
12"	38.00	43.00	45.50	16.60	15 lbs. 4 ozs.
Buzzer	10.00	13.00	15.50	.....	1 lb. 6 ozs.

Fully Guarded No. 551 F.G. (A.C.)

Has cast grid covering entire gong. Part grid same price.

6"	\$23.00	\$27.00	\$29.50	\$ 2.50	5 lbs. 12 ozs.
8"	28.00	30.00	34.50	8.50	13 lbs. 2 ozs.
10"	40.00	45.00	47.50	15.00	17 lbs. 14 ozs.
12"	50.00	55.00	57.50	16.60	23 lbs.

Double Gong No. 552 A.C. Bell

4"	\$14.00	\$17.00	\$19.00	\$ 1.20	4 lbs. 6 ozs.
6"	23.00	27.00	29.50	5.00	6 lbs. 4 ozs.
8"	27.50	31.50	34.00	17.00	15 lbs. 4 ozs.
10"	35.00	40.00	42.50	30.00	22 lbs. 12 ozs.

†12-30 Volts A.C. is the widest range that can be standardized on. Specifying a definite voltage within that range assures a more efficient bell. 8 Volt operation can be furnished, but 12 is more efficient. Unless otherwise specified, standard bells are for 60 cycles; no extra charge for 25-40 cycles.

Conduit Type Bells

110-240 Volt bells supplied as standard with plate which mounts on 4" square box—on standard switch box or any outlet box with single gang switch cover—on 3 $\frac{1}{4}$ " octagon box—on any single gang Condulet or Wiremold type fitting.

Low voltage bells can be supplied with above plate at \$1.25 list additional.

Cast Wall Boxes

Furnished if specified at \$2.50 list additional to low voltage bells, \$1.25 list additional to 110-240 volt bells.

Weatherproof Bells

When specified, these bells will be furnished thoroughly weatherproofed without extra charge.

Yard Type No. 551Y

Furnished complete with weatherproof hood for \$25.00 list additional to bell desired.

EDWARDS BELLS AND BUZZERS



No. 510 A.C. BELLS AND BUZZER

Best Quality Clapper Type Bell for Transformer and 110-130 Volt A.C. Lighting Circuits

These bells are designed to give lastingly efficient service at all voltages where a bell with contacts is desired. Has laminated magnets and specially constructed vibrating unit. The vibrating unit is designed to allow full motion of the armature spring with a mechanical breaking circuit, independent of the spring action, which gives more power, and longer life than the old pivoted magnet and coil spring type mechanisms. Has silver contacts over large area and excellent current carrying capacity. Binding posts and all parts are completely covered, making the bell practically bug and dust proof. Locking mechanism. Phosphor bronze springs.

Where clapper type construction with contacts is preferred, these bells have no equal, but no-contact, plunger type bells like Adaptabel or No. 551 are recommended as the best for A.C. work.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Our Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

EDWARDS BELLS AND BUZZERS



No. 510 Buzzer Full Grid No. 510FG Yard Type No. 510Y

STANDARD No. 510 A.C. BELL

For A.C. Only—For D.C. See No. 222 For 220-240 Volts A.C., See Adaptabel, No. 551.

List Prices, Schedule T, Specify Voltage

Size	Standard 8-12 V. Non-conduit Non-wpf.	Standard 110-130 V. A.C. Only with Adaptabel Plate for Conduit Non-wpf.	Standard 220-240 V. A.C.	Add for Brass or Bell Metal Gongs	Weight lbs. ozs.
3"	\$11.00	\$14.00		.....	2 5
4"	12.00	15.00	See	\$.60	2 9
6"	15.00	19.00	No.	2.50	6 10
8"	19.00	23.00	551	8.50	8 8
10"	30.00	35.00		15.00	10 7
12"	38.00	43.00		16.00	13 4
Buzzer	10.00	13.00	—	.....	1 12

Fully Guarded No. 510 FG (A.C.)

Has cast grid covering entire gong. Part grid same price.					
6"	\$23.00	\$27.00	.....	\$ 2.50	9 2
8"	28.00	30.00	.....	8.50	12
10"	40.00	45.00	.....	15.00	15 9
12"	50.00	55.00	.....	16.00	20 8

Conduit Type Bells

110-130 Volt bells supplied as standard with plate which mounts on 4" square box—on standard switch box or any outlet box with single gang switch cover—on 3¼" octagon box—on any single gang Condulet or Wiremold type fitting.

Low voltage bells can be supplied with above plate at \$1.25 list additional.

Cast Wall Boxes

Furnished if specified at \$2.50 list additional to low voltage bells, \$1.25 list additional to 110-130 Volt bells.

Weatherproof Bells

When specified, these bells will be furnished thoroughly weatherproofed without extra charge.

Yard Type No. 510Y

Furnished complete with weatherproof hood for \$25.00 list additional, to bell desired.

EDWARDS BELLS AND BUZZERS



No. 222 D. C. BELLS and BUZZERS

A Best Quality Clapper Type Bell for D.C. Voltages

These bells are designed to give lastingly efficient service on D.C. voltages where a bell with contacts is desired. Has superior type magnets and specially constructed armature. The vibrating unit is designed to allow full operation of the armature spring with a mechanical breaking of the circuit, independent of the spring action, which gives much more power, and longer life than the old pivoted armature and coil spring type mechanisms. Pure hard-drawn silver contacts with large area and excellent current carrying capacity. The binding posts and all parts are completely covered making the bell practically bug and dust proof. Locking adjustment.

Where clapper type construction is preferred this bell is without equal, but plunger type D.C. bells, the Adaptabel, or Recti Bell are recommended as being more powerful and better suited for hard service.

Electrical contractors have proved that it does not pay to cut prices by using second grade wiring devices and supplies.

Experience has taught them that to build up the lasting goodwill of the public they must use only accessories which give the longest service.

Insist upon having electrical accessories and wiring devices of only the finest quality. They are the transmitters of electrical energy for your requirements.

EDWARDS BELLS AND BUZZERS

Full Grid Type
No. 222 F.G.Yard Type
No. 222YNo. 222
Buzzer

STANDARD No. 222 D. C. BELL

For low voltage D.C. only—for 110-240 volts D.C., see Adaptabel and No. 100.

List Prices—Schedule T—Specify Voltage

Size	Standard 6-9 V. D.C. Only Non-Conduit Non-wpf.	For Special Voltage or Resistance Up to 48 V. Specify Exactly When Ordering	Add for Brass or Bell Metal Gongs	Weight lbs. ozs.
3"	\$11.00	\$12.50	\$	2 5
4"	12.00	13.50	.60	2 9
6"	15.00	17.00	2.50	6 10
8"	19.00	21.00	8.50	8 8
10"	30.00	32.50	15.00	10 7
12"	38.00	40.50	16.00	13 4

Fully Guarded No. 222 FG (D.C.)

	Has cast grid covering entire gong.	Part grid same price.
6"	\$23.00	\$25.00
8"	28.00	30.00
10"	40.00	42.50
12"	50.00	52.50

No. 222 Buzzer—For All D.C. Voltages

Standard 6-9 V. Non-Conduit Non-wpf.	110-130 V. with Adaptor Plate for Conduit Non-wpf.	For Special Voltage or Resistance up to 48 V.	Weight lb. ozs.
\$10.00	\$13.00	\$11.50	1 12

Conduit Type Bells

Furnished if specified with plate which mounts on 4" square box or any outlet box with single gang switch cover—on 3 1/4" octagon box—on any single gang Condulet or Wiremold type fitting for which add \$1.25 to list of bell desired.

Price of No. 222 Buzzer for 110-130V. includes plate as described above. On low voltage buzzers add \$1.25 list.

Cast Wall Boxes

Furnished if specified at \$2.50 list additional.

Weatherproof Bells

When specified, these bells will be furnished thoroughly weatherproofed without extra charge.

Yard Type No. 222Y

Furnished complete with weatherproof hood for \$25.00 list additional to bell desired.

EDWARDS BELLS



No. 23 (D.C.) No. 24 (A.C.)

SINGLE STROKE BELLS FOR APPROVED FIRE ALARM SYSTEMS

No. 23 for D.C.—No. 24 for A.C.

Electromagnet construction of a type approved by interested fire, insurance, and Underwriters' boards for closed circuit alarm systems. For other uses see Adaptabels.

The Time and Labor Saving installation method is the one on these bells, however, as illustrated. They mount directly on wall, on 4" square box, on standard switch box, or on outlet box with single gang switch cover, or any single gang, Condulet or Wiremold type fitting. On 4" size only, special box with terminal block is furnished from factory because of small size base.

List Prices—Schedule D For Series Operation on 110 Volts from Control Panel

Size	Weight
4	1 lb. 12 ozs.
6	4 lbs. 3 ozs.
8	5 lbs. 14 ozs.
10	7 lbs. 12 ozs.
12	9 lbs. 11 ozs.
14	
16	
18	



No. 300

No. 300 RIOT BELL

A Distinctive Warning

For Operation on Battery and 110 Volt A.C. or D.C.

The motor driven bell is an entirely new principle which has quick recognition for fire department, ambulances, glar alarms, and extension systems on street corners to n of the approach of fire apparatus. This quick responding gives a loud, continuous volume of sound immediately n pushing the button.

is absolutely weatherproof and especially constructed for floor service.

smooth running high efficiency motor, expecially designed this service, is used. The striker is mounted directly on motor shaft. No adjustment is necessary.

Specify Voltage and whether for A.C. or D.C.

List Prices—Schedule T—Specify Voltage

Size	6 Volt D.C.	110 Volt A.C. or D.C.	Weight
10	\$123.50	\$153.40	22 lbs.
12	127.20	157.10	25 lbs.
14	134.70	164.60	31 lbs.
16	157.10	187.10	39 lbs.
18	172.10	202.00	48 lbs.

Volts A.C. or D.C. Add to List \$30.00

ors complete for all sizes. List Price, each \$8.75

EDWARDS INDUSTRIAL HORNS



No. 311 for indoor use



No. 310 for indoor use

A far superior line of vibrating industrial horns. With oversized diaphragms (5 1/2") of special formula steel, powerful mechanisms, and correct acoustical design, it has been possible to achieve more volume and better quality of sound. All types are easily adjustable (after installed) for a raucous, clattering sound or a smoother, horn-like note, as desired. All types Underwriters' approved.

Indoor Types—Easy mounting Feature

A back plate mounts directly on wall for non-conduit wiring or on 4" square box, standard switch box, any outlet box with single gang cover, any single gang Condulet or Wiremold type fitting. An envelope is supplied containing all necessary mounting screws. For open wiring, washers are supplied to raise back plate from wall enough for wires to pass underneath it. Wires are brought through entrance hole in plate and connections made to binding posts on front of plate where there is plenty of room to work. The horn is then hung on two strong lugs and pressed home where it snaps solidly into place and is held securely. To prevent tampering, a few turns on a set screw at bottom of each device locks it in place. Thus, the hanging of the horn itself is a simple, non-electrical job.

No. 311—Powerful signal for all indoor uses. Pleasing appearance recommends it for schools and better buildings. Easily installed flush.

No. 310—Has projector—slightly louder—for indoor use where machinery noises must be overcome. 6" high, 6" deep, 10 3/4" long.

No. 314—Indoor 2 direction type, (but with mounting feature described above). 6" high, 6 3/4" deep, 18" long.

D.C. Voltages. Add \$2.50 List to prices shown for A.C. voltages. Add letter D to number.

Standard Finish. Black; no extra charge for red.

25-40 Cycle. Add \$2.50 List.

Series Operation. Divide full available voltage by number of horns per circuit to find voltage per horn for pricing. Give full information when ordering. For approved closed circuit fire alarm systems, series horns standardized at 10 on 110 Volt A.C. circuit, 14 on 110 Volt D.C. circuit.

WEATHERPROOF TYPES

No. 312 and No. 313 have the same excellent mechanisms, but are thoroughly weatherproofed. Cast housings are drilled top and bottom for 1/2" conduit. Larger drilling, if specified. Easy connection after mounting.

No. 312—6" high, 6" deep, 10 3/4" long.

No. 313—6" high, 6 3/4" deep, 18" long.

List Prices—Schedule T

List No.	12-30 V. A.C. 60 Cycle	110 V. A.C. 60 Cycle	200 V. A.C. 60 Cycle	Weight
No. 311	\$11.25	\$11.25	\$13.75	5 lbs.
No. 312	15.00	15.00	17.50	6 lbs.
No. 313	20.00	20.00	22.50	7 lbs.
No. 310	12.50	12.50	15.00	6 lbs.
No. 314	17.50	17.50	20.00	7 lbs.

BENJAMIN INDUSTRIAL SIGNALS and Telecode Relays

"Getting the man" when needed, at the office or on the telephone, saving the working minutes of superintendents, foremen and managers, who must shift about their plants, is simply a matter of installing first-class electric signals to "get" them wherever they are.

The signal itself is the most important element in either a calling or alarm system. Benjamin Industrial Howlers are so ruggedly made and perfectly assembled that infallible daily performance may be expected for years. The thousands in use for years continue to demonstrate their unfailing reliability, whether for factory calls in constant service or merely under occasional or emergency use as alarms.

Some Places Where Benjamin Industrial Howlers Are In Satisfactory Use

1. Factory superintendent's and foreman's calls.
2. Signaling the opening and closing hours of labor.
3. Tell-tale or warning; for water tank levels, steam or gas pressures, sprinkler systems, etc.
4. Telephone signals in engine rooms.
5. Industrial fire alarms.
6. Police call systems.
7. Burglar alarms.
8. Power stations, calls and signals.
9. Traffic warnings for street crossings.
10. Railroad crossings.
11. Mines.
12. Marine signals.
13. Draw bridge signals.
14. Municipal fire stations.
15. Heavy duty buzzers for dormitories.
16. Heavy duty howlers for apparatus floor.

Benjamin Motor Driven Signals

GET IMMEDIATE ATTENTION IN THE NOISIEST INDUSTRY

Uses

A weatherproof horn of remarkable carrying and penetrating power. For use in such locations as steel mills, railroad shops, on cranes, in foundries, cotton mills, screw machine departments, and machine shops, where a signal system must compete for attention with excessively loud manufacturing noises.

Suitable for either outdoor or indoor installation. Will operate with minimum attention or adjustment. Adaptable to code calling or for use as a warning signal.

Calling Systems

The Benjamin Motor Driven Signal is particularly efficient on code calling systems. Whether controlled by a push button or by an automatic calling device it responds accurately and distinctly in sounding the combinations of long and short calls. This is due to the motor attaining its full speed almost instantly when contact is made, and not coasting after current is cut off.

When installing these signals, care must be taken to use wire large enough to eliminate the voltage drop factor. In coding, signals will not respond correctly unless the motor is getting full power.

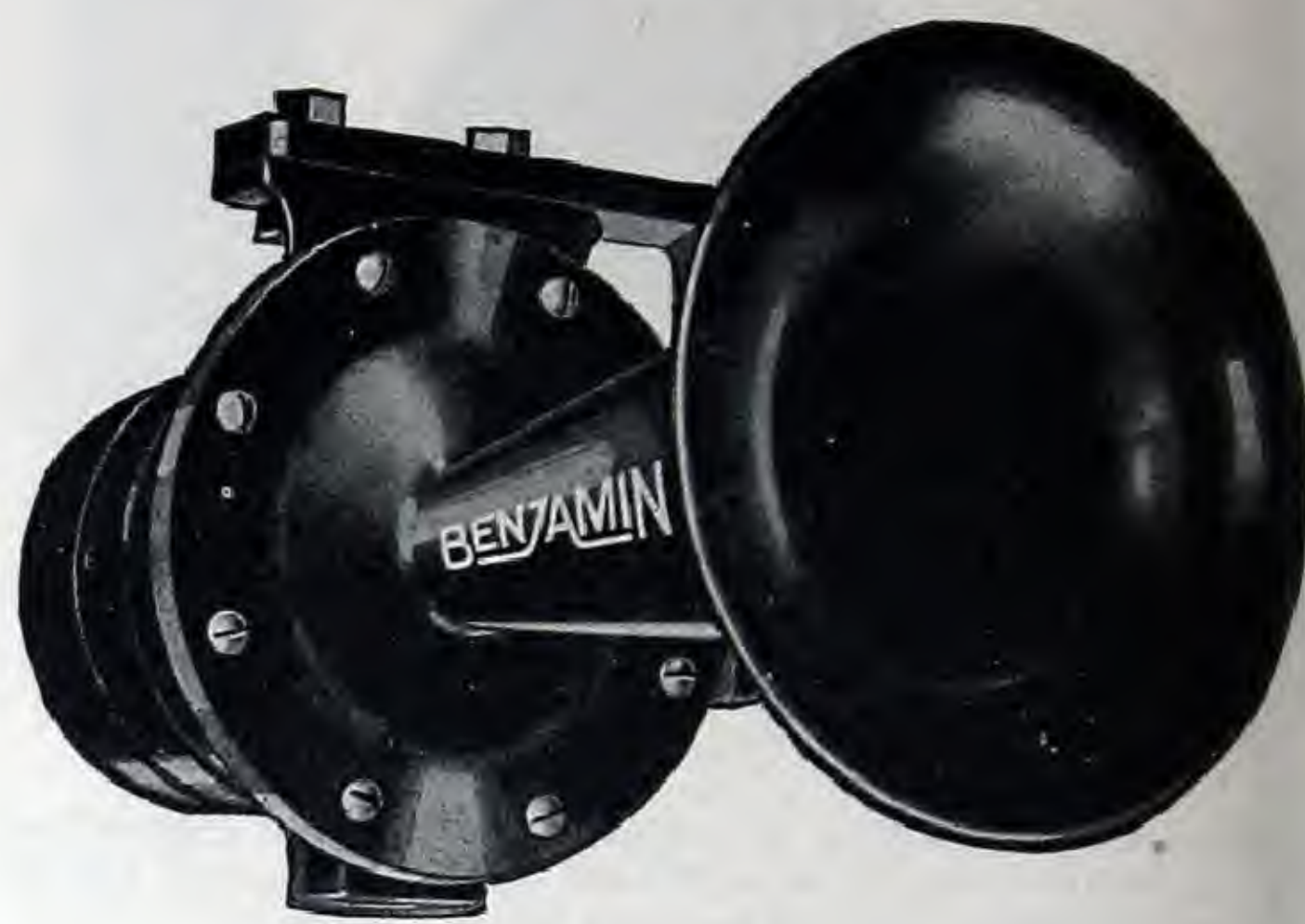
Pitch

The tone is of a pitch that is easily distinguished above the usual hum and din of active industry. It is a steady and penetrating one-tone blast—a resonant sound that is different enough to command immediate attention.

Range

The range of the motor driven signal, as with any audible signal, is dependent upon local noises and the proximity of objects that retard or reflect sound, such as walls, machinery and low ceilings. In a machine shop where there was considerable noise this horn was distinctly heard all over an area of 10,000 square feet, while in a flour mill warehouse it was clearly audible over twice that area. Outdoors it will carry a distance of a quarter of a mile under favorable conditions.

BENJAMIN INDUSTRIAL SIGNALS Motor Driven Signals



No. 8175

Construction: Sturdily and durably constructed of the most suitable materials. The single bell type sound projector is of heavy cast iron. The double projector consists of two seamless brass bell type units. Steel angle bracket is provided for mounting. Signal housing consisting of three units; projector, motor housing and cap is gasketed making signal thoroughly weatherproof.

Powerful heavy duty motor should require no adjusting for a period of one year. The armature of motor is permanently aligned by bearing brackets which are a part of the motor housing.

Armature shaft bearings are lubricated by wick feed oil cups which require filling only after a period of one year. Removal of projector and rear housing cap permits easy access to oil cups.

Diaphragm is rigidly supported at its outer edges between the machined surfaces of the motor housing and projector. Two rubber gaskets effectively seal diaphragm from moisture and water.

Easily accessible set screw at end of housing cap permits adjustment.

Signal furnished completely assembled and tested. Wired with 14" leads for easy installation.

Finish: Baked black enamel. Red enamel finish furnished at \$1.25 advance in list price.



No. 8175



No. 8180

Single Projector Signal

List No.	Connection	Voltage	Ship. Wgt. Lbs., Ea.	List Price
8175	1/2" Conduit	110 V., 60 cycle, A. C.	22	\$35.00
8176	1/2" Conduit	110 V., D.C.	22	35.00
Double Projector Signal				
8180	1/2" Conduit	110 V., 60 cycle, A. C.	26	38.75
8181	1/2" Conduit	110 V., D.C.	26	38.75

Voltage—Standard voltage is 110 volts, 60 cycles, A.C. or 110 volts D.C. as shown above. Power consumption is 55 watts.

Special A.C. voltages can be furnished as follows: 110 volts to 125 volts in any frequency from 25 to 50 cycles at an advance of \$2.50, list. 220 volts 25 cycles to 240 volts 60 cycles at \$5.00, list.

Special D.C. voltages can be furnished as follows: 125 volts at an advance of \$2.50, list. 220 volts to 250 volts at \$5.00, list. Cannot be supplied for voltages lower than 100 volts.

BENJAMIN INDUSTRIAL SIGNALS

Direct Current Industrial Howlers

For Multiple Circuits

These howlers are for multiple operation on direct current only and may be employed successfully on circuits as high as 50 volts. *(See footnote).

When six or eight D.C. Howlers are to be used on one circuit, not less than 32 volts should be used.

The sounding mechanism is of the vibrator type with over-size make-and-break contact points of silver. An especially constructed condenser across contact points prevents arcing. This insures long continued operation of the signal without attention.

The vibrator springs are of the best grade spring material and are mounted independently of the armature.

Adjustment of tone volume and pitch of note is made by turning the adjusting screw in center of diaphragm, reached through the projector. This adjusting screw is self locking so that vibrations will not jar it loose.



No. 8326A

HEAVY DUTY WEATHERPROOF HOWLER

Construction. The cast iron body with two mounting lugs is tapped for 1/2-inch pipe connection. The one-piece, drawn brass, bell type sound projector or special 14-inch conical projector is rigidly attached to a heavy pressed steel cover. A gasket between cover and body makes the signal weatherproof.

Finish. Baked black enamel.

List No.	Type of Projector	Connection	Shpg. Wgt. Lbs. Each	List Price
8326H	Brass Bell	1/2" Conduit	7	\$15.00
8358A	14" Conical	1/2" Conduit	9	16.25



No. 8326H

HEAVY DUTY NON-WEATHERPROOF HOWLER

Construction. This howler has pressed steel body with approved insulated side entrance for open wiring. One-piece, drawn brass, bell type sound projector is rigidly attached to heavy pressed steel cover which also carries the mounting bracket. Wire connections easily accessible by loosening two screws and removing back.

Finish. Baked black enamel.

List No.	Type of Projector	Connection	Shpg. Wgt. Lbs. Each	List Price
8326A	Brass Bell	Open Wiring	4	\$12.50

*Standard voltage is 110 volts, D.C., but any voltage from 6 to 250 D.C. inclusive, may be specified at an advance of 50c. list. Specify voltage when ordering.

BENJAMIN INDUSTRIAL SIGNALS

Alternating Current Industrial Howlers

For Series or Multiple Operation

Alternating Current Howlers may be operated on either multiple or series circuits, and will work well even in connection with vibrator or single stroke bells and other electrical signal equipment.

When Used in Series with other electrical devices, special windings are furnished which allow passage of sufficient current to operate the other devices on the same line. A 10 per cent variation in voltage will in no wise affect the satisfactory working of the Howler.

Weatherproof Types are recommended when signal is to be used outdoors.

The Sounding Mechanism is of the vibrator type. The vibrations are the result of the alternating current cycles and no make-and-break contacts are required. No adjustments are needed and the signals will operate indefinitely without attention.



No. 8346H

HEAVY DUTY WEATHERPROOF HOWLER

Construction—The cast iron body with two mounting lugs is tapped for 1/2-inch pipe connection. The one-piece, drawn brass, bell type sound projector or special 14-inch conical projector is rigidly attached to heavy pressed steel cover. A gasket between cover and body makes the signal weatherproof.

Finish—Baked black enamel.

List No.	Type of Projector	Connection	Ship. Wgt. Lbs., Ea.	List Price
*8346H	Brass Bell	1/2" Conduit	7	\$12.50
*8357A	14" Conical	1/2" Conduit	9	13.75



No. 8355A



No. 8152L

FACTORY NON-WEATHERPROOF HOWLER

Construction—This Howler has pressed steel body with approved insulated side entrance for open wiring. One-piece, drawn brass, bell type sound projector is attached to heavy pressed steel cover which also carries the mounting bracket. Wire connections easily accessible by loosening two screws and removing back.

Finish—Baked black enamel.

List No. 8152L is exactly like List No. 8355A except that it is equipped with a 9-inch conical sound projector, which tends to confine the volume of tone in one direction.

List No.	Type of Projector	Connection	Ship. Wgt. Lbs., Ea.	List Price
*8355A	Brass Bell	Open Wiring	4	\$10.00
*8152L	9" Conical	Open Wiring	4	8.75

*110 volts, 60 cycles is standard on all Benjamin A. C. horns. However, any voltage from 6 to 250 volts and any frequency from 25 to 60 cycles may be specified at an advance of 50c. list. Special voltages and frequencies must be specified when ordering.

BENJAMIN INDUSTRIAL SIGNALS

A.C. Industrial Howlers

For Series or Multiple Operation



No. 8152S

MINE TYPE WEATHERPROOF HOWLER

Construction. This howler has pressed steel body and front cover, with mounting bracket attached to front cover, and a one-piece, drawn brass, bell type sound projector. Electrical connections are made to insulate wire leads entering front cover. Howler made weatherproof by gasket and by sealing wire entrance.

†Finish. Baked black enamel.

List No.	Type of Projector	Connection	Shpg. Wgt. Lbs. Each	List Price
*8152S	Brass Bell	Open Wiring	4	\$12.50



No. 8360

Weatherproof Fire Alarm Howlers

Benjamin Fire Alarm Howlers are specially built for use on fire alarm systems operating under stringent regulations.

The Industrial Commission of the State Department of Labor, New York City, has approved them for use with standard fire alarm boards.

In series without condenser eight 14-volt or fourteen 8-volt howlers may be used, but where fourteen 14-volt howlers are used, a condenser must be supplied on the panel board. The 110-volt howlers may be used for open circuit work where a time limit fuse or switch is inserted in the circuit. The use of 8-volt and 14-volt howlers on one circuit is permitted. D.C. Howlers are for use on multiple circuits only.

The sounding mechanism for Benjamin Fire Alarm Howlers is of the vibrator type.

These howlers have cast iron body, with two mounting lugs, and are tapped for 1/2-inch pipe connection. A one-piece, drawn brass, bell type sound projector is rigidly attached to a pressed steel front cover. Howler is made weatherproof by gasket.

Finish. Red enamel.

List No.	Connection	Voltage	Shpg. Wgt. Lbs. Each	List Price
8360.....	1/2" Conduit	110 D. C.†	7	\$16.00
8864.....	1/2" Conduit	8 A. C.	7	13.50
8865.....	1/2" Conduit	14 A. C.	7	13.50
8866.....	1/2" Conduit	110 A. C.*	7	13.50

*Except in the special cases of List Numbers 8864 and 8865, 110 volts, 60 cycles is standard on all Benjamin A.C. horns. However, any voltage from 6 to 250, and any frequency from 25 to 60 cycles, may be specified at an advance of 50 cents list. Voltages and frequencies must be specified when ordering.

†110 volts is standard for all Benjamin D.C. horns. However, any voltage from 6 to 250 may be specified at an advance of 50 cents list. Specify voltage when ordering.

‡110 volts, 60 cycles is standard on all Benjamin A.C. Horns. However, any voltage from 6 to 250 volts and any frequency from 25 to 60 cycles may be specified at an advance of 50 cents list. Special voltages and frequencies must be specified when ordering.

BENJAMIN INDUSTRIAL SIGNALS



No. 8788

Weatherproof Double Projector Howlers

The Double Projector Howler offers an effective and economical means of projecting sound from a central point up and down a passageway or platform.

The Sounding Mechanism for the Double Projector Howler is of the vibrator type, furnished for D. C. or A. C. circuits, and is standard Benjamin Industrial Howler construction.

Finish—Baked black enamel. Red enamel finish will be furnished at \$1.00 advance in list price.

List No.	Connection	Voltage	Ship. Wgt. Lbs., Ea.	List Price
8788	1/2" Conduit	D. C.†	14	\$18.75
8790	1/2" Conduit	A. C.*	14	16.25



No. 8299M



No. 8297A

A. C. Industrial Buzzers

For Indoor and Outdoor Use

The Sounding Mechanism of these buzzers is of the vibrator type. The vibrations are the result of the alternating current cycles and no make-and-break contacts are used. These buzzers will operate indefinitely without adjustment or attention. They will operate successfully under all commercial conditions on either multiple or series circuits.

Finish—Baked black enamel.

HEAVY DUTY MINE BUZZER

Construction—Open wiring type No. 8299A has heavy stamped steel enamelled case and 8-inch wire leads sealed in for outside connection. Conduit type List No. 8299M has cast brass cover and is tapped for 1/2-inch pipe.

List No.	Connection	Std. Voltage	Ship. Wgt. Lbs., Ea.	List Price
8299A	Open Wiring	†110 A. C.	3	\$7.50
8299M	1/2-inch Conduit	†110 A. C.	3	11.25

OFFICE AND FACTORY BUZZER

Construction—One-piece pressed steel front cover has side opening with approved insulated wire entrance for open wiring. Back plate is pressed steel, with mounting brackets top and bottom.

List No.	Connection	Std. Voltage	Ship. Wgt. Lbs., Ea.	List Price
8297A	Open Wiring	†110 A. C.	3	\$5.75

‡110 volts, 60 cycles, is standard on all Benjamin Buzzers. However, any voltage from 6 to 250 volts and any frequency from 25 to 60 cycles may be specified at an advance of 50c.

*Except in the special cases of Numbers 8864 and 8865, 110 volts, 60 cycles is standard on all Benjamin A. C. horns. However, any voltage from 6 to 250, and any frequency from 25 to 60 cycles, may be specified at an advance of 50c.

†110 volts is standard for all Benjamin D.C. horns. However, any voltage from 6 to 250 may be specified at an advance of 50c. list.

BENJAMIN INDUSTRIAL SIGNALS

Guide to Wire Sizes for Signal Circuits

Wiring for 110 Volts A.C. or D.C.

Where 110 volts is to be used for the ringing current, all wiring should be done in accordance with the Canadian Electrical Code or rules of local Electrical Inspection Departments. On circuits more than 1,000 feet long, or where a large number of signals are used on one circuit, special attention should be given to the consideration of voltage drop.

Wiring for Secondary Battery Circuit of 32 Volts D.C. No lower than 32 volts should be used on any D.C. Industrial Signal circuit to obtain most satisfactory operation. On voltage circuits of this kind, the size of the wires is of the most importance and the following table is offered for ready reference in this connection.

No. of Signals	Distance in Feet							
	20	30	40	50	60	70	80	90
	B. & S. Gauge of Copper Wire Required							
1	16	16	16	16	16	16	16	16
2	16	16	16	16	16	16	16	16
3	16	16	16	16	16	16	16	16
4	16	16	16	16	16	16	16	16
5	16	16	16	16	16	16	16	16
6	16	16	16	16	16	16	15	15
7	16	16	16	16	16	15	14	14
8	16	16	16	16	15	15	14	13
9	16	16	16	15	14	14	13	12
10	16	16	16	15	14	13	12	12
11	16	16	15	15	14	12	12	11
12	16	16	14	14	13	12	11	10
13	16	15	13	13	12	11	10	10
14	16	15	13	12	11	10	10	9
15	15	14	12	11	11	10	9	9
16	14	13	12	10	10	9	9	9
17	14	12	11	10	9	8	8	7

No. of Signals	Distance in Feet							
	100	125	150	175	200	250	300	350
	B. & S. Gauge of Copper Wire Required							
1	16	16	16	16	15	15	14	13
2	16	16	15	15	14	14	13	12
3	16	15	14	14	13	13	12	12
4	16	15	14	13	13	12	12	11
5	15	14	13	12	12	11	11	10
6	14	13	12	11	11	11	10	9
7	13	12	11	11	11	10	9	8
8	12	12	11	10	10	9	8	8
9	12	11	11	10	9	8	8	7
10	11	11	10	9	8	7	7	6
11	11	10	9	9	8	7	6	5
12	10	9	8	8	7	7	6	5
13	9	9	8	7	7	6	5	4
14	9	8	7	7	6	5	4	3
15	8	8	7	6	6	5	4	3
16	7	7	6	5	5	4	3	2
17	7	6	5	5	4	3	2	2

No. of Signals	Dist. in Ft.		
	400	450	500
	B. & S. Gauge of Cop. Wire Required		
1	12	12	11
2	11	11	10
3	11	10	9
4	10	9	8
5	9	8	7
6	8	8	7
7	8	7	6
8	7	6	5
9	6	6	5
10	6	5	4
11	5	5	4
12	5	4	3
13	4	3	2
14	3	3	2
15	2	2	1
16	1	1	0
17	1	1	0

Example. It is desired to find proper size of wire for 20 Benjamin Factory Signals, 30 volt D.C., to be operated on a system with leads 250 feet long. Under column marked "No. of Signals," locate line marked "20" then find column headed "250," under "Distance in Feet." At the meeting of column and line will be found the quantity "5," which indicates the B. & S. gauge of copper wire required.

BENJAMIN INDUSTRIAL SIGNALS

Telecode Relays

Increases the Efficiency of Telephone Signaling

Increased Effectiveness in Telephone Ringing is gained by adding through the Telecode Relay, the powerful, distinctive tone of the Benjamin Industrial Howler.

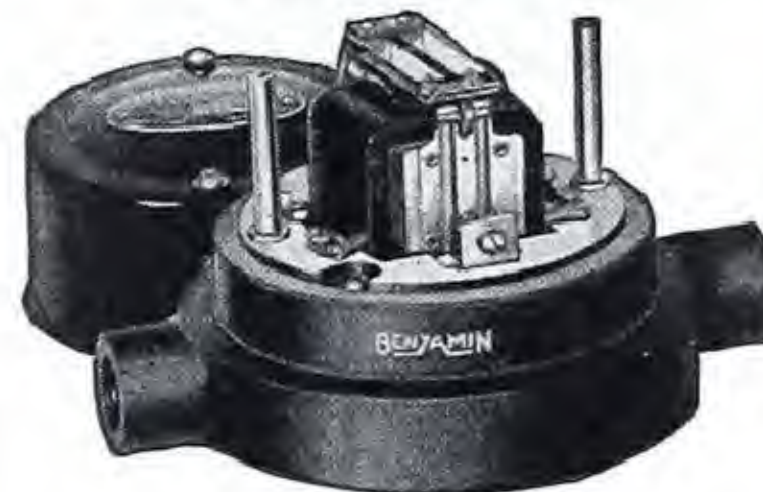
In Factories, Mines, Quarries, foundries, machine shops, and places where there is a great volume of noise, the ordinary telephone bell can seldom be heard. The Telecode Relay utilizes Benjamin Industrial Howlers on any type of telephone system. The ringing and talking efficiency of the telephone line is in no way affected.

A very sensitive, efficient and quick acting circuit closing unit is the Benjamin Telecode Relay.

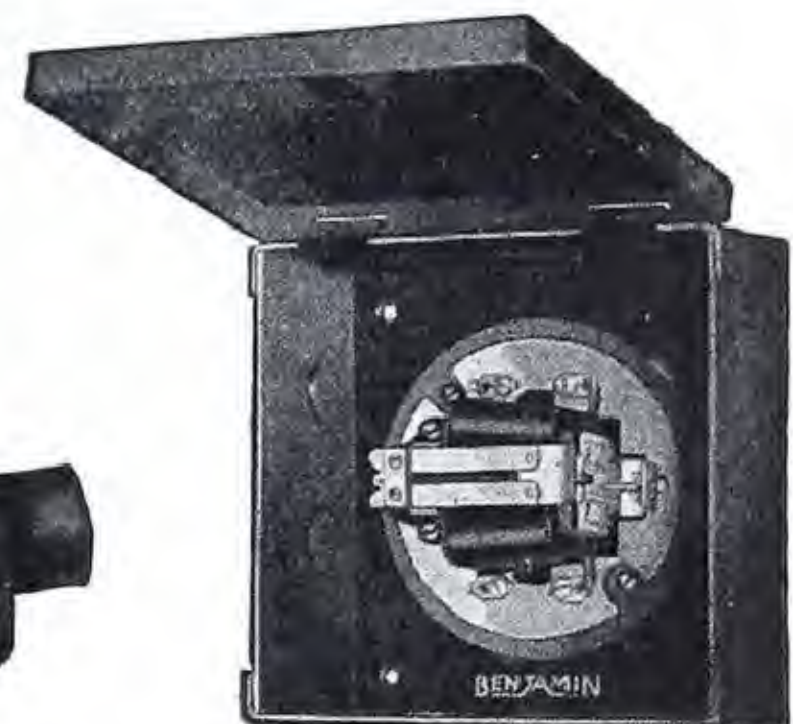
The wiring diagrams on the following page suggest circuits in which the Telecode Relay is used.



No. 8313



No. 8314



No. 8315

List No. 8313 is for mounting on a panel and comes with cover as shown.

List No. 8314 is mounted on a conduit fitting and has pressed steel cover, gasketed to make it weatherproof. Fitting is tapped at each end for 1/2-inch pipe.

List No. 8315 has relay mounted in a 6 x 6 inch steel box with 1/2-inch knockouts and is for general use indoors.

Details—Relay mechanism is mounted on porcelain base, 4 1/2 inches in diameter. Contact capacity is .8 ampere, 110 V., or equivalent to five Benjamin Signals. Mounting screw spacings are 3 1/2 inches on centers.

List No.	Description	Ship. Wgt. Lbs., Ea.	List Price
8313	For mounting on a panel—Back Connections.....	3 1/2	\$12.00
8314	With weatherproof conduit-fitting mounting, tapped 1/2"	6 1/2	14.50
8315	With 6 x 6-inch pressed steel box with knockouts.....	6 1/2	12.00

The Telecode Relay can be supplied for operation on telephone circuits using either A. C. or D. C. as their ringing energy. For standard telephone circuits the relay is wound to the same resistance as the bells of the circuit. In ordering, specify the resistance of the telephone bells on the same line.

If used on Intercommunicating Telephone systems having D. C. or A. C. for ringing energy, specify the voltage.

Standard Winding is 1000 Ohms. An extra charge of 50c list is made for all special resistance windings, when specified on order. For extra windings such as illustrated, an additional charge is made of \$1.50, list. Such extra windings must be specified when ordering.

Note: The Telecode Relay is standard with open circuit contacts. To obtain the closed circuit type, it must be so specified on the order. The open circuit type has the secondary circuit open until the primary circuit is energized while the closed circuit type has the secondary circuit closed until the primary circuit is energized.

BENJAMIN INDUSTRIAL SIGNALS

Telecode Relays and Signals

As Used in Telephone and Push Button Circuits

Telephone Signal Circuit

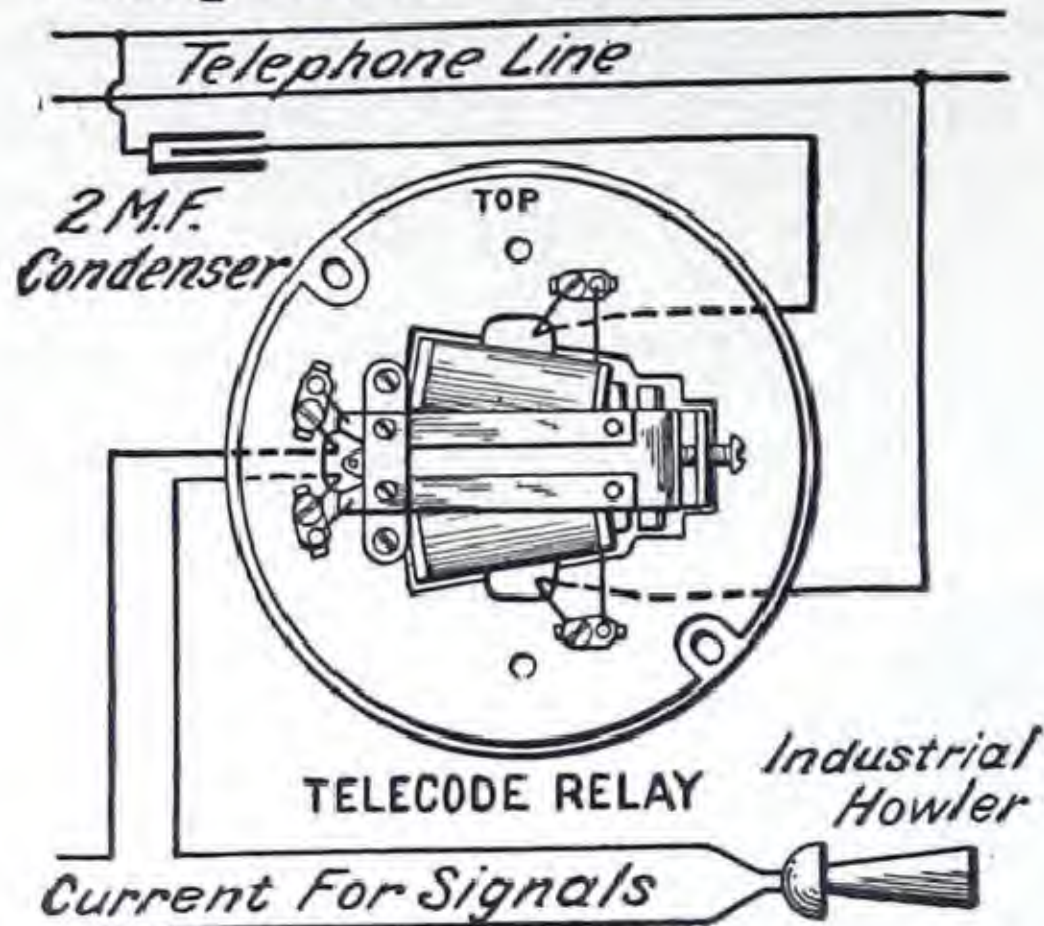


Diagram Eight

TELEPHONE SIGNAL CIRCUIT

Diagram eight shows how the Telecode Relay is used, in connection with a Benjamin Howler, to increase the effectiveness of telephone signaling.

When Telecode Relay is used on common battery telephone circuits a 2 M.F. condenser should be used as illustrated. The condenser is not necessary on magneto or intercommunicating telephone lines.

LOCKING RELAY CIRCUIT

Where it is desired to have the relay lock itself in position after being actuated, this may be obtained through the use of an auxiliary winding using the industrial signal current supply as illustrated in Diagram 9.

When contact is formed by telephone or battery current actuating the relay magnet, the power circuit locks the armature in contact until the circuit is broken. This gives a con-

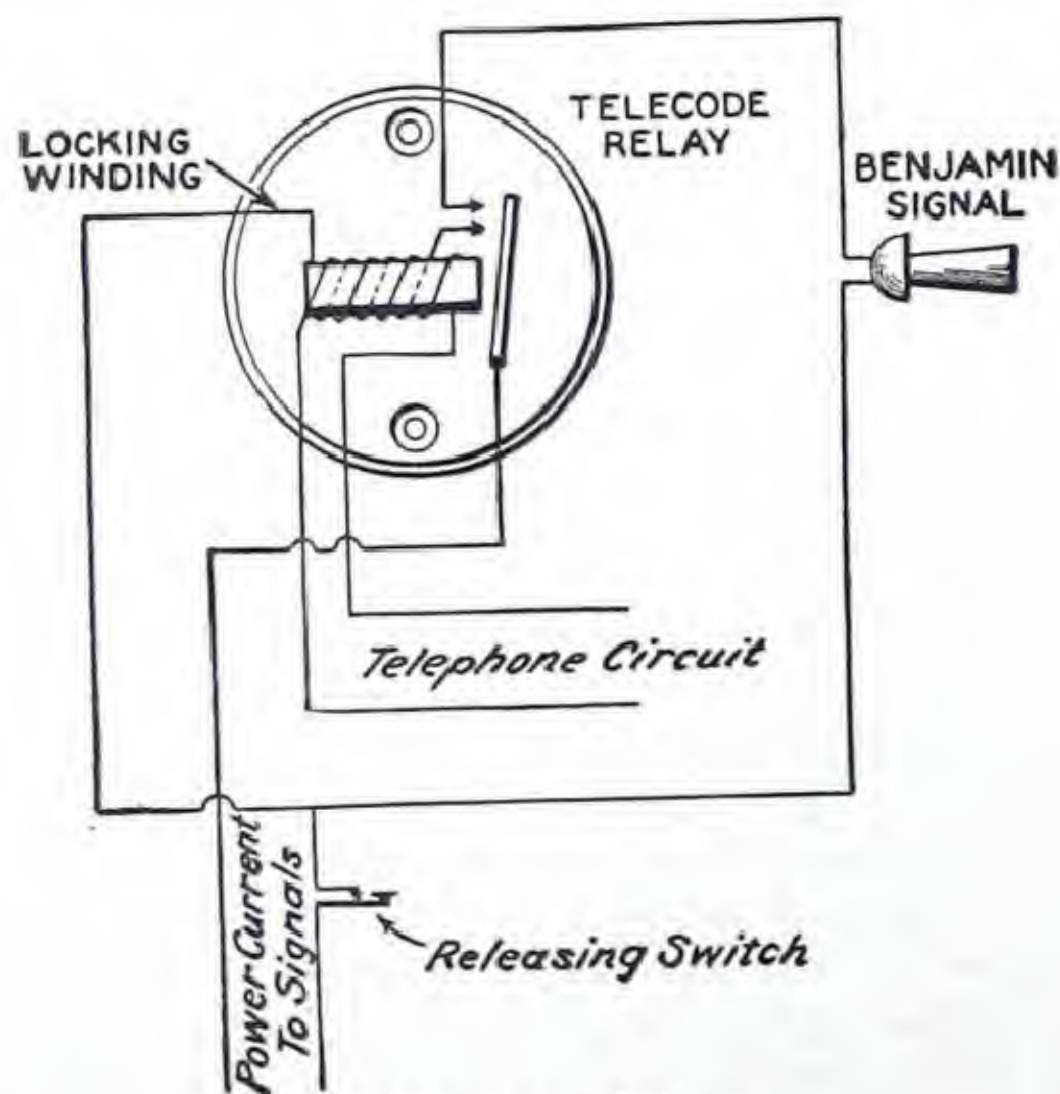


Diagram Nine

tinuous warning, stopped only on releasing the relay by an exterior circuit breaking switch.

For use on burglar alarms, sprinkler systems, telephone systems, etc.

When ordering the Benjamin Telecode Relay for this circuit, be sure to specify the number of ohms resistance of the energizing winding; also the voltage utilized on the signal circuit which furnishes energy to the locking winding.

BENJAMIN INDUSTRIAL SIGNALS

Telecode Relays and Signals

As used in telephone and push-button circuits.

TELL-TALE CIRCUIT

Diagram Ten illustrates a so-called Tell-Tale circuit. This hook-up is of great importance where it is imperative that an individual light or a number of lights be constantly burning for pilot purposes.

By using a special series winding on the relay and connecting this winding in series with the filament of a constant service, or pilot lamp, a supervisory circuit is obtained that will be the means of indicating the failure of the lamps or circuit.

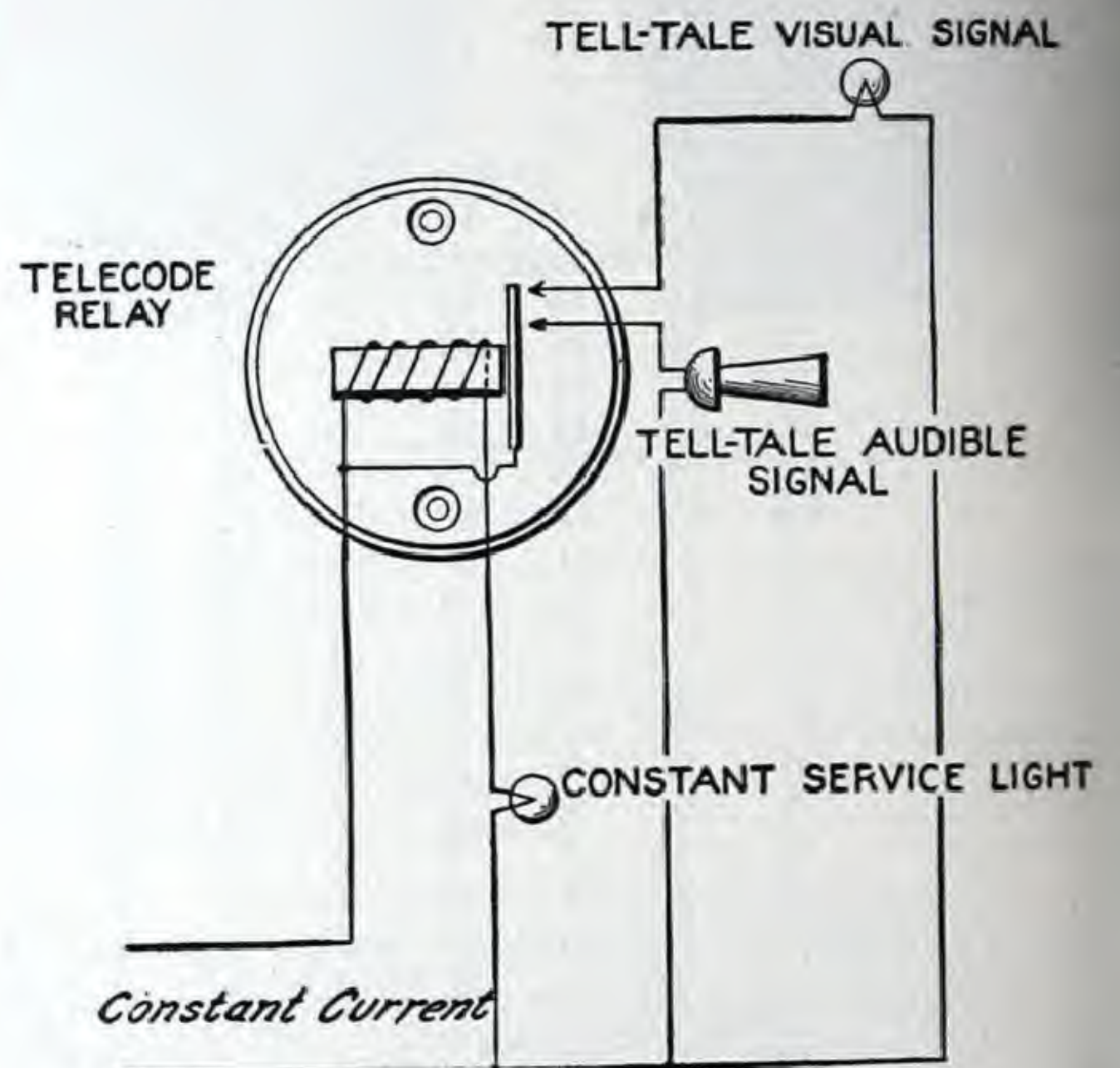


Diagram Ten

The coil of the relay, operating in series with the constant service lamp, energizes the relay and holds the contacts open. In case the pilot lamp burns out or the circuit becomes damaged, the relay armature drops back and closes connections to either a visual or audible signal as shown in the diagram.

As illustrated here, one source of power supply can be used for both the continuous burning lamp and the supervisory circuit, but it is often found advisable to connect the relay contact circuit to a separate source of power supply.

The Tell-Tale circuit is useful in mines, aboard ships, in railroad terminals, etc.

EDWARDS MUSICAL CHIMES

DIGNIFIED, CULTURAL,
ARTISTIC DOOR SIGNALS



Instead of Harsh Bells
and Buzzers

These chimes give forth deep, mellow musical notes, pleasing to the ear, yet distinctly audible for all practical uses. Each chime has a double use, with two different signals. The operation of one push button circuit causes a single mellow note to sound and the operation of another push button circuit sounds one note and then another lower note in a succession of perfect, beautiful harmony. The harmony succession notes may be used for a front door signal and the single note for rear door signal, or one may be used for a door signal and the other for dinner service call. In doctors and dentists' offices the succession harmony notes may be operated by the entrance push button and the single note used to call the nurse. The single note may be used to replace clanging telephone bells with the installation of an Edwards No. 962 Relay in the telephone ringing circuit.

Chimes mount directly on the wall or on any standard push box. Standard push buttons are used. Wiring is the same as for any bell or buzzer installation. A special transfer switch is furnished with each chime having ample capacity for all conditions. In existing residences the wiring is easily changed from old bells to new chime location and the old mechanism (or batteries) replaced with the one furnished. The mechanism is simple and thoroughly reliable. Dimensions are 50" long, 9" wide, 3 1/2" deep overall.

Schedule T

List Price

No. 570—Standard 2 tone—dull bronze colour and tubes.....	\$19.00
No. 571—Standard 1 tone—dull bronze colour and tubes.....	16.00
No. 570D—Directoire type, 2 tone—cast shield in bronze—brushed brass motif and tubes.....	24.00
No. 571D—Directoire type, 1 tone—cast shield in bronze—brushed brass motif and tubes.....	21.00

Special Finishes

Available in either Standard or Directoire model, but much artistic effect can be obtained with cast Directoire models.

Add to List

Any sprayed colour shield—brushed brass and tubes.....	\$ 2.00
All simulated Swedish Iron (for Spanish, French and English interiors).....	2.50
All plated finishes except Chromium.....	7.00
Chromium finish—brushed or polished.....	12.00

EDWARDS DIRECTORY PUSHES



No. 142 with 6 ft. cord and connector

No. 142 ORNAMENTAL CAST BRONZE DESK PUSH

A Fine quality cast bronze push for executive's desk in banks and offices of the best type. Finely tooled and finished in a conservative ornamental design that will harmonize with any decorative scheme. Supplied as standard with name openings as the No. 143. Names are interchangeable. If desired, name openings can be omitted and engravings substituted on face of bronze mat. Prices include engravings up to two letters or figures per button, additional characters \$0.25 list. Standard finish bank-bronze. Statuary bronze or polished bronze when specified, No Extra Charge.

Connector Box For Easy Installation

Note illustration of No. 142 connected with 6 feet of cord to a surface type connector box, which can be installed under desk, on baseboard, or wherever desired. Each connector plainly marked as to its corresponding push button. Allows quicker installation and a neater job.

No. 142 DESK PUSH

Number of Buttons	Schedule T	Standard Package—1		
	With 6-ft. Cord and Connector	With 6-ft. Cord Only	Without Cord	Weight of Push Only
1	\$11.80	\$10.44	\$ 9.90	14 ozs.
2	13.26	12.00	10.70	1 lb.
3	15.94	14.70	13.00	1 1/8 lbs.
4	18.94	17.60	15.80	1 3/16 lbs.
5	23.20	21.70	19.00	1 5/8 lbs.
6	27.26	25.50	22.50	1 11/16 lbs.
8	35.96	33.96	30.00	1 3/4 lbs.
10	44.54	42.34	37.50	2 lbs.
12	53.00	50.70	45.00	2 3/16 lbs.

Not made in larger sizes.

EDWARDS DIRECTORY PUSHES



No. 197 with 6 ft. cord and connector

No. 197 BAKELITE DESK PUSH

A distinctive all-Bakelite push of modern design and superior construction. Its finish is the real colour of the Bakelite itself, and will maintain a beautiful lustre indefinitely. Will not crack or chip off. Has phosphor bronze scraping contacts and all current-carrying parts are fully insulated. Base is covered with soft sponge rubber to prevent scratching. Changeable name cards.

Colours: The standard colour is black. Mahogany, oak, or walnut can be furnished if specified without extra charge. Since the directory push is always on the desk, black is recommended as a most serviceable colour.

Connector Box For Easy Installation

Note illustration of No. 197 connected with 6 feet of cord to a surface type connector box, which can be mounted under desk, on baseboard, or wherever desired. Each connector plainly marked as to its corresponding push button. Allows quicker installation and a neater job.

Schedule E Standard Package—5 Assorted.

Number of Buttons	With 6-ft. Cord and Connector	With 6-ft. Cord Only	Without Cord	†Weight of Push Only
1	\$ 4.40	\$ 3.30	\$ 2.50	4 ozs.
2	5.26	4.10	3.00	4 ozs.
3	6.44	5.20	3.50	5 ozs.
4	7.44	6.10	4.30	6 ozs.
5	10.00	8.50	5.80	7 ozs.
6	12.06	10.30	7.30	8 ozs.

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

EDWARDS DIRECTORY PUSHES



No. 190 Desk Push



No. 191 Directory Plate

No. 190 WOOD BASE AND METAL PLATE DESK PUSH

This push is ideal where it is desirable to match the desk with wood base of the push. Has phosphor bronze scraping contacts, and a sturdily constructed interior mechanism. All current-carrying parts are insulated. Push is weighted, and base is felt covered to prevent scratching. Buttons are black. Stocked in oak and walnut with nickel plates and mahogany with brass plate. No. 191 Directory Plate and Pushes for flush mounting. Standard Finish—Nickel. Brush Brass, if specified, no extra charge. Same price as No. 190 without cord. Name cards in both the above types are changeable. Specify finish when ordering.

No. 190 Desk Push

Number of Buttons	Schedule T		Standard Package—1	
	With 6-ft. Cord and Connector	With 6-ft. Cord Only	190-191 Without Cord	†Weight of Push Only
1	\$ 5.54	\$ 4.44	\$ 3.90	6 ozs.
2	7.78	6.62	5.30	7 ozs.
3	9.60	8.36	6.60	8 ozs.
4	11.64	10.30	8.10	9 ozs.
5	13.54	12.04	9.40	11 ozs.
6	15.64	13.88	10.80	12 ozs.
8	19.66	17.66	13.70	1 lb.
10	23.44	21.24	16.40	1 ³ / ₁₆ lbs.
12	28.27	25.97	20.25	1 ³ / ₈ lbs.



No. 195 with Buzzer

No. 195 WOOD BASE AND METAL PLATE DESK PUSH WITH BUZZER

Same as the No. 190 (above) except that a buzzer is included within the push itself. Plate is neatly perforated to allow free emission of sound. This combination eliminates extra wiring for buzzer, and is ideal for offices, banks, etc., where user calls several persons but only one calls him. Buttons are black. Stocked in black with black plate and mahogany with brass plate. Black and Black plate furnished as standard. Walnut and nickel, oak and nickel when specified, no extra charge.

No. 195 DESK PUSH WITH BUZZER

Number of Buttons	Schedule T		Standard Package—1	
	With 6-ft. Cord and Connector	With 6-ft. Cord Only	Without Cord	Weight of Push Only
1	\$11.54	\$10.44	\$9.90	8 ozs.
2	13.48	12.32	11.00	9 ozs.
3	16.00	14.76	13.00	10 ozs.
4	19.34	18.00	15.80	12 ozs.
5	23.14	21.64	19.00	14 ozs.
6	27.34	25.38	22.50	1 lb.
8	35.96	33.96	30.00	1 ⁵ / ₁₆ lbs.
10	44.54	42.34	37.50	1 ¹ / ₂ lbs.
12	53.00	50.70	45.00	2 ¹ / ₄ lbs.

Inclined Face no extra charge.

EDWARDS' DIRECTORY PUSHES



No. 146

No. 146 PUSH BUTTON BLOCK
With Numbered Pushes

Of Genuine molded Bakelite, with a removable weighted base and a sponge rubber pad. Flush, numbered, midget pushes are supplied with the block. Can be mounted on the edge of a desk with the use of a concealed mounting hole provided for that purpose. The lustrous permanent finish of Bakelite, together with the fact that it will not scratch, mar or deteriorate makes it much more desirable than the old style polished wood block. Stocked in Black, Mahogany and Walnut. Special engravings, initials or names, 25 cents list per letter.

No. 145 PUSH BUTTON BLOCK
Without Pushes

Block only, without pushes. Is drilled for 5/8" pushes. Provides the same mounting features as the No. 146 and is available in the same finish. See prices below. Specify finishes desired when ordering.

Schedule E		Standard Package—5 Assorted		
Number of Buttons	No. 146 With 6 ft. Cord	No. 146 Without Cord	No. 145 Without Pushes	†Weight of Block Only
1	\$2.69	\$2.15	\$1.90	4 ozs.
2	3.82	2.50	2.00	4 ozs.
3	4.96	3.20	2.45	5 ozs.
4	5.85	3.65	2.65	4 ozs.
5	7.14	4.50	3.25	5 ozs.
6	8.33	5.25	3.75	5 ozs.
Over 6 buttons, add per button	1.38	.90	.65	
Over six buttons, wood construction.				

No. 158 SWITCH BOX PLATE



No. 158

Schedule T		Standard Package—1	
		List Price	
Metal Plate....	†Weight 4 ozs. each	Hole for 1 push	\$0.35
		Hole for 2 pushes	0.50
		Hole for 3 pushes	0.75
Bakelite Plate..	†Weight 3 ozs. each..	Add to List....	0.25

EDWARDS DIRECTORY PUSHES



No. 143 with Buzzer

No. 143 ORNAMENTAL CAST BRONZE DESK PUSH
WITH BUZZER

Same as No. 142 except that a buzzer is included within the push itself. This eliminates extra wiring for buzzer, and makes for simpler installation. Ideal for offices, banks, etc., where user calls several persons but only one calls him. Standard finishes same as No. 142. Engravings same as for No. 142.

No. 143 DESK PUSH WITH BUZZER

Schedule T		Standard Package—1		
Number of Buttons	With 6-ft. Cord and Connector	With 6-ft. Cord Only	Without Cord	†Weight of Push Only
1	\$16.90	\$15.80	\$15.00	1 5/16 lbs.
2	18.26	17.10	16.00	1 3/8 lbs.
3	20.94	19.70	18.00	1 7/16 lbs.
4	24.14	22.80	21.00	1 5/8 lbs.
5	27.90	26.40	23.70	1 11/16 lbs.
6	34.76	33.00	30.00	2 lbs.
8	43.46	41.46	37.50	2 5/16 lbs.
10	52.04	49.84	45.00	2 7/16 lbs.
Not made in larger sizes.				



No. 198 Toggle Switch Desk Push



No. 199 Directory Plate
(Same price as No. 190
Without cord)

No. 198 TOGGLE SWITCH DESK PUSH
For Use with Lamp Annunciators

This push is similar in every respect to the No. 190 Desk Push on opposite page, except that in place of buttons, it is equipped with small Toggle Switches mounted alongside each card-holder. Recommended for use with Lamp Annunciators where relays are not used. Push button can also be provided to sound audible signal in the Lamp Annunciator.

List Prices and Standard Finishes same as No. 190 on opposite page. No. 199 Toggle Switch Directory Plate for flush mounting. Standard Finish—Nickel. Brush Brass, when specified, no extra charge. Same price as No. 190 without cord on opposite page. Specify finish desired when ordering.

Flexible Cord Only: For larger than 6 foot length connected to any push add \$0.08 list per foot per conductor to listed prices. Cord only \$0.08 list per foot per conductor in less than 100 foot lengths (same size), over 100 foot lengths (same size), \$0.06 list per foot per conductor.

Pearl Centers: Instead of black centers on any push, add to list \$0.50 per button.

EDWARDS PUSH BUTTON PLATES

Push Buttons Not Included In Price Of Escutcheon Plates



No. 62



No. 62D



No. 157D

Push Button not included
in price of Escutcheons

Small escutcheon plates that present a very fine appearance when used with either flat pearl center, round glass center or protruding Bakelite center push buttons. Spring clips on side of pushes hold them securely in place. Plates are solid Brass. Note various styles and sizes listed below. No. 62 and No. 62D are flat, whereas No. 157S and No. 157D have beveled edges and are heavier gauge. State size of push to be used when ordering.

Standard finish—Nickel, Brush Brass or Cadmium, when specified, no extra charge. All other finishes add 20 per cent (\$0.50 list minimum) except Gold, Silver or Chromium, for which add 50 per cent (\$1.00 list minimum).

For $\frac{5}{8}$ Pushes Only

Schedule E; Weight 8 ozs; Standard Package—10

List Price

No. 62—(Rectangular type) $1\frac{1}{4}$ " wide, 2" high..... \$0.25
No. 62D—(Diamond type) $1\frac{1}{2}$ " wide, $2\frac{1}{4}$ " high..... .25

For $\frac{5}{8}$ or $\frac{3}{4}$ Pushes—Specify size when ordering
Schedule E; Weight 13 ozs.; Standard Package—10

No. 157S—(Square type) $1\frac{7}{8}$ " wide, $1\frac{7}{8}$ " high..... \$0.60
No. 157D—(Diamond type) $2\frac{1}{8}$ " wide, $3\frac{1}{16}$ " high..... .60

Assortment permitted to make standard package.

Nos. 60 and 61 Escutcheons



No. 60 or 61

An entirely different escutcheon from those listed above, for use on plaster or where larger than the midget push is required. Iron sub-plate is first secured to the wall. There being a number of screw holes, it is always possible to engage a lath. The brass plate is then placed over the iron plate and push button pressed into place. Spring clips on side of the push button grip iron plate securely and hold button and top plate in place.

Standard finish—Nickel, Brush Brass or Cadmium, when specified, no extra charge. All other finishes add 20 per cent (\$0.50 list minimum) except Gold, Silver or Chromium, for which add 50 per cent (\$1.00 list minimum).
Schedule E; Standard Package—10

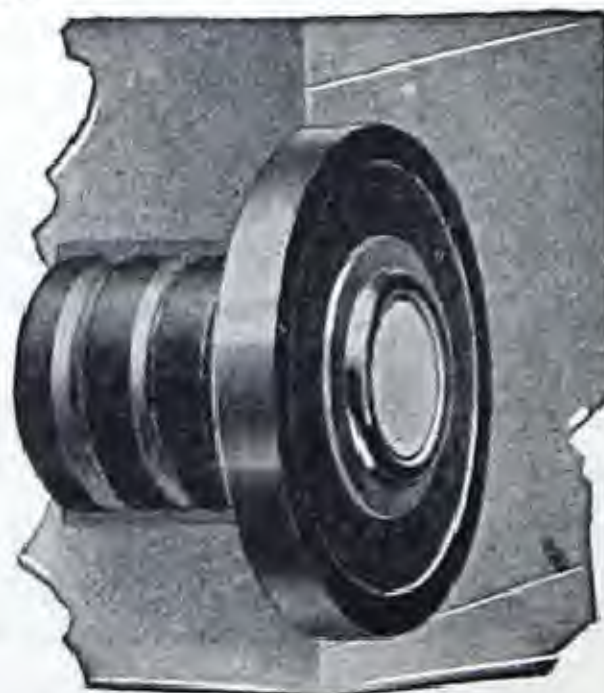
List Price

No. 60—(For $\frac{5}{8}$ " push); Weight 5 ozs..... \$0.30
No. 61—(For $\frac{3}{4}$ " push); Weight 9 ozs..... .30

No. 261

STONE ESCUTCHEON

A plain flanged casting for cementing into stone or tile entrances. Drilled for $\frac{3}{4}$ " push only. Hole to be drilled in cement, stone or tile must be $1\frac{3}{8}$ " deep and $1\frac{3}{16}$ " in diameter. Standard finish—Bauer Barff (black). No push furnished unless specified. No. 260 push button is recommended.



No. 261

Push Button not included in
price of Escutcheon

Schedule T; Standard Package—1

List price

No. 261—Escutcheon only; Weight 8 ozs..... \$3.50
No. 260—Push Button only; Weight 2 ozs..... 1.40

EDWARDS ENTRANCE PUSH BUTTON

Eleven Styles in Satin Brass and Oxidized Copper



No. 600 and 603



No. 601



No. 602



No. 606



No. 604



No. 607



No. 609



No. 605 and 608



No. 610

This established line of all metal, one piece type entrance pushes is in constant demand. They are designed in eleven different styles to cover all general needs. Their sturdy mechanism is fully insulated. Binding posts and screws are large enough for No.14 wire.

Packed with screws in individual boxes for convenient shelf use. Standard finish Satin Brass. Oxidized Copper supplied if specified—add to list \$0.05 each. Both the above finishes can be shipped from stock. Other commercial sprayed finishes add to list \$0.10 each. Chromium add to list \$0.50 each.

SCHEDULE E

List No.	Std. Pkg.	Size	Weight	List Price Each
600	100	$2\frac{5}{16}$ " Diameter	$8\frac{7}{16}$ lbs.	\$0.15
601	50	$2\frac{1}{4}$ " x $2\frac{1}{2}$ "	$3\frac{1}{2}$ lbs.	.25
602	20	2" x $4\frac{9}{16}$ "	$2\frac{13}{16}$ lbs.	.45
603	100	$1\frac{3}{4}$ " Diameter	$4\frac{13}{16}$ lbs.	.15
604	20	$1\frac{9}{16}$ " x $3\frac{15}{16}$ "	$2\frac{3}{16}$ lbs.	.35
605	20	$1\frac{1}{4}$ " x $3\frac{1}{2}$ "	$1\frac{3}{4}$ lbs.	.35
606	20	$1\frac{9}{16}$ " x $2\frac{3}{8}$ "	$1\frac{3}{16}$ lbs.	.25
607	50	$2\frac{1}{16}$ " x $2\frac{5}{8}$ "	$4\frac{1}{8}$ lbs.	.25
608	20	$2\frac{1}{16}$ " x $4\frac{1}{2}$ "	$2\frac{7}{8}$ lbs.	.40
609	20	$2\frac{1}{16}$ " x $4\frac{1}{2}$ "	$2\frac{5}{8}$ lbs.	.40
610	10	$1\frac{9}{16}$ " x $6\frac{3}{4}$ "	2 lbs.	1.75

EDWARDS PUSH BUTTONS



No. 625

FLUSH RAISED CENTER PUSH

For Low Voltage Service

Standard finish, nickel—brush brass when specified, no charge. This push has a raised white glass center but is otherwise exactly the same as No. 620. Can also be furnished with black, red, blue, yellow, and other color centers at no charge. White center is standard and furnished unless otherwise specified.

Schedule E

Assortment of colored centers permitted to make standard package.

	Wgt.	Std.	List
	Ozs.	Pkg.	Price
White center standard, and furnished unless otherwise specified	.7	20	\$0.44
Insulated—fits $\frac{5}{8}$ " hole			
or luminous center. Schedule T			Add to list \$0.50



No. 621



No. 116



No. 622

FLUSH PROTRUDING CENTER PUSHES

For Low Voltage Service

Standard finish, nickel—brush brass when specified, no charge. Center quality, solid turned brass shell, protruding center. Phosphor-bronze springs, self-cleaning contacts. No. 622 has escutcheon for wood screw mounting in $\frac{1}{2}$ " hole. No. 116 is for forced fit in $\frac{1}{2}$ " hole.

Schedule E

	Wgt.	Std.	List
	Ozs.	Pkg.	Price
Protruding Black Center			
Insulated—fits $\frac{5}{8}$ " hole	7	10	\$0.65
Insulated—fits $\frac{1}{2}$ " hole	7	10	.90
Schedule T			
Insulated—forced fit, $\frac{1}{2}$ " hole	1	1	1.30

LOW VOLTAGE RETURN CALL PUSH



No. 265

Known also as "3 point push." In operation it breaks one circuit and makes another. For 3 wire return call systems. Also used where a number of pushes are installed, one for each bell, with one push to ring all bells.

Standard finish, nickel—brush brass when specified, no extra charge.

Schedule T

Standard package, 1.

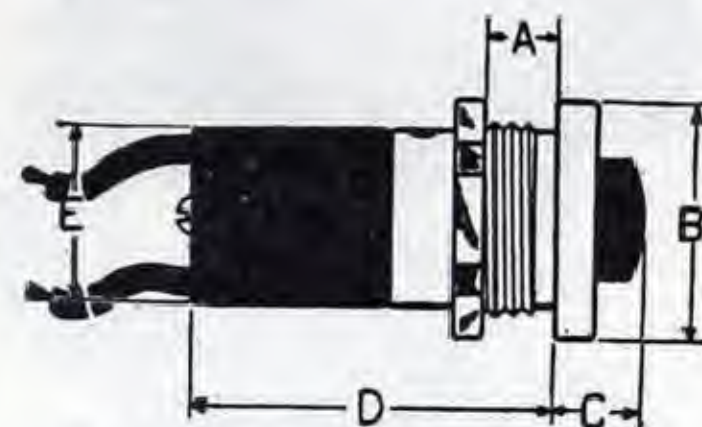
	Wgt.	List
	Ozs.	Price
Insulated—fits $\frac{3}{4}$ " hole	2	\$1.90

EDWARDS PUSH BUTTONS

Underwriters' Listed
125-250 Volt Pushes



No. 84-C High Voltage Push Requires a hole at least $\frac{27}{32}$ " diam.



Dimensions of No. 84-C

Quick Make and Break Types

A new quick-make, quick-break, high voltage push button in three styles: No. 84-C for panel boards, plates, etc.; No. 840-C Pendant Type and No. 841-C Weatherproof Type.

Despite the strength or speed with which pressure is applied to the button, it is impossible to get a slow make or slow break.

These pushes are extremely strong and durable. The mechanism, although compact, is very simple and sturdy, having only one moving member and two coil springs. The contacts are phosphor bronze of ample area, self-cleaning and of a unique design that assures unusually long life.

No. 84-C HIGH VOLTAGE PUSH

Designed and approved for 125-250 volt operation. Rated 1 ampere at 125 volts and $\frac{1}{2}$ ampere at 250 volts. Its construction is extremely strong and durable (see description above). Especially recommended for panel boards, plates, etc. Standard finish, Nickel—Brushed Brass when specified, No Extra Charge. Chromium can be furnished if specified. Add to list \$0.25 each.

Dimensions (see drawing above): A— $\frac{1}{4}$ " Maximum, B—1", C— $\frac{11}{32}$ ", D— $1\frac{9}{16}$ ", E— $\frac{3}{4}$ " over fiber casing, $\frac{27}{32}$ " over threads.

Schedule T, Weight $2\frac{1}{2}$ ozs. List Price \$2.65

For Surface or Flush Interior Wiring

Use No. 84-C Push with No. 158C Switch Plate. Will fit any standard switch box or outlet box with cover. Box must be $1\frac{3}{4}$ " deep. Standard finish of plate brushed brass or nickel, as specified.

No. 158C Switch Plate—Price Does Not Include Push

Schedule T

Hole for 1 button	List Price	\$0.35
Holes for 2 buttons	List Price	0.50
Holes for 3 buttons (2 gang)	List Price	1.00
Holes for 4 buttons (2 gang)	List Price	1.25
Bakelite Plates—Add to list		0.25
Chromium Plates—Add to list		0.50

No. 840-C PENDANT TYPE PUSH



No. 840-C Pendant Type known also as 125-250 volt Pear Push

Also known as 125-250 volt Pear Push. This push is simply the complete No. 84-C screwed firmly into a Black Bakelite shell of neat design. End of the Bakelite shell is removable for connecting, with ample room for taping and knotting. Entrance hole is large enough for all types of approved cord. Bakelite shell will not warp, crack or chip off.

Schedule T

Weight 4 ozs. List Price.. \$4.50

EDWARDS PUSH BUTTONS



No. 85



No. 85L (Lock-Nut)



No. 85P (Plate Type)

QUICK BREAK 110-220 VOLT PUSHES

Sturdy mechanism and heavy contacts so designed that no matter how slowly the finger pressure is released the contact breaks quickly. Designed for voltages up to those listed with non-inductive loads of about 1 ampere. Standard finish, nickel—brush brass when specified, no extra charge.

Schedule T				
List No.	Volt-age		Wgt. Ozs.	List Price
85	110	Forced Fit in $\frac{3}{4}$ " hole.....	2	\$2.40
85A	220	Forced Fit in $1\frac{1}{8}$ " hole.....	4	6.20
85P	110	Escutcheon Type, for $\frac{3}{4}$ " hole...	4	3.15
85AP	220	Escutcheon Type, for $1\frac{1}{8}$ " hole..	6	6.95
85L	110	Locknut Type. Fits $\frac{7}{8}$ " hole....	3	2.65
85C	110	Closed Circuit. Forced Fit in $1\frac{1}{8}$ " hole.....	4	7.85

Standard Package, 1.

Above can be furnished with red or white centers for which, add to list \$0.70.



No. 260

LOW VOLTAGE MULTIPLE CONTACT PUSH

Four insulated contact springs on which a plunger contacts when depressed. The contacts may be connected to provide three circuits with one common or strapped together to close two circuits with double contact capacity. Phosphor-bronze, wiping contacts. Standard finish, nickel—brush brass when specified, no extra charge.

Schedule T				
List No.			Wgt. Ozs.	List Price
260	For Open Circuit. Fits $\frac{3}{4}$ " hole.....		2	\$1.40
260C	For Closed Circuit. Fits $\frac{3}{4}$ " hole.....		2	2.05

Standard Package, 1.

EDWARDS PUSH BUTTONS



No. 841-C Weatherproof Type
Fits any Std. Box
at least $2\frac{3}{8}$ " deep



No. 1787 Weatherproof Push
Fits any Standard Box

No. 841-C WEATHERPOOF PUSH

(Fits any standard box at least $2\frac{3}{8}$ " deep)

This push has the same mechanism as the No 84-C but is special construction for exterior weatherproof installation. A special turned bronze shell forms a watertight compartment for the plunger of the standard push. This compartment covered with a pigskin diaphragm over which is placed second bronze plunger that protrudes through the sub-plate to which the whole unit is securely fastened. Wire leads are brought through a tight fitting washer and the complete unit encased in threaded Bakelite tubing, so that water cannot reach the mechanism from any point. The finished plate secured to the subplate with two screws. Rubber Gasket also furnished for use between finished plate and wall. Standard finish of push and plate is Bronze. Brushed Brass on both when specified, No Extra Charge.

Schedule T; Weight 12 ozs.....List Price \$5.

No. 1787 WEATHERPROOF FLUSH PUSH

With a finely finished face plate this push presents a great improved appearance over old flush types. Complete contact mechanism enclosed in cast brass shell and covered with pigskin diaphragm. Shell is tightly fastened to subplate with bronze plunger (on outside of diaphragm) protruding through subplate. Wire leads are brought out through tight bushings. Complete unit is weatherproof.

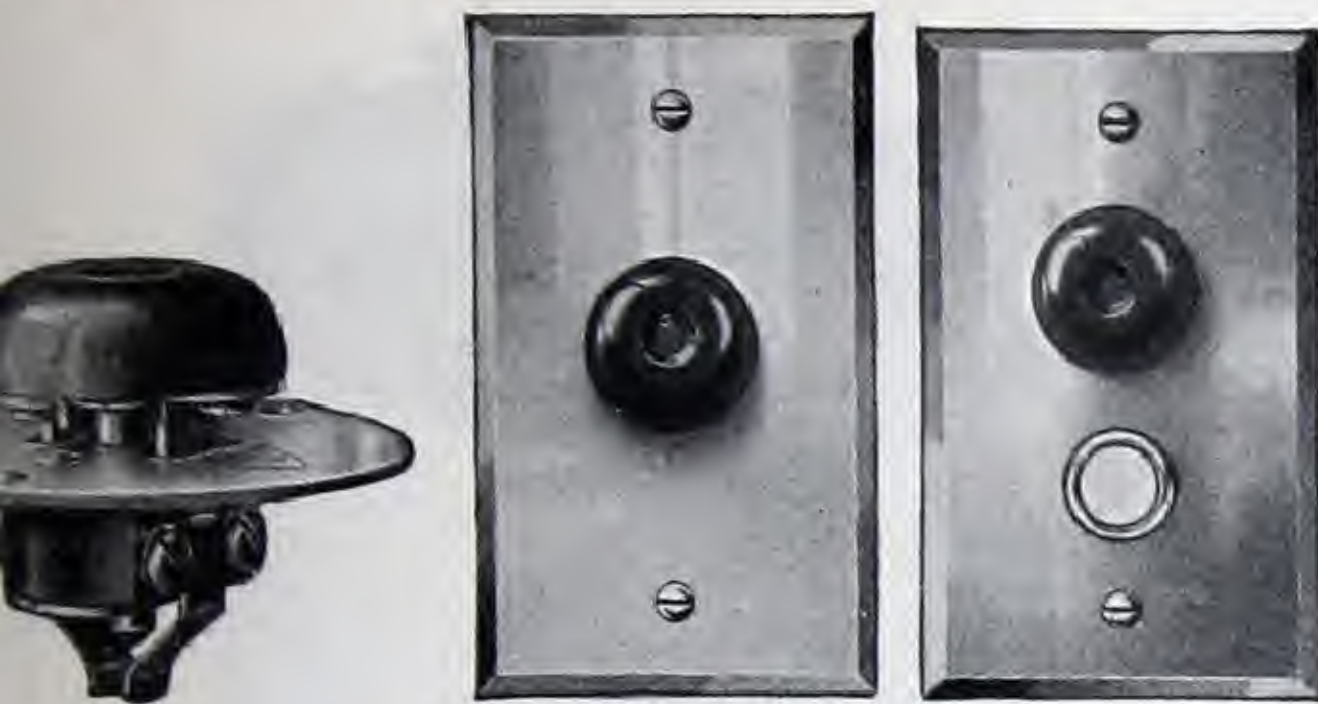
Fits any standard single gang switchbox or fitting. Furnished complete with face plate for low voltages only. For 110 volt Weatherproof Push see No. 841. Rubber gasket (No. 1787RG) for use between plate and wall supplied when specified.

Standard finish—Polished Bronze.

Schedule T; Weight 14 ozs.; Standard Package—1

No. 1787—(With face plate).....List Price \$5.
No. 1787RG—(Rubber Gasket only).....

EDWARDS SPECIAL PUSH BUTTONS



No. 235 No. 158-235 No. 204

No. 235 COMBINATION FLOOR PLUG AND PUSH
 A dual purpose device providing means for closing a signaling circuit at a fixed location or extending the circuit to a table push button. A sturdy contact mechanism with a pin and a compact attachment plug for use with floor push buttons (No. 290), table pushes (Nos. 150, 206), or pendant switches (Nos. 65, 66, 67, 70). Will not fit any standard lighting circuit receptacle, preventing the possibility of shorting the lighting line. Standard finish—Satin Brass.

Schedule E Weight 3 ozs. Standard Package—10
 No. 235—Combination Floor Plug and Push.
 Price..... \$0.95
 No. 235-F—Same as above to fit floor box (specify of box)..... List Price 1.50

No. 158-235 WALL PLATE AND PLUG
 Extension of a signaling circuit to table push, floor push, or other push button. Contains the same contact mechanism as No. 235 floor plug (without pin) mounted on a standard switch plate for flush wall installation. Fits standard switch box. Standard finish—Satin Brass. Nickel supplied if specified, no extra charge.
 Schedule T Weight 5 ozs. Standard Package—1
 No. 158-235—Wall Plate and Plug.. List Price \$1.60

No. 204 WALL PLATE, PLUG AND PUSH
 A dual purpose device providing for the extension of a signaling circuit to table push, floor push, etc., with an added push button feature. Contains the same contact mechanism as No. 235 floor plug (without pin) mounted on a standard switch plate with pearl push button (No. 620) for flush wall installation. Fits standard switch box. Standard finish—Brushed Brass. Nickel supplied if specified, no extra charge.
 Schedule T Weight 5 ozs. Standard Package—1
 No. 204—Wall Plate, Plug and Push. List Price \$3.00



No. 620



No. 63

FLUSH FLAT PEARL CENTER PUSHES
 For Low Voltage Service
 Standard Finish Nickel—Brush Brass When Specified, No Extra Charge.
 These are quality dependable pushes at reasonable cost for all utility purposes. Stamped shell, phosphor bronze contacts, self-cleaning contacts, self-forming binding posts. Spring clips hold push firmly in mounting hole.

Schedule E			
Flush Pearl Center	Wgt. Ozs.	Std. Pkg.	List Price
Insulated—fits 5/8" hole.....	14	50	\$0.38
Insulated—fits 3/4" hole.....	9	20	.75
Grounded—fits 1/2" hole.....	9	50	.67
Black Center (Standard Package—20) Add to list \$0.12			

EDWARDS ENTRANCE PUSH BUTTONS

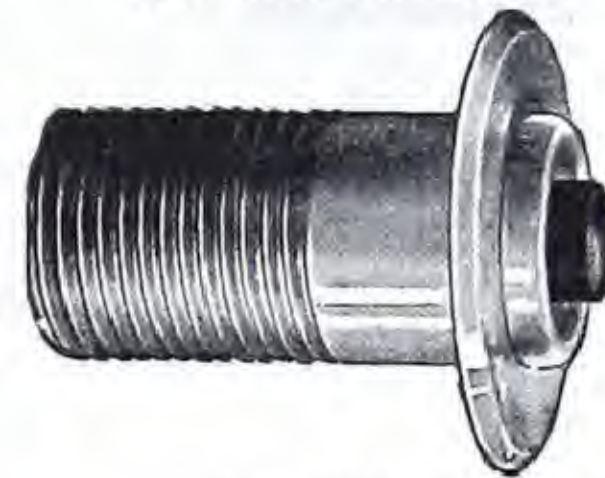
To Harmonize with Distinctive Hardware and Meet All Other Requirements in Apartment or Residence Work



No. 650



The new No. 1786 with Conduit Fitting



No. 262

No. 650 SOLID FORGED BRASS PUSH

This new solid forged brass push button is highly recommended for better grade apartment and residence work. Its modern design and clean cut construction is conservatively ornamental and departs entirely from the old-fashioned large round, oblong and oval types that were too wide for proper mounting on narrow trims.

The sturdy mechanism is entirely insulated and securely riveted to the solid brass case, making the push all-one-piece. Connections are easily made direct to two large screws on back of the push. Can be mounted on metal trims without fear of short circuiting.

Oval head wood screws 3/4" No. 6 are furnished standard to match finish. Overall Dimensions: Height 3 1/4", Width 1 1/8", Depth 5".

Standard finish. Brush Brass with Antique (Black) Mat.

Schedule E; Weight 2 lbs. 2 ozs.; Standard Package—10

On 10 or more in assorted finishes, Std. Pkg. discounts apply.

List No.	Finishes	List Price
650	Brush Brass with Antique (Black) Mat..	\$1.10
650A	Polished Brass.....	1.15
650B	Verde Antique.....	1.20
650C	Bauer Barff (Black).....	1.20
650D	Swedish Iron.....	1.25
650E	Polished Bronze.....	1.25
650F	Polished Copper.....	1.25
650G	Chromium, polished or dull as specified..	1.75

No. 1786 WEATHERPROOF PUSH (SURFACE TYPE)

A neat solid brass push button absolutely dependable for use outside of buildings, residences, etc. Also recommended for marine work, ice plants, chemical plants, and all places where dampness, exposure, or fumes will corrode and destroy the mechanism of an ordinary push button.

Standard finish—Polished Brass.

Schedule T; Standard Package—1

List Price

No. 1786; Weight 9 ozs..... \$3.50
 No. 1786C; (With plate threaded for 1/2" conduit).... 5.50

No. 262 CONDUIT PUSH

A complete push button and threaded attachment to fit 1/2" conduit coupling. Protruding Black center and polished Nickel rim standard. Brush Brass no extra charge.

Schedule T; Weight 4 ozs..... List Price \$4.00

No. 261 ESCUTCHEON FOR STONE ENTRANCES

A plain flanged casting for cementing into stone or tile entrances. Standard finish Bauer Barff (black). Drilled for 3/4" push. No. 260 push button is recommended.

Schedule T; Standard Package—1

List Price

No. 261—Escutcheon only; Weight 8 ozs..... \$3.50
 No. 260—Push Button only; Weight 2 ozs..... 1.40

EDWARDS ENTRANCE PUSH BUTTONS

Two New Bakelite Pushes in Mottled Brown



No. 615



No. 616

No. 615 AND No. 616 BAKELITE PUSHES

Small, neatly designed one piece Bakelite pushes in a pleasing shade of Mottled Brown. Screws furnished are the same finish. Green center.

Binding post screws are large enough for No. 14 wire. Either No. 615 (plain type) or No. 616 (card holder type) will harmonize perfectly with any surroundings. Cannot be furnished in other finishes.

Schedule E

List No.	List Price Each	Std. Pkg.	Dimensions—Inches	Weight
615	\$0.18	100	Height $1\frac{5}{8}$ Width $1\frac{5}{8}$ Depth $\frac{9}{16}$	4½ lbs.
616	.25	100	Height $2\frac{3}{16}$ Width $1\frac{3}{4}$ Depth $\frac{9}{16}$	4¾ lbs.

EDWARDS SPECIAL PUSHES

No. 159 ELEVATOR CALL BUTTON



No. 159

Designed for use with Edwards annunciators or any standard make. Case is iron finished in black, for surface mounting. Overall—4⅞" high, 3" wide, 1⅜" deep. As illustrated, has "Up" and "Down" button. Fits standard switch box.

Schedule T.....	Weight 1 lb. 14 ozs. Standard Package—1
No. 159—(Up and Down).....	List Price \$6.00
No. 159U—(Up only).....	List Price 5.00
No. 159D—(Down only).....	List Price 5.00
No. 159X—(1 button not designated).....	List Price 5.00

No. 117 FOOT PUSH

Case is cast brass with rubber gasket between the case and base which is iron. An additional rubber gasket on the back insulates from the vehicle. The push is moisture proof. Contact and lever springs are phosphor-bronze. Capacity 100 volts or less at ½ ampere. Size 3" x 3¼". Finish natural metal.



No. 117 Foot Push

Schedule T.....	Weight 1 lb.....	List Price \$6.00
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EDWARDS SPECIAL PUSH BUTTONS



No. 290

Bakelite
Pendant Push

No. 206

BAKELITE PENDANT PUSHES

These pushes are suitable for low cost residence and hospital work. Their lustrous Bakelite finish will not become scratched or marred like wood. They are light, but exceedingly strong and will not warp, crack or chip off.

No. 65 has a raised, rounded center.

No. 66 has a protruding center.

No. 67 has a flat pearl center.

Supplied in Black, Mahogany or White Enamel finish. Specify finish when ordering.

Schedule T, Weight 2 ozs, Standard Package—1.

	List Price
No. 65—Black or Mahogany (raised, rounded center)	\$ 4
No. 65—White Enamel (raised, rounded center).....	5
No. 66—Black or Mahogany (protruding black center)	10
No. 66—White Enamel (protruding black center)....	15
Schedule E, Weight 11 ozs; Standard Package—10 (one color).	
No. 67—Black or Mahogany (flat pearl center).....	50
No. 67—White Enamel (flat pearl center).....	75

For 2-Conductor Brown Cord Attached, Add To \$0.16 per foot.

*No. 206 TABLE PUSH

Clamps securely on table without scratching. Usually in connection with floor push (No. 235) or wall plug (No. 158-235.).

A self-contained unit with button and contact built into spring clamp base.

Self-cleaning, phosphor bronze contacts open to inspection. Standard finish—Nickel.

Schedule E, Weight 2 ozs., Standard Package—10.

No. 206—Table Clamp.....	25
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No. 290 DIXIE FLOOR PUSH

Recommended as a dining room push for calling service during meals. Contact easily made by pressure at any point. Rubber covered base prevents push from sliding. The connectors are firm and reliable and whole device is designed for quick, easy installation. Cord enters through brass cap which holds it securely. Standard finish—Satin Brass.

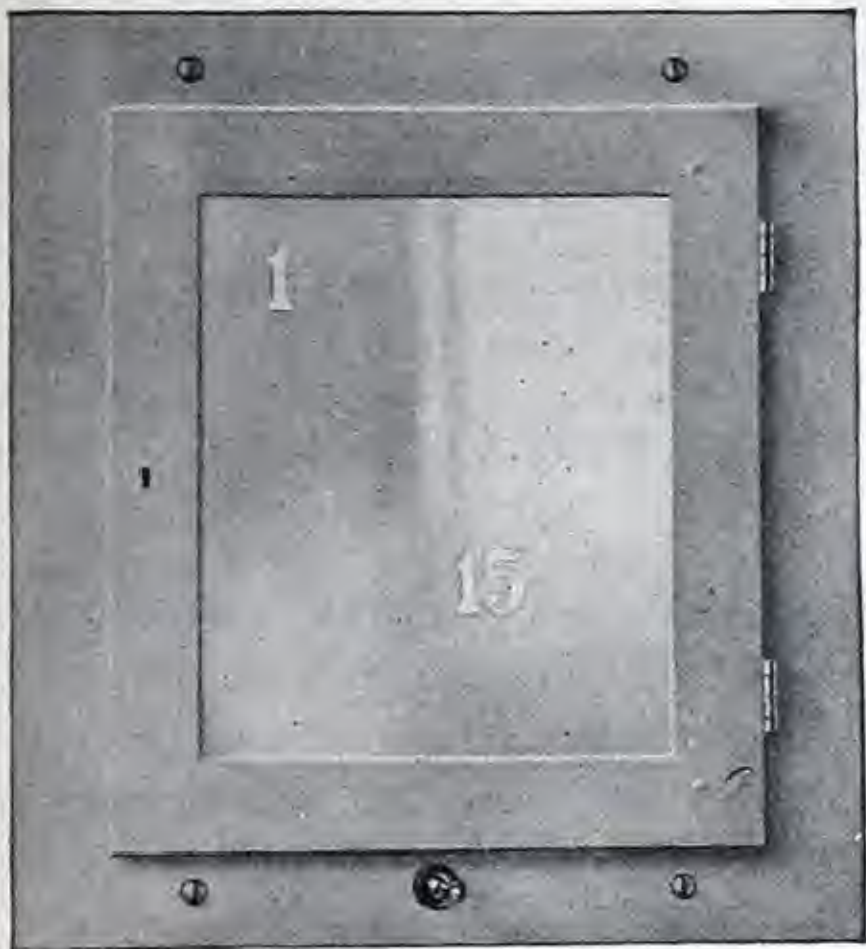
Schedule E, Weight 5 ozs., Standard Package—10.

No. 209—Dixie Floor Push.....	List Price 50
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EDWARDS LAMP ANNUNCIATORS



No. 422



No. 425

BULL'S-EYE TYPE

Unless otherwise specified 5/8" milk-white bull's eyes are supplied with card racks underneath. All-metal fronts finished as specified (except chromium, price on application). Flush types furnished complete with wall box. Larger sizes have hinged front for easy installation. Standard for operation on 32 V. D.C. or A.C. as specified. For 110 V. operation Bull's Eyes are necessary. Buzzer audible signal.

Unless locking or small toggle pushes are used, locking relays are necessary to keep the signals lighted until reset by a push button, which is usually located on the annunciator. Relays can be furnished in the annunciator case, but this increases its size, and detracts from its appearance. It is better practice to have the relays in a separate cabinet, which can be placed out of view—under a desk—on the baseboard,

OPAQUE GLASS TYPE

Used where larger numerical indications are desired. Clear numeral or letter shows only when lamp is lighted. Specially processed metal facing is used in back of glass, instead of paint which peels and deteriorates. Other construction and mounting features same as described for Bull's-eye Types above. Standard in two sizes—with 7/8" numerals or with 1 1/4" numerals. Larger indications, double face, ceiling suspension, and other such special features can be furnished, price on application.

EDWARDS LAMP ANNUNCIATORS

(Continued)

OPTIONAL FEATURES TO SPECIFY IN ORDERING

- 1. Voltage, cycles, etc.
- 2. With or without relays? Relays in annunciator or in separate cabinet?
- 3. White, Red, or Green Bull's Eyes? 7/8" or 1 3/4" Numerals in Opaque Glass Type.
- 4. Finish?

List Numbers

Bull's-eye type for surface wall mounting.....	421
Bull's-eye type for flush wall mounting.....	422
Bull's-eye type for desk.....	423
Opaque glass type for surface wall mounting.....	424
Opaque glass type for flush wall mounting.....	425

List Prices—Schedule D

Standard for up to 32 V. D.C. or A.C. as specified.
Complete installation data supplied.

Size	Bull's-eye Types		Opaque Glass Types		Add for Relays
	No. 421 Surface	No. 423 Flush Desk	No. 424 Surface	No. 425 Flush	
2 Lamps	.....	\$ 71.00	.....	.....	\$ 25.00
4 Lamps	\$ 71.00	90.00	.....	.....	41.00
6 Lamps	91.00	110.00	\$80.00	.....	48.00
9 Lamps	110.00	140.00	92.00	.....	72.00
12 Lamps	141.00	170.00	104.00	.....	96.00
16 Lamps	181.00	200.00	118.00	.....	128.00
20 Lamps	221.00	240.00	129.60	.....	160.00
25 Lamps	235.00	310.00	147.30	.....	200.00
30 Lamps	275.00	.....	171.20	.....	240.00
36 Lamps	312.00	.....	200.00	.....	288.00
42 Lamps	341.00	Larger	230.00	.....	336.00
48 Lamps	369.00	Sizes	260.00	.....	384.00
56 Lamps	407.00	Price	300.00	.....	448.00
Larger Sizes, add per Lamp }	5.00	on Appli-	5.00	Per Relay	\$8.00
110 Volt add per Lamp }	2.00	cation	{ no extra charge }		2.00

Sizes, Wallcuts, Approximate Weights, etc., will be furnished upon receipt of specifications.

EDWARDS ANNUNCIATORS

Electric Reset Annunciators



No. 403

furnished on case for every 20 drops. Connectors also provided for remote resetting as standard.

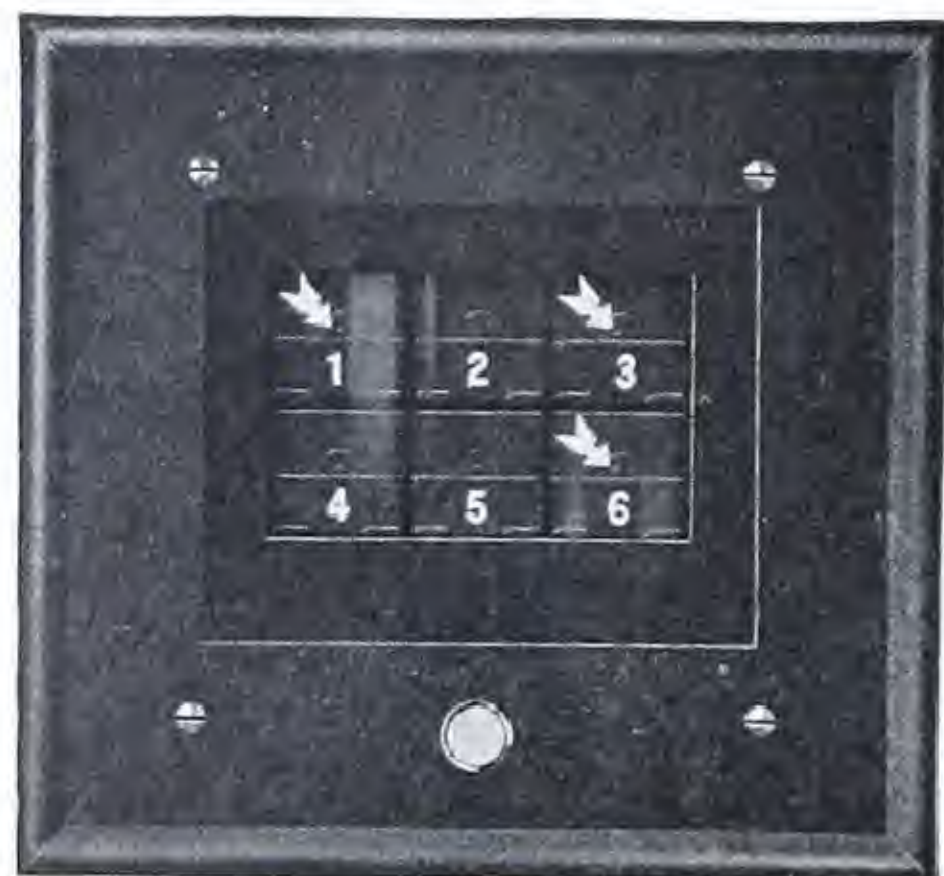
Standard Voltage: For 16 V. A.C. or 8 V. D.C. operation. For up to 24 V.A.C. or D.C., no extra charge. Special finishes, features, etc., extra.

No. 403 SURFACE TYPE—SCHEDULE T

Standard: Black Finish. Mahogany, Oak or Walnut, no extra charge. Any Solid Spray Finish, add 5%

No. of Drops	Arrangement Across	Arrangement Down	Dimensions			Wght.	List Price
			Hght	Width	Depth		
4	2	2	6 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	3"	3 $\frac{1}{2}$ lbs.	\$ 26.00
6	3	2	6 $\frac{1}{8}$ "	6 $\frac{5}{8}$ "	3"	4 $\frac{1}{2}$ lbs.	32.00
8	4	2	6 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	3"	5 $\frac{1}{4}$ lbs.	38.00
10	4	3	8 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	3"	6 $\frac{1}{3}$ lbs.	44.00
12	4	3	8 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	3"	6 $\frac{1}{2}$ lbs.	52.00
14	6	3	8 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	3"	7 lbs.	60.00
16	6	3	8 $\frac{1}{8}$ "	11 $\frac{1}{8}$ "	3"	8 $\frac{1}{4}$ lbs.	68.00
18	6	3	8 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	3"	9 lbs.	76.00
20	5	4	10 $\frac{1}{4}$ "	9 $\frac{5}{8}$ "	3"	10 lbs.	84.00
24	6	4	10 $\frac{1}{4}$ "	11 $\frac{1}{8}$ "	3"	12 lbs.	100.00

Larger sizes, add per drop \$5.00 list.



No. 409 FLUSH TYPE—SCHEDULE T

Standard: Black Finish. Mahogany, Oak, Walnut or any Solid Spray Finish, no extra charge. Price includes steel wall box.

No. of Drops	Arrangement Across	Arrangement Down	Wallcut Dim.			Wght.	List Price
			Hght	Width	Depth		
4	2	2	7 $\frac{1}{8}$ "	5 $\frac{1}{8}$ "	4"	4 $\frac{1}{4}$ lbs.	\$60.00
6	3	2	7 $\frac{1}{8}$ "	6 $\frac{5}{8}$ "	4"	5 lbs.	66.00
8	4	2	7 $\frac{1}{8}$ "	8 $\frac{1}{8}$ "	4"	6 $\frac{1}{2}$ lbs.	72.00
10	4	3	9 $\frac{5}{8}$ "	8 $\frac{5}{8}$ "	4"	7 $\frac{1}{2}$ lbs.	78.00
12	4	3	9 $\frac{5}{8}$ "	8 $\frac{5}{8}$ "	4"	7 $\frac{3}{4}$ lbs.	86.00
14	6	3	9 $\frac{5}{8}$ "	8 $\frac{5}{8}$ "	4"	9 lbs.	94.00
16	6	3	9 $\frac{5}{8}$ "	11 $\frac{5}{8}$ "	4"	10 $\frac{1}{2}$ lbs.	102.00
18	6	3	9 $\frac{5}{8}$ "	11 $\frac{5}{8}$ "	4"	10 $\frac{3}{4}$ lbs.	110.00
20	5	4	11 $\frac{3}{4}$ "	10 $\frac{1}{8}$ "	4"	11 lbs.	118.00
24	6	4	11 $\frac{3}{4}$ "	11 $\frac{5}{8}$ "	4"	12 $\frac{1}{2}$ lbs.	134.00

Larger Sizes, add per drop \$5.00 list. Add 1" for Overall.

All-metal cases of pleasing symmetrical design, and superior in every respect to those of wood construction. The new No. 4 Drop used in these annunciators, uses less current for indicating and resetting and gives a far better indication than any drop heretofore manufactured. The audible signal is a new type double adjustment buzzer. One reset button regularly

EDWARDS ANNUNCIATORS

Manual Reset Annunciators



No. 81



No. 91

No. 81 DIXIE ANNUNCIATOR AND

No. 91 SAN-FER-ANN ANNUNCIATOR

These all-metal case, finely finished annunciators have years met the exacting requirements of builders for reside and apartment signaling. While well-proportioned and with slightly larger indications they are not as neat in appearance or as small in dimensions as the Annunciettes. Annunciators are also best for multiple operation.

The No. 80 drop, which is used, is absolutely locked in place and cannot be released by shaking or jarring. Indications black on white background and cards are changeable. Buzzer audible signal is standard. Ring audible signal can be supplied if specified at slight additional charge.

Schedule T

Standard: No. 81 Black Finish. No. 91 White Enamel any Solid Spray Finish. For 6-8 V.D.C. or 12 V.A.C. operation. Up to 24 V.A.C. or D.C., no extra charge. Special finishes, features, etc., extra.

No. 91

San-

No. of Drops	No. 81	Fer- Ann	Arrang.	Dimensions	Weight
			Acrr. Dwn	Hght. Width	
2	\$11.50	\$12.08	2	1 5"	7 $\frac{3}{16}$ " 2 lbs. 5 ozs.
3	12.50	13.13	3	1 5"	7 $\frac{3}{16}$ " 2 lbs. 7 ozs.
4	13.50	14.18	4	1 5"	7 $\frac{3}{16}$ " 2 lbs. 8 ozs.
6	17.00	17.85	3	2 7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ " 3 lbs. 8 ozs.
8	20.50	21.53	4	2 7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ " 3 lbs. 10 ozs.
10	25.50	26.78	5	2 7 $\frac{3}{16}$ "	8 $\frac{3}{8}$ " 6 lbs.
12	30.50	32.03	6	2 7 $\frac{3}{16}$ "	9 $\frac{7}{8}$ " 6 lbs. 12 ozs.
14	36.80	38.64	5	3 9 $\frac{3}{8}$ "	8 $\frac{1}{2}$ " 7 $\frac{3}{4}$ lbs.
16	40.50	42.53	6	3 9 $\frac{3}{8}$ "	9 $\frac{7}{8}$ " 8 $\frac{1}{2}$ lbs.
18	45.50	47.78	6	3 9 $\frac{3}{8}$ "	9 $\frac{7}{8}$ " 8 $\frac{3}{4}$ lbs.
20	50.50	53.03	7	3 9 $\frac{3}{8}$ "	11 $\frac{1}{4}$ " 9 $\frac{1}{2}$ lbs.
24	60.50	63.53	8	3 9 $\frac{3}{8}$ "	12 $\frac{5}{8}$ " 10 $\frac{1}{2}$ lbs.

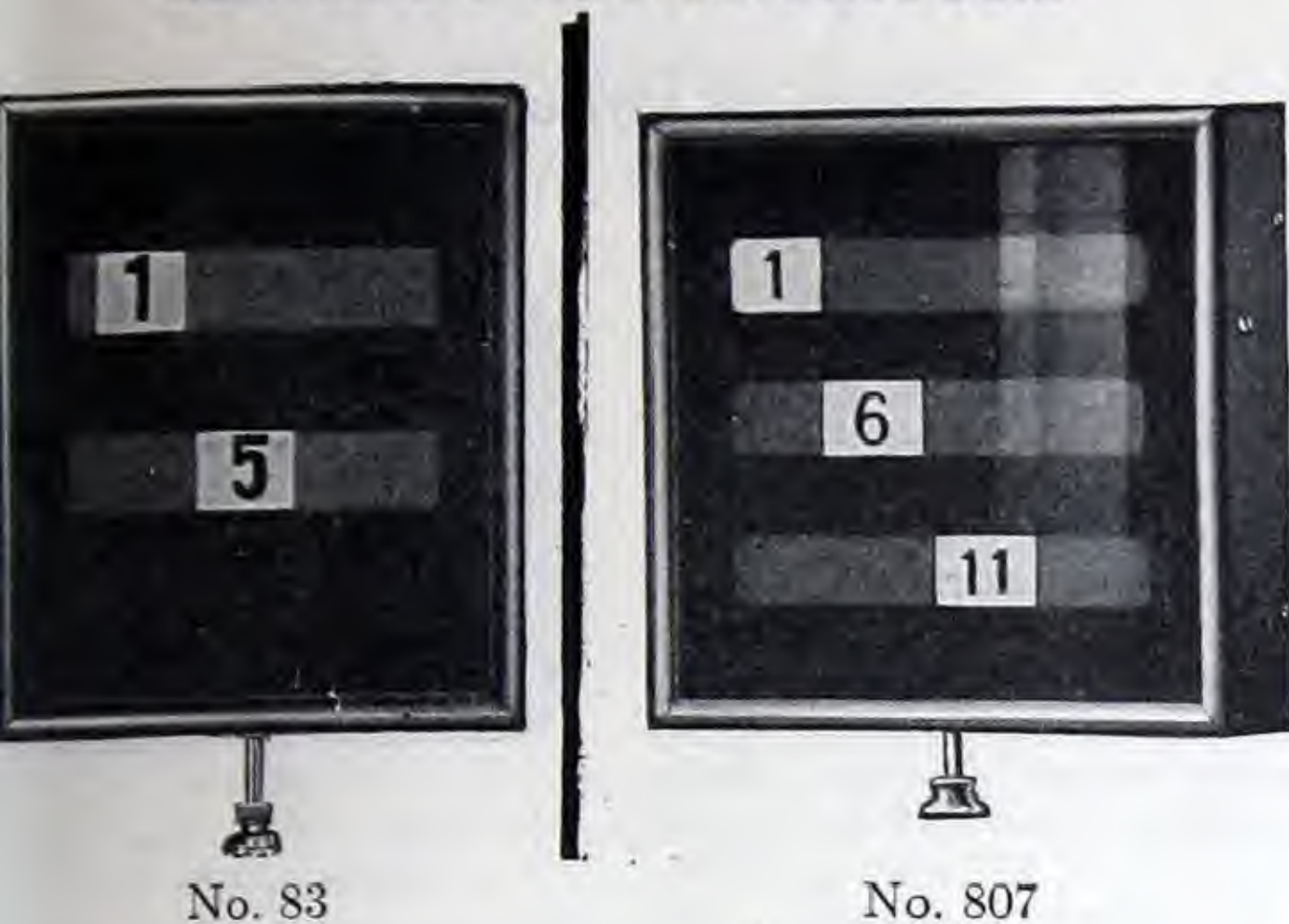
Larger

Sizes

Add per drop 4.00 4.20

Depth, 3 $\frac{3}{8}$ " for all sizes

EDWARDS ANNUNCIATORS



No. 83 SPRINKLER ANNUNCIATOR

Surface Manual Reset Type

Special drops are used in this annunciator having a double set of contact clips, one set to short the drop magnet out of the circuit in operation, and the other set to act as a relay to give the current a free path to the bells. With this arrangement the supervisory system may be laid out so that the operation of certain sprinkler heads will operate individual bells, section bells, or any arrangement that is desired.

Standard: Black Finish, and for 12 V. A.C. or 8 V. D.C. operation. Any solid spray finish, add 5%. For up to 24 V. A.C. or D.C., no extra charge. Special finishes, features, etc., extra.

SCHEDULE T

No. of Drops	Arrangement Across	Down	Dimensions Hght	Width	Depth	Wght.	List Price
4	4	1	5 1/4"	10 1/8"	3 1/4"	3 lbs.	\$35.35
6	3	2	7 3/4"	8 1/8"	3 1/4"	4 lbs.	45.60
8	4	2	7 3/4"	10 1/8"	3 1/4"	4 lbs.	56.50
10	5	2	7 3/4"	12 1/8"	3 1/4"	5 lbs.	69.72
12	6	2	7 3/4"	14 1/8"	3 1/4"	5 lbs.	82.96

13 to 55 drops, add to list per drop \$6.72.

56 and over, add to list per drop \$7.34.

No. 807 HIGH VOLTAGE ANNUNCIATORS

(Surface Manual Reset Type)

Has a metal case with double Micarta backboard on which are mounted the No. 80 drops. Great care has been given to the insulation of all current-carrying parts, eliminating all materials affected by heat or moisture. The price includes a bell, which may be installed adjacent to the annunciator where desired. The annunciator is wired with marked connectors for this purpose.

Standard: Black Finish, and for 110 V. A.C. or D.C. operation. Any solid spray finish, add 5%.

SCHEDULE T

No. of Drops	Arrangement Across	Down	Dimensions Hght	Width	Depth	Wght.	110 V.D.C. or A.C. List Price
4	4	1	5 1/4"	7 5/8"	3 1/4"	7 lbs.	\$ 62.00
6	3	2	7 3/4"	6 1/8"	3 1/4"	8 lbs.	74.00
8	4	2	7 3/4"	7 5/8"	3 1/4"	10 lbs.	91.00
10	5	2	7 3/4"	9 1/4"	3 1/4"	12 lbs.	102.00
12	4	3	7 3/4"	10 5/8"	3 1/4"	14 lbs.	124.00

Larger sizes, add per drop \$12.00. For 220 Volts add \$2.00 per drop.

No. 810 MARINE ANNUNCIATOR

(Surface Manual Reset Type)

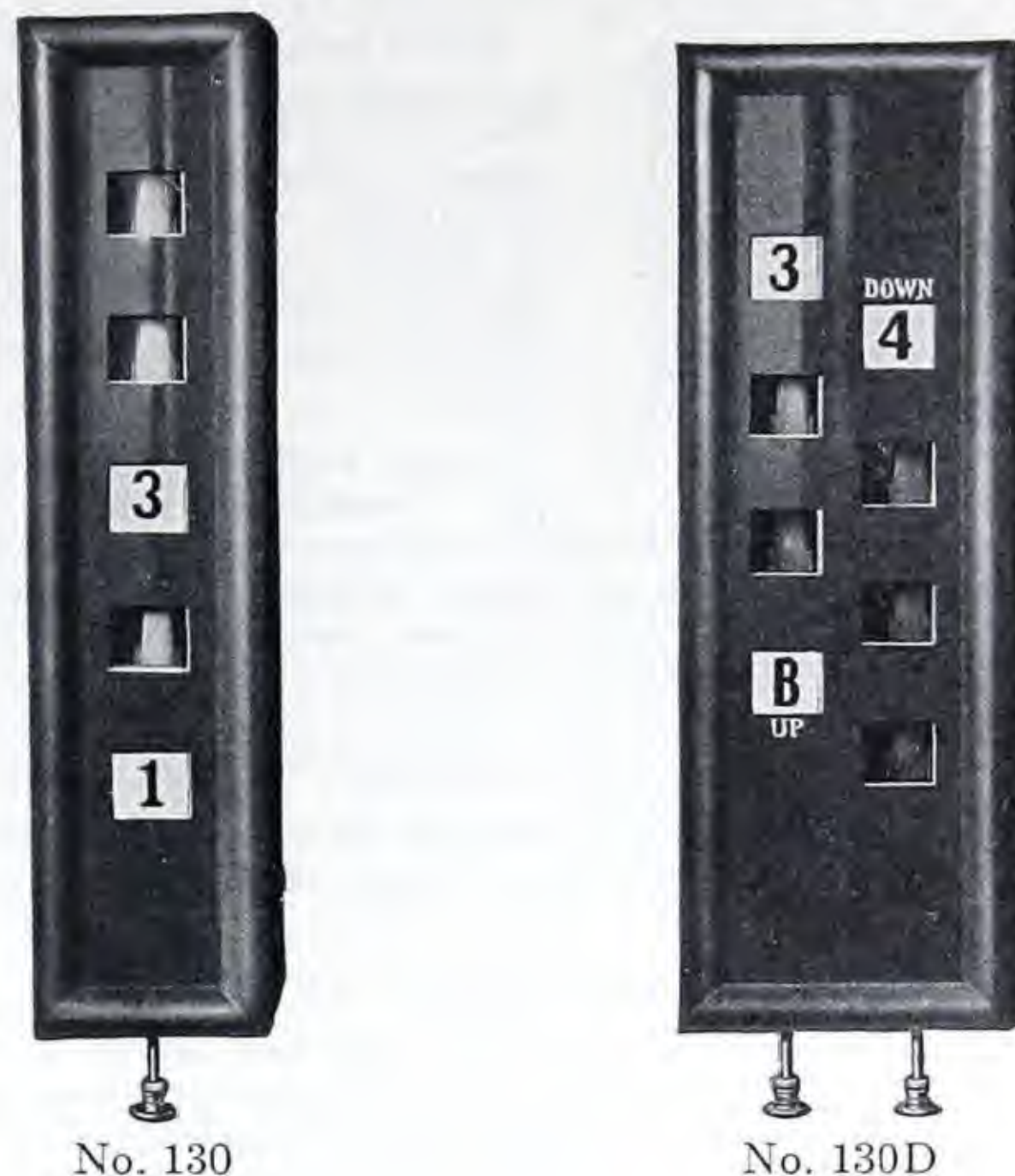
For use on ships or any place subject to excess moisture. Good case and backboard thoroughly impregnated and protected with gaskets. Finished as specified.

SCHEDULE T

drops..... List Price, each \$66.00
Larger sizes, add per drop \$3.00 list.

EDWARDS ELEVATOR ANNUNCIATORS

Elevator Annunciettes



No. 130 SURFACE ELEVATOR MANUAL RESET

Much smaller and neater than old-fashioned surface elevator annunciators without affecting clearness of indication.

Buzz audible signal. Smooth, sturdy, reliable reset. Up-and-down type equipped with reset push for each column of indications.

Order and price by number of drops not by number of floors.

Standard, Nos. 130 and 130D black finish and for 8-12 volts A.C. or 6-8 volts D.C. operation. Any solid spray finish, add 5%. For up to 24 volts A.C. or D.C., no extra charge. Special finishes, features, etc., extra.

No. 130—Single Row

No. of Drops	Arrangement Across	Down	Overall Height	Width	Wgt. Lbs.	List Price
3	1	3	7 3/8"	2 1/2"	2	\$18.50
4	1	4	7 3/8"	2 1/2"	2 1/8	19.50
5	1	5	9 3/4"	2 1/2"	2 3/4	21.40
6	1	6	9 3/4"	2 1/2"	2 3/4	23.25
7	1	7	12 1/4"	2 1/2"	3 1/3	25.25
8	1	8	12 1/4"	2 1/2"	3 1/4	27.25
9	1	9	14 3/4"	2 1/2"	3 3/4	29.25
10	1	10	14 3/4"	2 1/2"	4	31.25
11	1	11	17 1/4"	2 1/2"	4 1/4	33.25
12	1	12	17 1/4"	2 1/2"	4 1/2	35.00
14	2	7	12 7/8"	4 "	5 3/4	40.00
16	2	8	12 7/8"	4 "	6	45.00

No. 130-D—Up and Down Type

No. of Drops	Arrangement Across	Down	Overall Height	Width	Wgt. Lbs.	List Price
4	2	2	7 3/8"	4"	2 1/2	\$23.25
6	2	3	7 3/8"	4"	3 1/4	27.10
8	2	4	7 3/8"	4"	3 3/4	32.25
10	2	5	10 1/8"	4"	4 1/4	36.25
12	2	6	10 1/8"	4"	4 3/4	42.50
16	2	8	12 7/8"	4"	6 1/4	52.50

Larger Sizes. Add \$4.00 per drop list.

Depth. 2 1/2" on all types and sizes.

EDWARDS ANNUNCIATORS

Flush Annunciates

No. 672 MANUAL RESET TYPE



No. 672

New Flush Annunciates that are much smaller and neater than old-fashioned annunciators, without affecting clearness of indications. Push button reset on front of case is entirely new—no "thrust" or "bang"—just firm, easy pressure of the button.

Drops and reset mechanism are thoroughly reliable and will stand up indefinitely under most severe service. Mounts easily in wall box allowing plumb adjustment. Front connectors in full view allow complete installation, test, and operation before face plate is fastened.

Buzz audible signal with marked connectors for adding extension signals if desired. Envelope included with 100 separate name and number cards for drops, allowing definite, correct indications in residence, bank, office, or any installation.

No. 682 ELECTROMANUAL RESET TYPE

The same superior Annunciator described above, but designed for remote resetting or for multiple operation where resetting an Annunciator at one location must automatically reset an Annunciator at another location. Connectors provided so the resetting of one or more Annunciators may be controlled from a remote point if desired. Resets all drops at once. Individual reset of drops not possible. While reset mechanism is actuated electrically, manual, mechanical reset push on case remains in case of emergency.

Where individual reset of drops is desired, see Electric Reset Annunciators.

List Prices—Schedule T

Standard: White Enamel Finish and for 8-12 V. A.C. operation. Any solid spray finish, add 5%. For up to 24 V. A.C. or D.C., no extra charge. Special finishes, features, etc., are extra.

Number of Drops	No. 672 No. 682		Arrangement		Wallcut Dimensions		Weight	
	Annun- ciette *with wall box	Annun- ciette *with wall box	Across	Down	Hgt.	Wd.	Lbs.	Ozs.
2	\$14.50	\$22.50	2	1	4 $\frac{5}{8}$ "	5 $\frac{7}{8}$ "	4	
3	15.50	23.50	3	1	4 $\frac{5}{8}$ "	5 $\frac{7}{8}$ "	4	
4	16.50	24.50	4	1	4 $\frac{5}{8}$ "	5 $\frac{7}{8}$ "	4	
6	20.50	28.50	3	2	4 $\frac{5}{8}$ "	5 $\frac{7}{8}$ "	4	3
8	23.50	33.50	4	2	4 $\frac{5}{8}$ "	5 $\frac{7}{8}$ "	4	5
10	28.50	38.50	5	2	4 $\frac{5}{8}$ "	7 $\frac{1}{8}$ "	5	5
12	33.50	43.50	6	2	4 $\frac{5}{8}$ "	7 $\frac{1}{8}$ "	5	8
14	39.50	49.88	5	3	6 $\frac{1}{4}$ "	7 $\frac{1}{8}$ "	6 $\frac{1}{2}$	
16	43.50	55.50	6	3	6 $\frac{1}{4}$ "	7 $\frac{1}{8}$ "	6 $\frac{3}{4}$	
18	48.50	60.50	6	3	6 $\frac{1}{4}$ "	7 $\frac{1}{8}$ "	7 $\frac{3}{4}$	
20	53.50	65.50	5	4	7 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	8	
24	63.50	75.50	6	4	7 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	10 $\frac{1}{4}$	
Larger Sizes Add per drop	4.00	5.00	Depth—3" for all sizes. Add $\frac{3}{8}$ " all around for overall size of trim.					

*WALL BOXES ONLY FOR No. 672 AND No. 682

Wall boxes are necessary for easy, most satisfactory installation. When wall boxes are ordered separately for shipment to stock, or to job when roughing in, they are designated and priced as follows:

	List Price
No. 671A—Wall Box for 2-8 Drop Annunciates.	\$1.00
No. 671B—Wall Box for 10-12 Drop Annunciates.	1.00
No. 671C—Wall Box for 14-18 Drop Annunciates.	5.00
No. 671X—(with size specified) for larger sizes.	5.00

When wall box has been shipped previously and Annunciator without wall box is desired, specify No. 670 instead of No. 672 or No. 680 instead of No. 682.

EDWARDS ANNUNCIATORS

Surface Annunciates

No. 82 MANUAL RESET TYPE



No. 82

New Surface Annunciates that are much smaller and neater than old-fashioned annunciators without affecting clearness of indications (see comparison at right). Drops and reset mechanism are thoroughly reliable, and will stand up indefinitely under most severe service. Buzz audible signal with marked connectors for adding extension signals if desired. Envelope included with 100 separate name and number cards for drops, allowing definite, correct indications in residence, bank, office, or any installation.

Where individual reset of drops is desired, see Electric Reset Annunciators.

No. 482 ELECTROMANUAL RESET TYPE

The same superior Annunciator described above, but designed for remote resetting or for multiple operation where resetting an Annunciator at one location must automatically reset an Annunciator at another location. Connectors provided so the resetting of one or more Annunciators may be controlled from a remote point if desired. Resets all drops at once. Individual reset of drops not possible. While reset mechanism is actuated electrically, manual, mechanical reset remains in case of emergency.

Where individual reset of drops is desired, see Electric Reset Annunciators.

List Prices—Schedule T

Standard: Black Finish and for 8-12 V.A.C. operation. Any solid spray finish add 5%. For up to 24 V.A.C. or D.C. no extra charge. Special finishes, features, etc., extra.

No. of Drops	No. 82 No. 482		Arrangement			
	Manual Reset	Electro-manual Reset	Across	Down	Across	Down
2	\$11.50	\$19.50	2	1	2	1
3	12.50	20.50	3	1	3	1
4	13.50	21.50	4	1	4	1
6	17.00	25.00	3	2	3	2
8	20.50	30.50	4	2	4	2
10	25.50	35.50	5	2	5	2
12	30.50	40.50	6	2	4	3
14	36.80	46.80	5	3	5	3
16	40.50	52.50	4	4	6	3
18	45.50	57.50	5	4	6	3
20	50.50	62.50	5	4	7	3
24	60.50	72.50	6	4	8	3
Larger Sizes, Add per Drop	4.00	5.00				

No. of Drops	Overall Dimensions				Weight
	No. 82 Height	No. 82 Width	No. 482 Height	No. 482 Width	
2	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	1 lb. 9 c
3	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	1 lb. 10 c
4	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	1 lb. 11 c
6	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	5"	7 $\frac{3}{16}$ "	1 lb. 13 c
8	4 $\frac{3}{8}$ "	5 $\frac{1}{4}$ "	5"	7 $\frac{3}{16}$ "	1 lb. 15 c
10	5"	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	2 lbs. 9 c
12	5"	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	2 lbs. 10 c
14	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	3 lbs. 7 c
16	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	8 $\frac{3}{8}$ "	3 lbs. 11 c
18	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	8 $\frac{3}{8}$ "	3 lbs. 12 c
20	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	7 $\frac{3}{16}$ "	8 $\frac{3}{8}$ "	5 lbs. 2 c
24	7 $\frac{3}{16}$ "	8 $\frac{3}{8}$ "	7 $\frac{3}{16}$ "	10 $\frac{1}{2}$ "	6 lbs.
Larger sizes, Add per drop	Depth	2 $\frac{1}{2}$ "	Depth	2 $\frac{1}{2}$ "	

EDWARDS ANNUNCIATORS

Desk and Surface Types

No. 673 DESK MANUAL RESET ANNUNCIETTE



No. 673

A New desk Annunciator much smaller and neater than old-fashioned desk annunciators without affecting clearness of indications. Smooth, positive rest push on top of case assures efficient operation. Base is felt covered to prevent scratching. Buzz audible signal is stand-

d. For convenience in installation a complete assortment of 100 name and numerical indications for drops is furnished with each Annunciator.

Furnished complete with 6 foot cord and connector block.

Schedule T

Standard: Mahogany, Walnut, or Oak Finish and for 8-12 A.C. operation. Any solid spray finish, add 5%. For up to 24 V. A.C. or D.C., no extra charge. Special finishes, textures, etc., extra.

No. of Drops	List Price	Arrangement Across	Arrangement Down	Overall Dim. Hgt.	Overall Dim. Width	Weight
2	\$30.00	2	1	2 1/2"	4"	2 1/4 lbs.
3	35.20	3	1	2 1/2"	4"	2 1/2 lbs.
4	41.60	4	1	2 1/2"	5"	2 3/4 lbs.
5	48.00	5	1	2 1/2"	7"	3 1/2 lbs.
6	54.40	6	1	2 1/2"	7"	3 3/4 lbs.
8	67.20	8	1	2 1/2"	9"	5 lbs.
10	80.00	5	2	3 1/8"	7"	5 1/2 lbs.
Larger Size Add per drop	6.40	..	..	Depth, 2 5/8"	for all sizes	..

Special Features

STANDARD MARKINGS FURNISHED WITH ALL ANNUNCIETTES

Each Annunciator below nineteen drop size furnished with envelope containing 100 different markings (clear white characters on black background), numerals and blanks as listed below. Twenty drop to sixty-eight drop sizes are furnished with 150 different markings same as described above. Over sixty-eight drop size are numbered only. Special markings per drop \$0.30 list.

Numbers—1 to 68, two blanks.

Capital Letters—A, B, C and D.

Names		
Master Bedroom	Nursery	Dining Room
Closet	Den	Breakfast Room
Chamber 1, 2, 3	Living Room	Studio
Guest Room 1, 2	Reception Room	Study
Master Bath	Music Room	Game Room
Closet Bath	Conservatory	Basement
Guest Bath	Library	Sub-Basement
Bedroom 1, 2, 3	Sun Room	1st Floor
Dressing Room	Sun Porch	2nd Floor
Repeating Porch	Terrace	Mezzanine
..
..	Front Door	President 1, 2
..	Rear Door	Vice President 1, 2
..	Side Door	Sales Manager 1, 2
..	Service Entrance	Manager 1, 2
..	Main Entrance	File 1, 2, 3
..	Basement Entrance	Cashier
..	Garage	Assistant Cashier
..	Secretary	Paying Teller
..	Boy 1, 2, 3	Receiving Teller
..	Stenographer 1, 2, 3	Buyer
..	..	Purchasing Agent

EDWARDS ANNUNCIATORS

Special Features

AUTOMATIC RESET ANNUNCIATORS

Surface—Flush—Desk

Automatic Reset must not be confused with electric reset. It provides that a drop in indicating automatically resets any drop previously indicated. The last indication is always left in view until a later one is made. While there are some few cases where it fills a need it reduces the efficiency of the signaling system in most cases. If no one happens to be at the annunciator when the indication appears, it is not likely to be noticed later or if it is noticed, there is no way of telling whether it is a new call or one that has been attended to and left standing. If one drop indicates while someone is not at the annunciator and a second drop indicates before the first one is noticed, the first call is lost entirely. The standard reset method leaves no doubt, if there is an indication it calls for immediate attention.

Automatic Reset can be furnished at no extra charge on all styles of Electric Reset and Electromanual Reset Annunciators listed on previous pages. The electromanual type is preferable for up to 12 drop sizes—electric reset type for larger sizes.

MANUAL AND ELECTROMANUAL RESET ANNUNCIATORS

Standard Voltage—Shown on page where annunciator is listed.

Special Voltage—Up to 24 Volts A.C. or D.C., when specified, no extra charge. Over 24 Volts A.C. or D.C., add to list 20%.

Special Finishes

	Add to List
Any Solid Spray Colour.....	5%
Grained Wood Finishes.....	10%
Solid Brass or Bronze Case finished or plated as specified (except chromium).....	25%
Chromium finish.....	40%

Closed Circuit Annunciators—Add \$10.55 list per drop to any style hand reset annunciator.

ELECTRIC RESET ANNUNCIATORS

Standard Voltage—Shown on page where annunciator is listed.

	Add to List Price
Special Voltage—Up to 24 Volts D.C. or A.C., no charge. 25 to 40 Volts add per drop.....	\$ 1.00

Special Commercial Finishes other than standard except chromium, add per annunciator: 4 to 10 drop, \$6.00 list; 12 to 24 drop, \$8.00 list; 26 to 52 drop, \$12.00 list; over 52 drop..... 16.00

Solid Bronze or Brass Cases or Chromium Finish on Annunciator—Add per annunciator: 4 to 10 drop, \$12.00 list; 12 to 24 drop, \$20.00 list; 26 to 52 drop, \$30.00 list; over 52 drop..... 50.00

Individual Reset on all Wall Type Annunciators with pushes on case, per push..... 4.00

With terminals only for remote control, per terminal..... .60

On all Desk Type Annunciators..... 6.00

Special Arrangement of drops, same addition as for commercial finishes above.

Special Markings other than number, per drop... .30

Bell Instead of Buzzer..... 3.00

Switch on Case, 1 or 2 point..... 3.50

EDWARDS ANNUNCIATORS Return Call Systems

For Y.M.C.A. Buildings, Dormitories, Small Hotels, Etc.



No. 12 or No. 412

and Return Call room stations provides a most efficient system with much less possibility of trouble, fewer wires, only one transformer, and lower installation cost.

RETURN CALL ANNUNCIETTES MANUAL RESET

No. 12 Flush Type with Metal Face Plate and Wall Box.
No. 10 Surface Type with Metal Case.

Smaller and neater units than old-fashioned Return Call Annunciators without affecting clearness of indications. Have push button for calling each room station, and drops for recording calls or acknowledgement of a call from the rooms. Push button type manual reset. All drops are reset at once. For individual reset of drops see No. 415 Electric Reset Annunciator. For convenience in installation, a complete assortment of name and numerical indications for drops are furnished with each Annunciette. Buzz audible signal is standard.

ELECTROMANUAL RESET

No. 412 Flush Type with Metal Face Plate and Wall Box.
No. 410 Surface Type with Metal Case.

Ideal for return call systems where it is desirable to reset the Annunciette from a remote point. Resets all drops at once. Individual reset of drops not possible. While reset mechanism is actuated electrically, manual, mechanical reset remains in case of emergency. Other features same as Manual Reset Types above.

Standard: Nos. 12, 412, 10, 410 Black Finish, and for 8-12 V. A.C. or 6-8 V. D.C. operation. Mahogany, Walnut or Oak, no extra charge. For up to 24 V. A.C. or D.C. no extra charge. Special finishes, features, etc., extra.

Schedule T

No.		Schedule 1			Wallcut		
of	List Price	Arrangement	Dimensions		Wgt.		
Drops	No. 12	No. 412	Across	Down	Height	Width	Lbs.
16	\$153.00	\$163.00	8	2	10 ³ / ₄ "	13 ¹ / ₈ "	10 ¹ / ₂
20	165.00	175.00	7	3	13 ¹ / ₈ "	12 ¹ / ₈ "	11
25	189.00	199.00	9	3	13 ¹ / ₈ "	14 ¹ / ₈ "	12 ¹ / ₂
30	210.00	220.00	9	4	15 ¹ / ₂ "	14 ¹ / ₈ "	14 ¹ / ₄
40	265.00	285.00	10	4	15 ¹ / ₂ "	15 ¹ / ₈ "	16 ¹ / ₂
50	320.00	340.00	10	5	17 ⁷ / ₈ "	15 ¹ / ₈ "	20
60	364.00	384.00	12	5	17 ⁷ / ₈ "	17 ¹ / ₈ "	23 ³ / ₄
70	410.00	430.00	12	6	20 ¹ / ₄ "	17 ¹ / ₈ "	38 ³ / ₄
80	461.00	481.00	14	6	20 ¹ / ₄ "	19 ¹ / ₈ "	33 ¹ / ₄
90	508.00	528.00	15	6	20 ¹ / ₄ "	20 ¹ / ₈ "	38 ¹ / ₄
100	553.00	573.00	15	7	22 ⁵ / ₈ "	20 ¹ / ₈ "	43 ¹ / ₄

Larger Sizes—Add per drop, \$7.00 list. Depth—4¹/₈"
Overall Trim Size—Add 1/2" to height and 1/2" to width.

	No. 10	No. 410					
16	\$140.00	\$150.00	8	2	8 ⁵ / ₈ "	11"	10 ¹ / ₂
20	152.00	162.00	7	3	11"	10"	11
25	176.00	186.00	9	3	11"	12"	12 ¹ / ₂
30	197.00	207.00	9	4	13 ³ / ₈ "	12"	14 ¹ / ₄
40	252.00	272.00	10	4	13 ³ / ₈ "	13"	16 ¹ / ₂
50	307.00	327.00	10	5	15 ³ / ₄ "	13"	20
60	351.00	371.00	12	5	15 ³ / ₄ "	15"	23 ³ / ₄
70	397.00	417.00	12	6	18 ¹ / ₈ "	15"	28 ³ / ₄
80	448.00	468.00	14	6	18 ¹ / ₈ "	17"	33 ¹ / ₄
90	495.00	515.00	15	6	18 ¹ / ₈ "	18"	38 ¹ / ₄
100	540.00	560.00	15	7	20 ¹ / ₂ "	18"	43 ¹ / ₄

Larger Sizes—Add per drop, \$7.00 list. Depth—3¹/₂".

These systems are arranged so that the rooms may be called from the office or central station, or vice versa, and the call may be acknowledged. Particular attention is called to the fact that the use of the ordinary type annunciator, push buttons, and bells or buzzers greatly complicates and adds to the expense of the installation; whereas the use of Edwards Return Call Annunciators

EDWARDS ANNUNCIATORS Return Call Systems (Continued)

For Y.M.C.A. Buildings, Dormitories, Small Hotels, Etc.

ELECTRIC RESET RETURN CALL ANNUNCIATOR No. 415 SURFACE ELECTRIC RESET



No. 415

drops. Where desired, this annunciator can be arranged for individual resetting of each drop. Buzz audible signal standard.

Standard: Black Finish, and for 16 V. A.C. or 8 V. D.C. operation. Mahogany, Walnut, or Oak, no extra charge. For up to 24 V. A.C. or D.C., no extra charge. Special finishes, features, etc., extra.

Schedule T

Schedule 1							
No. of	List	Arrangement		Dimensions			Wgt
Drops	Price	Across	Down	Height	Width	Depth	lbs
25	\$221.00	9	3	14 ³ / ₈ "	16 ¹ / ₂ "	3 ⁵ / ₈ "	23
30	247.00	10	3	14 ³ / ₈ "	18"	3 ⁵ / ₈ "	25
36	283.00	9	4	17 ¹ / ₄ "	16 ¹ / ₂ "	3 ⁵ / ₈ "	28
42	331.00	11	4	17 ¹ / ₄ "	19 ¹ / ₂ "	3 ⁵ / ₈ "	33
49	377.00	10	5	20 ¹ / ₈ "	18"	3 ⁵ / ₈ "	37
56	416.00	12	5	20 ⁷ / ₈ "	21 ³ / ₄ "	3 ³ / ₄ "	41
64	468.00	13	5	20 ⁷ / ₈ "	23 ¹ / ₄ "	3 ³ / ₄ "	46
72	512.00	15	5	20 ⁷ / ₈ "	26 ¹ / ₄ "	3 ³ / ₄ "	52
81	567.00	14	6	23 ³ / ₄ "	24 ³ / ₄ "	3 ³ / ₄ "	57
90	619.00	15	6	23 ³ / ₄ "	26 ¹ / ₄ "	3 ³ / ₄ "	62
100	676.00	15	7	26 ⁵ / ₈ "	26 ¹ / ₄ "	3 ³ / ₄ "	69



No. 139 Ansercall
(Non-indicating)



No. 140 Ansercall
(Indicating)

Schedule T

A. C. ANSERCALLS

8-12 Volts A.C. Standard, up to 24 Volts A.C. no extra charge.

No. 139

This new Return Call Station replaces all old-fashioned stations except where D.C. operation is required. It is any standard single gang switch box 2³/₈" deep and takes a standard push button switch plate.

Buzz audible signal has no contacts or pivots and requires no adjustment. May, however, be varied, after installation from loud low tone to a soft high tone through hole in switch plate. The push button is new and of a more dependable design. Marked binding posts are easily accessible.

List No. 139, less plate, weight 8 ozs., List Price.... \$4

No. 140

This new Return Call Station has Annunciette type drop which leaves a visual signal. Operation of push button when call is answered, automatically resets drop. It is especially recommended for use in Y.M.C.A. buildings, dormitories, and other places where it is desirable to leave an indication that a call has been made to the room during the occupant's absence. It fits any standard single gang switch box 2³/₈" deep, and takes any standard single gang push button switch plate.

List No. 140, less plate, weight 8 ozs., List Price.... \$9

EDWARDS ANNUNCIATORS

Return Call Systems

No. 136 SURFACE RETURN CALL STATION



No. 136



No. 137

This is designed particularly for installation in existing buildings. Provides a very neat appearing plate mounted on shallow cast box which provides entrance for conduit or wires as desired. The audible signal is an Edwards adjustable Lungen Buzzer, and the station is completely wired for installation with the special Edwards No. 5 Return Call Push. It is suitable for operation with any of the return call annunciators.

The cast box is rubberoid black, the plate brushed brass or nickel.

List No.	Schedule	Wgt. Lbs.	List Price Each
136	T	1½	\$6.00

Nickel plate can be furnished if desired—Additional charge..... \$0.25 list

No. 137 FLUSH RETURN CALL STATION

A flush plate of pleasing design for mounting on a standard single gang switch box. The audible signal is an Edwards adjustable Lungen Buzzer, and the station is completely wired for installation with the special Edwards No. 5 Return Call Push. It is suitable for operation with any of the return call annunciators.

Standard finish brushed brass or nickel plate.

List No.	Schedule	Wgt. Lbs.	List Price Each
137	T	½	\$5.00

Nickel plate can be furnished if desired—Additional charge..... \$0.25 list

No. 138 INDICATING RETURN CALL STATION



No. 138
Indicating Return
Call Push and Buzzer

For use in college dormitories and other places where it is desirable to leave an indication that a call has been made to the room during the occupant's absence. It fits a standard two-gang switch box. The audible signal is an Edwards double adjustment Lungen Buzzer. The visible signal is a white arrow which is sharply outlined through a small round glass window. One push button is for the return call, the other to reset the indicating arrow. It is suitable for operation

any of the return call annunciators.

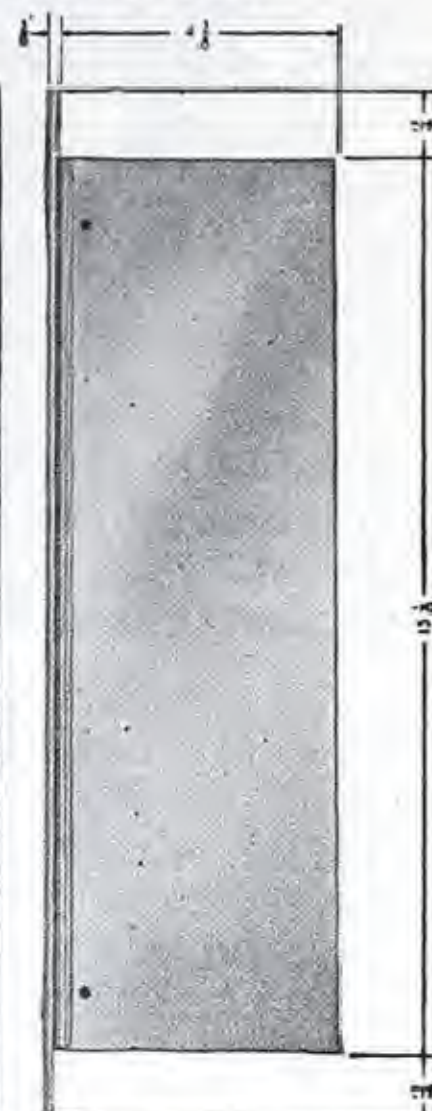
List No.	Schedule	Wgt. Lbs.	List Price Each
138	T	1	\$12.00

AMALGAMATED APARTMENT MAIL BOXES

Approved by the Postmaster-General



No. 35



This new type Apartment Mail Box has features already fully approved by the Postmaster-General as improvements over the types of Mail Boxes formerly used.

A few of the features incorporated in this new type Mail Box are:

1. Multiple locking of top door, making it a practically fool-proof feature.
2. Entire front and doors made of heavy brass and finished on all sides and edges with a rust-proof and long wearing satin brass lacquer.
3. Brass doors are heavily re-inforced with steel back-plate.
4. Tenants' locks are of approved type from which keys cannot be removed until door is properly locked.
5. Each lock can be opened only with proper key. There is no master key.
6. Containers are of full size for papers and magazines.
7. Containers are constructed of heavy lead-coated steel, being non-tarnishable and rust-proof. Always clean and sanitary.

Height of Box: 15½". Depth of Box: 4¾".

Height of Flush Plate: 17".

List No.	For Number of Tenants	Width of Box	Width of Flush Plate	List Price Each With Push Buttons	List Price Each Plain
31	1	3⅝"	5⅜"	\$ 9.00	\$ 8.50
32	2	7"	8¾"	18.00	17.00
33	3	10⅜"	12⅛"	27.00	25.50
34	4	13¾"	15½"	36.00	34.00
35	5	17⅛"	18⅞"	45.00	42.50
36	6	20½"	22¼"	54.00	51.00
37	7	23⅞"	25⅝"	63.00	59.50
38	8	27¼"	29"	72.00	68.00
39	9	30⅝"	32⅜"	81.00	76.50

Mail Boxes are supplied with push button in top of flush plate immediately above each tenant's door, or without push buttons (plain).

When space is limited, boxes may be mounted in two rows.

Where boxes are required for more than nine tenants, two sections are needed. For example, a twelve-suite apartment is supplied with two No. 36 boxes.

Each tenant's door is fitted with inside card holders, which cannot be changed excepting by opening door.

When janitor lives on premises, regulations require a mail box for delivery of mail to him.

The Standard Finish of Apartment Mail Boxes is Satin Brass. Other finishes can be supplied at extra cost. Prices on application.

EDWARDS DOOR OPENERS

Edwards door openers are compact and rugged. Available for use under the most varying conditions, and may be installed at a minimum expense. All door openers may be used on either right or left hand doors, except No. 1541, where right hand or left hand must be specified when ordering.

Operation. Although the pressure exerted by the ordinary door is well under 50 lbs., all door openers, with the exception of the No. 9, are tested with a pressure on the nosing of approximately 50 lbs. In exceptional cases, when the nosing pressure will exceed this, the factory must be so advised.

Door openers are installed in the door frame, taking the place of the strike plate. The door may be opened with key in the usual way, according to the type of latch used. Electric operation of the door opener simply allows nosing to pass without use of key.

All standard stock door openers will operate on $4\frac{1}{2}$ to 6 Volts D.C. All standard stock door openers will also operate on 12-16 Volts, 60 cycles A.C., with the exception of the No. 52, which operates on D.C. only and the No. 9, which is recommended for operation on 8-12 Volts A.C. When A.C. is to be used, the Edwards No. 88 Transformer is recommended. Door openers cannot be furnished for 110 Volt operation.

The No. 9 is specially designed for use where an inexpensive door opener is desired.

Air Release Check. This feature keeps the door opener in the unlocked position after button is pushed, until it is returned to its normal locking position by a trip, which operates when door is pushed open. All door openers except Nos. 9 and 52 can be equipped with a release check, for which add to list \$2.00.

Special Voltage. All door openers except the No. 9 can be furnished specially wound as follows:

For up to 12 volts.....	Add to List \$1.00
For up to 24 volts.....	Add to List 1.50
For up to 32 volts.....	Add to List 2.50
For up to 48 volts.....	Add to List 4.00



No. 9



No. 152

No. 9 ECONOMY, MORTISE TYPE

Standard: $4\frac{1}{2}$ -6 Volts D.C. or 8-12 Volts A.C.

Face plate and nosing, solid brass. Used extensively for low cost apartment jobs. Fits same size mortise as same shape openers of other manufacturers. Height $3\frac{5}{8}$ ", depth $2\frac{1}{8}$ ", thickness 1". Nosing openings $1\frac{3}{16}$ ". Face plate $5\frac{7}{8}$ " x $1\frac{1}{4}$ ". See No. 154 for better grade jobs.

Schedule E

Standard Package, 50; Weight 1 lb.....List Price \$3.00

No. 152 COMMERCIAL, RIM TYPE

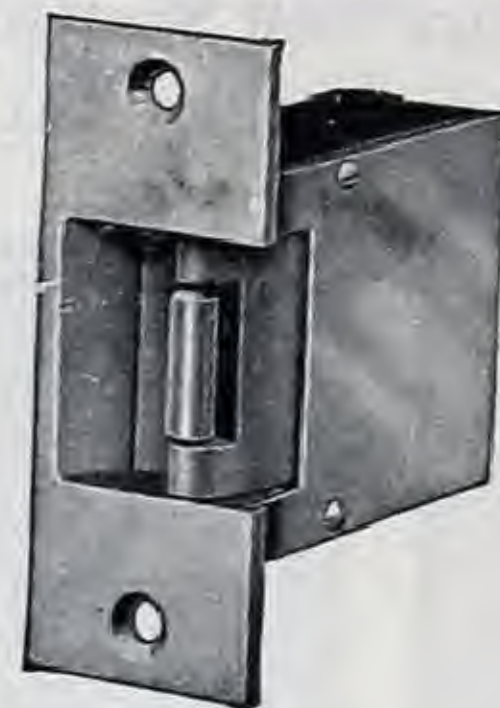
Standard: $4\frac{1}{2}$ -6 Volts D.C. or 12-16 Volts A.C.

Solid nose. For surface locks, thin frames, etc. Made of cast iron and very substantial. Height 2", depth 3", thickness $1\frac{1}{8}$ ". Nosing opening $1\frac{1}{4}$ ".

Schedule T

Weight 13 ozs.....List Price \$5.00

EDWARDS DOOR OPENERS



No. 154

No. 154 ROLLER NOSE, MORTISE TYPE

Standard: $4\frac{1}{2}$ -6 Volts D.C. or 12-16 Volts A.C.

Roller nose. For better grade jobs than the No. 9, requiring smaller mortise. Height $3\frac{3}{8}$ ", depth $2\frac{7}{8}$ ", thickness $1\frac{1}{4}$ ". Nosing opening $1\frac{1}{4}$ ". Face plate $1\frac{1}{4}$ " x $3\frac{3}{8}$ ". Finish brass.

Schedule T.....Weight 14 ozs.....List Price \$5.00

EDWARDS BURGLAR ALARM MATERIALS



No. 27 Trap



No. 29 Trap

BURGLAR ALARM TRAPS

Installed with cord or wire stretched across entrance open spaces, or attached to doors, windows, etc. Slight movement of cord or wire operates trap, which makes a holds contact causing continuous ringing of bell without other additional devices.

No. 27 covered type, substantial and most dependable.

Schedule E Standard Package—10—May be assorted

List Price

No. 27 For Open Circuit.....Weight 6 ozs.....\$1.00

No. 27-C For Closed Circuit....Weight 6 ozs.....1.00

No. 29 uncovered type, satisfactory for low cost jobs.

Schedule E Standard Package—20—May be assorted

No. 29 For Open Circuit.....Weight 2 ozs.....\$0.50

No. 29-C For Closed Circuit....Weight 2 ozs.....0.50

ELECTRIC MATTING

For use in open circuit systems to protect entrance stairways, etc., that are otherwise difficult to protect. Can be placed under carpets or other places where foot pressure will close contact. Full length roll can easily be cut in any lengths desired on the job, but the width cannot be changed.

SCHEDULE E

Standard Package—1 full roll, 10 feet long, 2 feet wide

List Price \$3.00 per square foot.

TIN FOIL RIBBON

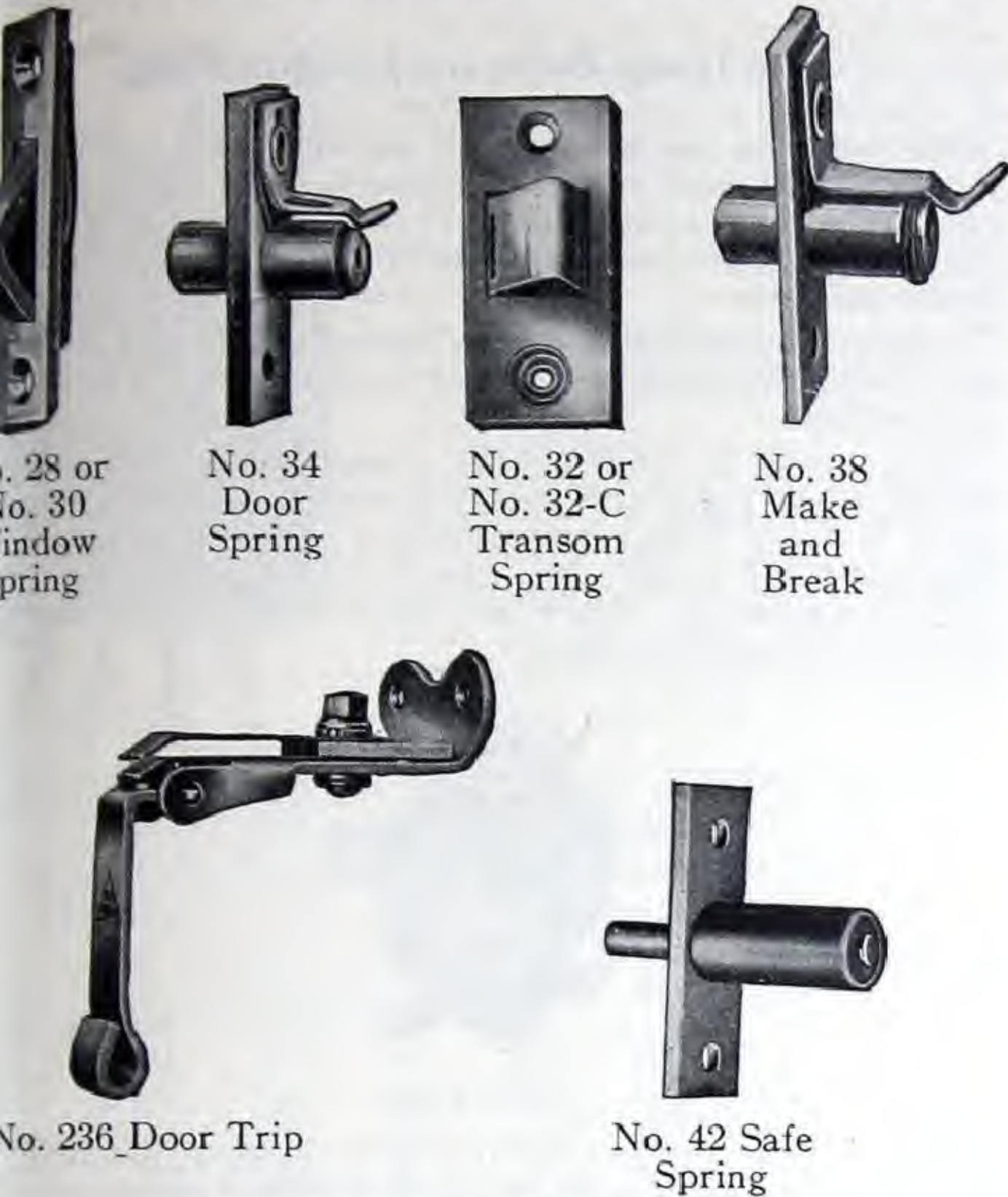
For protecting glass, show windows, etc. Usually placed around glass as a border and soldered at each end to wire so as to form part of a closed circuit. Breakage of glass breaks ribbon and opens circuit. Best secured with "liquid glass" and finished with a coat of shellac.

Schedule E Standard Package 10 Rolls (10 lbs.)

1 pound roll, approximately 300 foot per roll, size $\frac{3}{8}$ " w

List Price \$1.20 per roll

EDWARDS BURGLAR ALARM SPRINGS



BURGLAR ALARM SPRINGS

Window springs should be placed in the frame several inches above the lower end of the upper sash—and the same distance below the upper end of the lower sash. Each sash should be mortised so the nosing of the spring will be set in the recess when the window is closed. The mortise should be continued (beyond the necessary point) to permit the opening of the window for ventilation. It is advisable (although not necessary) that this system of installation be followed—without the mortise anyone trying to enter the house and opening of the window springs can very easily open the window gradually, and hold the spring depressed with the finger. The Edwards springs when properly used as described are classified as follows:

Open Circuit Window Springs—nosing in normal position contact is broken.

Closed Circuit Window Springs—nosing in normal position contact is established.

Open Circuit Door Springs—plunger in normal position contact is established.

Closed Circuit Door Springs—plunger in normal position contact is broken.

If window sash will not be mortised as described above, the open and closed circuit listings for window springs should be reversed.

Schedule E. Standard Package shown below, but 50 may be assorted.

Open Circuit	List Price	Std. Pkg.	Size Plate	Weight
Window Spring	\$0.50	10	2 1/2" x 1 1/2"	10 ozs.
Window	.80	10	3 3/8" x 5/8"	1 lb. 2 ozs.
Transom	1.10	10	2 1/2" x 1 1/16"	1 lb. 8 ozs.
Door	.42	50	2" x 5/8"	2 lb. 13 ozs.
Make & Break	.42	10	2" x 5/8"	1 lb. 2 ozs.
Door Trip	1.05	10	2 1/4" x 1 1/4"	14 ozs.
Window	.80	10	3 3/8" x 5/8"	1 lb. 3 ozs.
Door	.42	10	2" x 5/8"	1 lb. 2 ozs.
Transom	1.10	10	2 1/2" x 1 1/16"	1 lb. 8 ozs.
Safe	.42	10	1 3/4" x 5/8"	1 lb.
Plate for No. 42	.06	10	1 3/4" x 5/8"	8 ozs.

Insulated Window Springs—No. 31 Open Circuit, No. 31-C Closed Circuit.

Insulated Door Springs—No. 35 Open Circuit, No. 35-C Closed Circuit.

Schedule T. *Standard Package—1...List Price \$3.00

EDWARDS BURGLAR ALARM MATERIAL



BURGLAR ALARM LOCK SWITCHES

Lock Switches to be mounted outside the door so persons having key may enter without giving alarm. Finish—Polished Brass.

Schedule T

Standard Package—1

List Price

No. 95, complete with mounting plate and wood screws. Weight 3/8 lb. \$6.50

No. 95-A, two locks. On entering alarm is turned off and after entering turned on inside. Weight 3/4 lb. 13.00

No. 95-B, same as No. 95, with rod to go through door, fastened by nuts inside. Weight 1/2 lb. each.. 7.95

Extra Keys..... 0.80

CONSTANT RINGING DROPS



Especially designed for use in Burglar Alarm Systems. With momentary closing of protective circuit (door springs, window springs, etc.) this device causes bell to ring continuously, irrespective of subsequent opening of protective circuit. Plunger resets mechanism.

The No. 26-B for ordinary use (6-8 V. D.C., 8-12 V. A.C.). The No. 26-C recommended for battery systems where alarm may ring for several hours—it cuts own magnet out of circuit thereby reducing battery drain.

Standard up to 16 V. A.C. or 12 V. D.C. Special voltages up to 48 Volts add to list \$1.30.

Schedule T

Standard Package—1

No. 26-B.....Weight 1/2 lb.....List Price \$2.70

No. 26-C.....Weight 1/2 lb.....List Price 2.70

No. 1238 OPEN TYPE DIXIE RELAY FOR D.C.

Adjustable for low voltage D.C. open or closed circuit operation. (See No. 1239 for A.C.) Designed especially for Burglar Alarm installations. Pure hard-drawn silver contacts. 250 ohms recommended for closed circuit systems. Contacts 1 ampere.

Schedule T

Standard Package—1

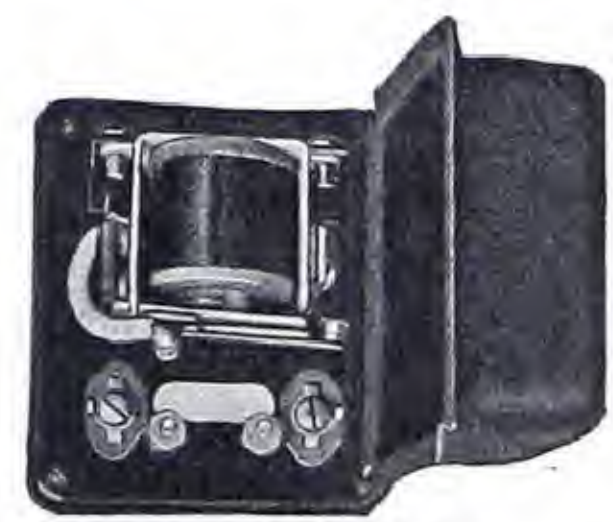
20 Ohms.....Weight 1 lb.....List Price \$6.00

250 Ohms.....Weight 1 lb.....List Price 7.00

251 to 600 Ohms.....Weight 1 lb.....List Price 8.00



No. 1238 Relay



No. 1239 Relay

No. 1239 ENCLOSED TYPE RELAY FOR A.C. OR D.C.

No. 1239 small, compact, enclosed A.C. or D.C. open or closed circuit type as specified. Specify operating voltage. Contacts 3 amperes, 110 Volts A.C. 6 amperes up to 48 Volts A.C. Contacts 1 ampere, 110 Volts D.C., 2 amperes up to 48 Volts D.C.

Schedule T

Standard Package—1

8-24 Volts.....Weight 14 ozs....List Price \$6.00

25-48 Volts.....Weight 14 ozs....List Price 6.75

110 Volts.....Weight 14 ozs....List Price 8.00

EDWARDS DOORBELL TRANSFORMERS

Edwards transformers are correctly designed for the proper operation of all signaling devices.



No. 86



No. 86T



No. 86ER

For Open Surface Wall Mounting

No. 86—Steel Clad, Single Voltage. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts.

No. 86T—Steel Case, Tri-Volt (6-12-18). Will deliver approximately 18 Volts at no load and 7/10 ampere at 9 Volts (on 18 Volt tap).

No. 87—Porcelain case, Single Voltage. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts.

For Enclosed Mounting in Standard Boxes

No. 86ER—Round Outlet Box Type. Fits on 3 1/4" Octagon Boxes. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts. Will also fit 4" round boxes.

No. 86ES—Square Outlet Box Type. Fits on 4" Square or 3 1/4" Octagon Boxes. Has a knockout for drop cord to provide light in basement. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts.

No. 860—Enclosed in Cutout Box with double pole fusing. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts.

No. 860P—Enclosed in cutout box with single pole fusing. Will deliver approximately 9 Volts at no load and 1 ampere at 6 Volts.

No Secondary Fusing Required on the Above Transformers.

110 Volt transformers can be used on 110-130 Volts A.C. and 50-60 cycles. 25 Cycle transformers can be used on 25 to 40 cycles

Schedule E

List No.	List Price	Watts	Primary Volts	Cycles	Std. Pkg.	Weight
86	\$.84	5	110	60	50	52 lbs.
86	1.68	5	110	25	50	52 lbs.
86T	1.55	5	110	60	20	27 lbs.
86T	3.10	5	110	25	20	27 lbs.
87	1.80	5	110	60	20	36 lbs.
87	3.60	5	110	25	20	36 lbs.
86ER	1.16	5	110	60	20	28 lbs.
86ER	2.32	5	110	25	20	28 lbs.
86ES	1.16	5	110	60	20	30 lbs.
86ES	2.32	5	110	25	20	30 lbs.
860	3.00	5	110	60	10	39 lbs.
860	3.50	5	110	25	10	39 lbs.
860P	3.00	5	110	60	10	37 lbs.
860P	3.50	5	110	25	10	37 lbs.

205-210 or 215-230 or 240-250 Volts, 50-60 cycles—Add to List 15%.

JEFFERSON TRANSFORMERS

For Door Bells and Signalling

The Jefferson line of door bell and signalling transformer is designed to meet every requirement from the single door bell of the small cottage to the complicated bell and signalling systems of large apartment buildings, industrial plants or public buildings.

Jefferson transformers are of perfectly balanced construction, giving the maximum output consistent with low heating requirements.

Each model is listed by the Underwriters' Laboratories. Compactness, rugged construction and efficiency are features found in every Jefferson transformer. All types, except the Porcelain-Klad model, are assembled in attractive black enamelled housings. Black and white primary leads indicate positive and negative wires.



WIZARD

Designed for the average residence or small flat building. The secondary is 10 volts, which is sufficient to operate door bells, buzzers, annunciators and door openers used in the above service. Size, 2 1/4" x 2 3/8" x 2 3/8". Weight, 1 lb.

List No.	Watts	Volts	Cycles	List Price Each
230-101.....	5	100-120	50-133	\$1.0
230-102.....	5	100-120	25-40	2.0

For 220 volt add 15% to 110 volt prices.



Tri-Volt



Porcelain-Klad

TRI-VOLT

Has three secondary voltages 6, 12 and 18 volts. Recommended where longer leads are used or where the voltage required is greater than that supplied by the 10 volt transformers.

Size, 2" x 2 1/2" x 3 3/4". Weight, 1 1/2 lbs.

List No.	Watts	Volts	Cycles	List Price Each
230-121.....	5	100-120	50-133	\$2.0
230-122.....	5	100-120	25-40	4.0

For 220 volt, add 15% to 110 volt prices.

PORCELAIN-KLAD

A porcelain covered moisture-proof transformer with metal base which eliminates the danger of breaking or chipping the case. Secondary 10 volts.

Size, 3 1/8" x 3 1/8" x 1 7/8". Weight, 1 3/4 lbs.

List No.	Watts	Volts	Cycles	List Price Each
230-131.....	5	100-120	50-133	\$2.0

Made in above voltage and frequency only.

EDWARDS SIGNALING TRANSFORMERS



A new line of signaling transformers, designed to have more wattage capacity, and supplied with a greater number of low voltage taps than the Door Bell type.

These transformers are furnished with 50-100-250-500-750 and 1000 watt ratings. The secondary voltages are 4-8-12-16-20 and 24. Twelve inch leads are standard except on 750 and 1000 watts.

This improved range of secondary voltages is a distinct advantage inasmuch as Edwards transformers will operate practically any standard signaling device on the market. This reduces the necessity for special transformers, and more important for specially wound signaling devices.

110 Volt transformers can be used on 110-130 Volts A.C. and 50 to 60 cycles

25 Cycle transformers can be used on 25 to 40 cycles

Schedule T

Standard Package—1

List No.	Price	Watts	Cycles	Height	Wd.	Depth	Weight
88	\$ 6.26	50	60	4 7/8"	3 7/16"	2 9/16"	3
88	10.00	50	25	5 5/8"	4 5/16"	2 7/8"	6
90	10.00	100	60	5 9/16"	4 5/16"	3 3/8"	7
90	16.00	100	25	6 5/16"	4 7/8"	4 1/4"	12
94	22.50	250	60	6 5/16"	4 7/8"	4 1/4"	12
94	36.00	250	25	6 5/16"	4 7/8"	4 1/4"	14
99	36.26	500	60	9 1/2"	6"	4 7/8"	28
99	58.00	500	25	9 1/2"	6"	6"	35
94	48.12	750	60	10 1/2"	7"	6 1/2"	42
94	77.50	750	25	10 1/2"	7"	6 1/2"	50
95	60.00	1000	60	12 3/4"	7 1/2"	6 1/2"	55
95	96.26	1000	25	12 3/4"	7 1/2"	6 1/2"	62

110 Volts.

†Ratings apply to 24 Volt tap.

205 to 210 or 215 to 230 or 240 to 250 Volts, 50 to 60 cycles—Add to list 15%.

All-steel cabinet with hinged door and necessary knockouts for conduit. Proper fused cutouts for primary and secondary windings. Finish Black.

Schedule T

Standard Package—1

Surface Type, Cabinet Only—Add to List	.....	\$12.00
Push Type, Cabinet Only—Add to List	.....	14.00
or Steel Barrier (separating primary and secondary)—Add to List of Cabinet	.....	3.00

TRANSFORMER CHARACTERISTICS

List No.	Correct Primary Fuse Amps.	Approx. Exciting Current (60 Cyc.)	Correct Secondary Fuse For Any Low Voltage Tap Amps.	Maximum Safe Continuous Current Amps.
86ES, 86ER, 86T	3-5	0.016	2	Short Cir. 2.5
86T	3-5	0.016	2	Short Cir. 2.5
666	3-5	0.014	2	Short Cir. 2.5
88	3-5	0.065	2-3	2.2
90	3-5	0.110	5-6	5.5
94	5-10	0.180	10-12	10.0
99	10	0.225	20-25	22.5
194	15	.....	30-55	36.0
195	15	.....	45-50	50.0

Terminal Voltage at Maximum Safe Current of 24 V. of 20 V. of 16 V. of 12 V. of 8 V. of 4 V.

Transformer	Tap Volts	Tap Volts	Tap Volts	Tap Volts	Tap Volts	Tap Volts
88	22.5	18.5	15.0	11.2	7.5	3.7
90	21.0	17.5	14.0	11.0	7.0	3.5
94	22.5	18.5	15.0	11.2	7.4	3.7
99	21.0	17.5	14.0	11.0	7.0	3.5
194	21.0	17.5	14.0	10.5	7.0	3.6
195	22.5	18.5	15.0	11.2	7.4	3.7

JEFFERSON SIGNALING TRANSFORMERS

H.E.P.C. App. No. 2952



No. 231-101
50 Watts



No. 231-141
and 231-151
250 and 500 Watts

Jefferson Signalling Transformers have been designed primarily for the most efficient operation of the present types of alternating current bells, horns and gongs, and for supplying low voltage power for the operation of complete signalling systems including relays, controls, lamps, recorders, annunciators, etc.

The core and windings of each transformer are hermetically sealed in a heavy metal case for protection against dampness. To comply with the National Board of Underwriters' Specifications, transformers are equipped with flexible secondary leads, although if desired the binding posts can be supplied.

The correct transformer for any specific installation must be determined by the maximum power required for the operation of the signalling equipment. Thus, if a single heavy duty 24-volt gong requires 50 watts, the No. 321-101 transformer should be selected, while if 4 such gongs are to be rung simultaneously, the No. 231-141 transformer is chosen. Should devices requiring lower voltages be used in the same installation, such units may be connected to the lower voltage taps of the same transformer.

All Jefferson signalling transformers are designed to be connected to the line continuously with very low power losses and to deliver full power at the maximum secondary voltage for intermittent service. Reduced voltage taps are rated to deliver power in proportion of the lower voltage to the maximum secondary voltage. For example: using the 16-volt tap on a 24-volt transformer, the rating of this tap would be 16/24 or 66% of the transformer rating.

List No.	Pri. Watts	Pri. Volts	Cycles	Secondary Voltages	List Price Each
231-101	50	100-120	50-133	4, 8, 12, 16, 20, 24	\$ 8.00
231-102	50	"	25-40	" " " " " "	12.75
231-111	100	"	50-133	" " " " " "	12.75
231-112	100	"	25-40	" " " " " "	20.50
231-141	250	"	50-133	" " " " " "	29.00
231-142	250	"	25-40	" " " " " "	46.00
231-151	500	"	50-133	" " " " " "	46.00
231-152	500	"	25-40	" " " " " "	74.50
231-171	750	"	50-133	" " " " " "	61.75
231-172	750	"	25-40	" " " " " "	99.50
231-181	1000	"	50-133	" " " " " "	77.00
231-182	1000	"	25-40	" " " " " "	123.00

Dimensions and Weights of 60-cycle Types

List No.	Watts	Depth	Width	Length	Wgt. Lbs.
231-101	50	3 3/4	4 1/8	6 11/16	7 1/2
231-111	100	3 3/4	4 1/8	6 11/16	11 3/4
231-141	250	5	4 7/8	7 5/8	14 3/4
231-151	500	6	5	11	28
231-171	750	6 3/4	5	11	35
231-181	1000	7	8 1/4	12	59

JEFFERSON TRANSFORMERS

For Door Bells and Signalling



No. 230-111



No. 230-141

NUCODE (WITH ROUND OR SQUARE COVER)

Nucode is identical with the Wizard, except that it is mounted on an outlet box cover, either round or square. The round cover will fit both $3\frac{1}{4}$ " and 4" octagon boxes, and the square cover, either $3\frac{1}{4}$ " or 4" octagon and 4" square boxes.

Secondary voltage, 10 volts. Size, $2\frac{1}{4}$ " deep, $2\frac{3}{8}$ " wide, $2\frac{1}{4}$ " high. Weight, $1\frac{1}{8}$ lbs.

List No.	Watts	Primary Volts	Cycles	List Price Each
230-111	5	100-120	50-133	\$1.50
230-112	5	100-120	25-40	3.00
230-141	5	100-120	50-133	1.50
230-142	5	100-120	25-40	3.00

(For 220 volt, add 15% to 110 volt prices)

Jefferson Toy Transformers



No. 535-161



No. 535-191

These new Jefferson transformers are particularly desirable for use with remote control and reversible type engines. With geared voltage, it is possible to increase or decrease the speed of the train without throwing the engine into reverse because of the fact that there is no break in the voltage, causing the current to go back to zero and thereby operating the reversing mechanism of the engine. The stop position provided in this new style transformer, readily takes care of the reversing of the train when so desired. Likewise, this very fine regulation of secondary voltage eliminates the necessity of a separate rheostat in the secondary circuit to prevent reversing of the engine and to prevent the train from jumping the track such as occurs with a transformer having voltage regulation of one or two-volt steps.

Liberal design and sturdy construction, both electrically and mechanically, make Jefferson transformers ideal for typical-boy service. A sub-base is provided in accordance with Underwriters' specifications to insure complete circulation of air and cool operation. New one-piece binding posts with knurled heads and burred ends to prevent removal and loss are also a feature. All models are assembled in attractive black wrinkle finish cases.

The four new types listed provide a type for every requirement. These range in capacity from 50 to 150-watts and the data shown indicates exactly what equipment each transformer will satisfactorily operate. In addition, this information is shown on the label attached to the carton of each transformer preventing the possibility of inexperienced help selling the incorrect type of transformer with each train outfit.

JEFFERSON TRANSFORMERS

Jefferson Toy Transformers

LITTLE JEFF—CAPACITY 50 WATTS

The Little Jeff 50 watt toy transformer delivers secondary switch voltages ranging from $6\frac{1}{2}$ to $11\frac{1}{2}$ -volts in changes averaging fifteen one-hundredths (.15) of a volt per step. This transformer is recommended for operating all narrow gauge American Flyer, Bing, Borgfeldt, Dorfan, Ives and Lionel train outfits and Gilbert toy motors.

Listed as standard by Underwriters' Laboratories.

MIDGET—CAPACITY 75 WATTS

The Midget toy transformer delivers secondary switch voltages ranging from $5\frac{1}{2}$ to $22\frac{1}{2}$ -volts, with additional permanent voltages of 6 and 12-volts. This transformer delivers approximately 120 different voltages between $5\frac{1}{2}$ and $22\frac{1}{2}$ -volts in steps approximately .15 volt each. It will operate Ives trains, all narrow and small sized wide gauge outfits, American Flyer—all narrow and small sized wide gauge trains, Lionel trains—all "O" gauge, and small sized standard gauge. Will also operate the Kokomo Electricar. The Midget Transformer should be recommended for outfits listed for the Little Jeff Transformer, when additional cars and accessories are to be used.

Listed as standard by Underwriters' Laboratories.

MODEL TWO—CAPACITY 100 WATTS

The Model Two Toy Transformer delivers secondary switch voltages ranging from 6 to 24-volts with additional permanent voltages of 6 and 12-volts. Approximately 126 different switch voltages are available, averaging .15 volt per step. Model Two will operate all American Flyer, Ives, Lionel and other wide gauge trains. It will also operate Christmas Tree lighting outfits up to sixteen 14-volt lamps. The Model Two will also operate the outfits listed for the Midget transformer and should be recommended when additional cars and accessories are to be used.

Listed as standard by Underwriters' Laboratories.

MODEL THREE—CAPACITY 150 WATTS

The Model Three Toy Transformer delivers secondary switch voltages ranging from 1 to 30-volts and has additional permanent voltages of 6, 12, 18 and 24-volts. Approximately 150 different secondary voltages averaging .2 volt per step, are obtainable through the No. 3 transformer which will operate all types of trains and especially the expensive outfits with elaborately lighted equipment. Also recommended for use with window or counter train displays Christmas tree lighting outfits up to thirty-two 14-volt lamps can be operated with this transformer.

List No.	Model	Watts	Secondary Switch Voltages	Permanent Secondary Voltages	Primary Volts Cy.	List Price
535-161	Little Jeff	50	$6\frac{1}{2}$ to $11\frac{1}{2}$	None	100-120 50-133	\$5.0
535-162	Little Jeff	50	$6\frac{1}{2}$ to $11\frac{1}{2}$	None	100-120 25-40	6.0
535-171	Midget	75	$5\frac{1}{2}$ to $22\frac{1}{2}$	6 and 12	100-120 50-133	7.5
535-172	Midget	75	$5\frac{1}{2}$ to $22\frac{1}{2}$	6 and 12	100-120 25-40	9.0
535-181	No. 2	100	6 to 24	6 and 12	100-120 50-133	9.7
535-182	No. 2	100	6 to 24	6 and 12	100-120 25-40	12.0
535-191	No. 3	150	1 to 30	6-12-18 and 24	100-120 50-133	13.8

Model No. 3, 150 watts not furnished for 25 cycle.

EDWARDS RECTIFYING UNITS



Rectifying Unit

Edwards Rectifying Units consist of highest quality transformer, full wave copper-oxide rectifier, filter condensers, chokes and fuses completely assembled in metal cabinet. Connections plainly marked. Copper-sulphide rectifiers are not used in Edwards units, because their life is extremely limited. From the following tabulated information the correct size unit may be chosen, which will give complete satisfaction.

In the units for general signaling use, chokes and filter condensers are omitted, but otherwise they are of the same excellent design.

Large installations or those where 110 Volt service is not thoroughly dependable, often require an emergency storage battery. For this service Edwards units are equipped with a variable charging resistor and where necessary an auxiliary relay to automatically transfer from rectifier to storage battery.

Standard Units are for use on 110-130 V. A.C., 50-60 cycles. Can be furnished for other voltages and cycles where necessary.

RECTIFYING UNITS FOR GENERAL SIGNALING SYSTEMS

Schedule D	List Price	D.C. Volts		D.C. Amperes	
		Continuous	Intermittent	Continuous	Intermittent
11	\$ 39.00	6-8	5	1	2
12	50.00	6-8	5	2	4
13	90.00	6-8	5	4	8
14	60.00	12-15	9	1	2
15	98.00	12-15	9	2	4
16	120.00	12-15	9	4	8
17	80.00	16-18	13	1	2
18	110.00	16-18	13	2	4
19	140.00	16-18	13	4	8
20	114.00	20-24	17	1	2
21	200.00	20-24	17	2	4
22	230.00	20-24	17	4	8

D. C. REDUCING UNITS

Similar units can be furnished for reducing 110 Volt D.C. to service to the necessary low voltage and amperage for operation of telephone and signal systems. There are several types of design according to the results desired.

Full information and prices upon application.

JEFFERSON TRANSFORMERS

For Oil Burner Ignition

Listed as standard by Underwriters' Laboratories



Types Nos. 638-251, 638-261
638-271 and 638-161

The introduction of various types of burners has required the development of different types of transformers. In the Jefferson line will be found a transformer for every specific application—5,000, 10,000, 12,000 and 15,000-volt ratings—for intermittent and continuous service—grounded, mid-point grounded, balanced mid-point grounded, and insulated secondaries—and in core and shell-type designs. These transformers have all been carefully selected by our engineers to most satisfactorily meet their respective applications.

Radio Interference

For the elimination of troublesome radio interference all popular models are equipped with special radio filter condenser.

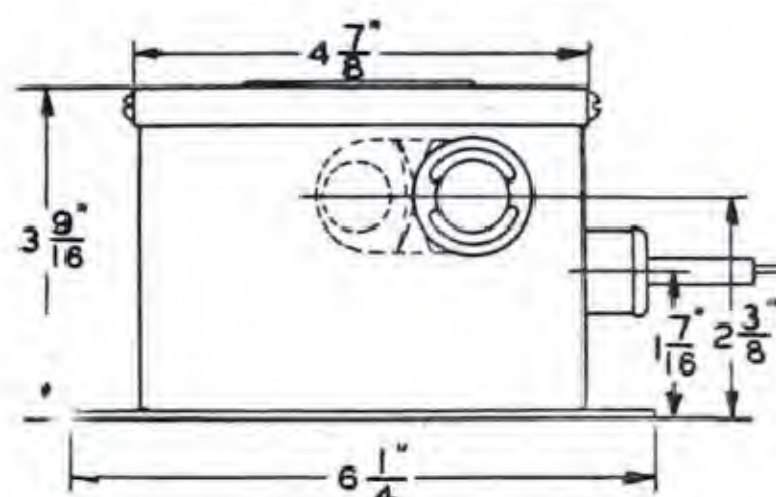
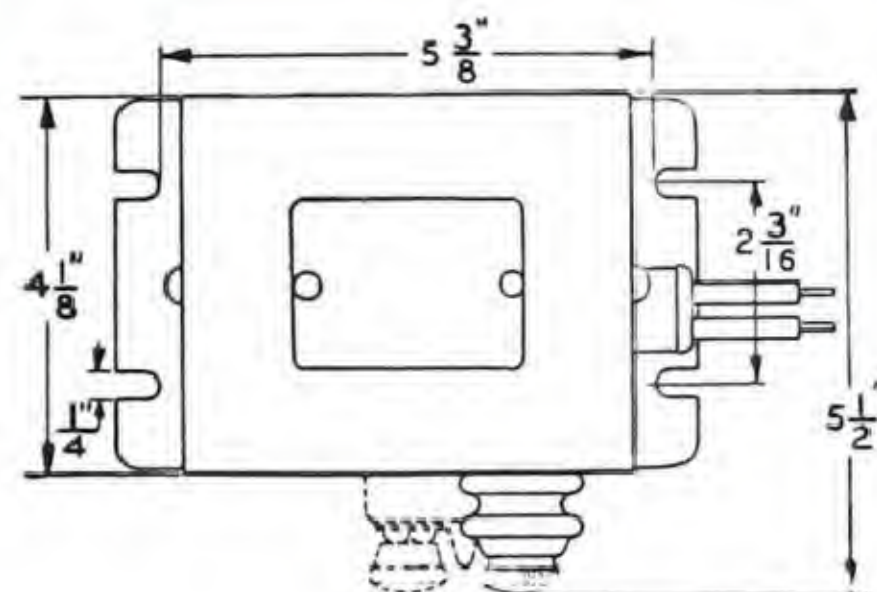


Figure No. 1

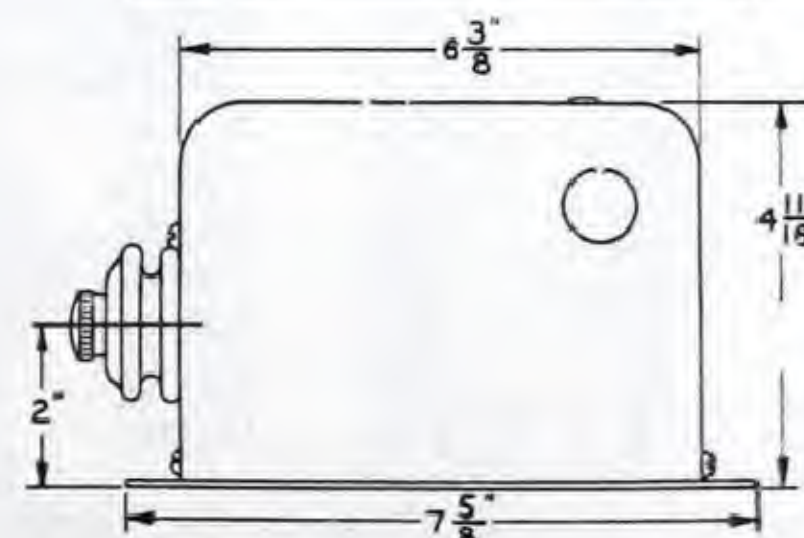
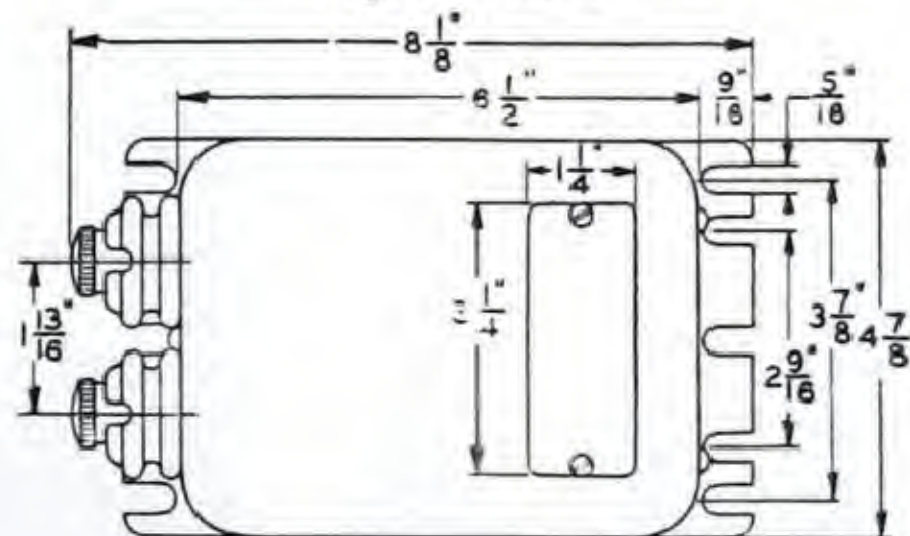


Figure No. 2

Note.—Figures in diagrams are 60 cycle dimensions.

JEFFERSON TRANSFORMERS

For Oil Burner Ignition



Type No. 638-281

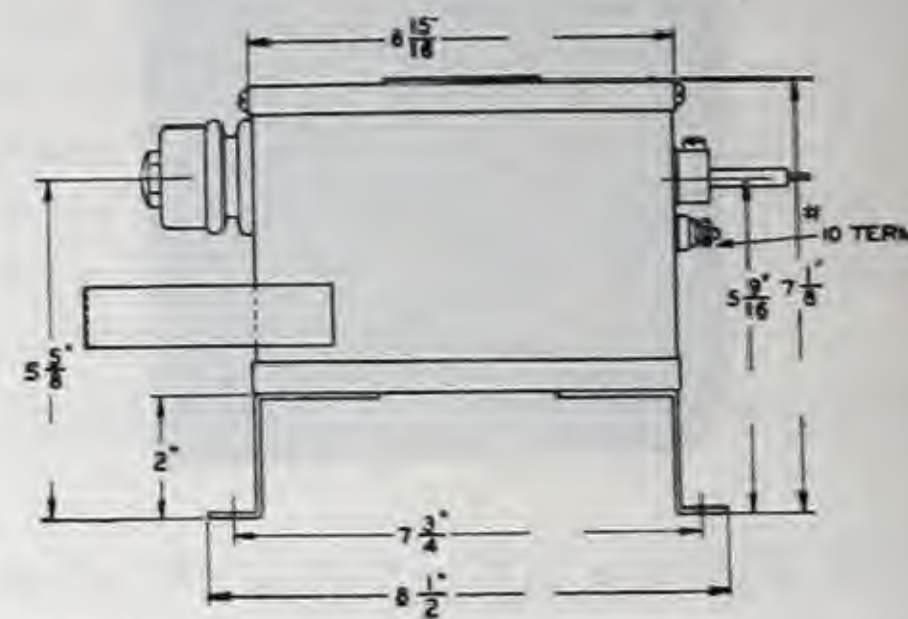
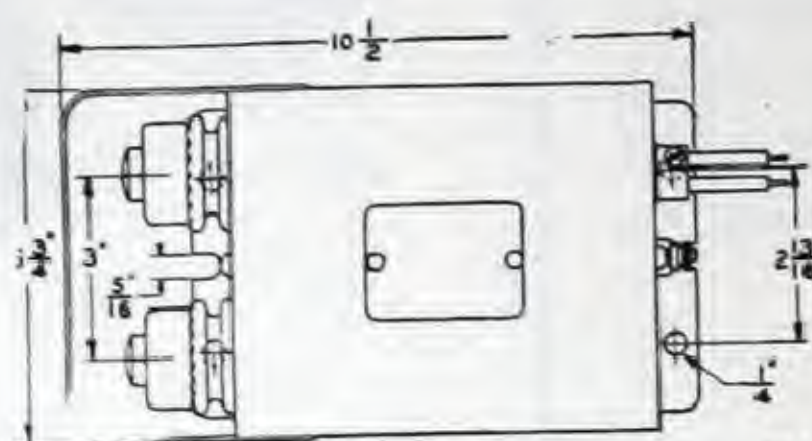


Figure No. 3

*Note—Figures in diagrams are 60 cycle dimensions.

ELECTRICAL SPECIFICATIONS AND DIMENSIONS

List No.	Primary Volts	Primary Cycles	Capacity V. A.	Secondary Output Volts	Secondary Output MA	Type of Core	Design	Max. Gap Setting	No. of Sec. Term	Dimensions ^a	Approx. Shpg. Weight	List Price
638-281*	110	60	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	9	\$12.00
638-282*	110	25	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	12 1/2	16.50
638-283*	220	60	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	9	12.00
638-284*	220	25	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	12 1/2	16.50
638-285*	110	50	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	9	12.00
638-287*	220	50	125	5000	18	Shell	Grounded	$\frac{1}{16}$ "	1	Fig. 1	9	12.00
638-191*	110	60	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	9	12.00
638-192*	110	25	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	12 1/2	16.50
638-193*	220	60	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	9	12.00
638-194*	220	25	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	12 1/2	16.50
638-195*	110	50	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	9	12.00
638-197*	220	50	125	5000	18	Shell	Insulated	$\frac{1}{16}$ "	2	Fig. 1	9	12.00
*Not equipped with radio filter.												
638-171	110	60	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	14	15.00
638-172	110	25	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	18 1/2	20.00
638-173	220	60	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	14	15.00
638-174	220	25	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	18 1/2	20.00
638-175	110	50	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	14	15.00
638-176	70	30	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	14	15.00
638-177	220	50	250	10000	23	Core	Grounded	$\frac{3}{16}$ "	1	Fig. 2	14	15.00
638-251	110	60	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-252	110	25	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	18 1/2	20.00
638-253	220	60	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-254	220	25	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	18 1/2	20.00
638-255	110	50	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-256	70	30	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-257	220	50	250	10000	23	Core	Mid-Point Grd.	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-261	110	60	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-262	110	25	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	18 1/2	20.00
638-263	220	60	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-264	220	25	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	18 1/2	20.00
638-265	110	50	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-266	70	30	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-267	220	50	250	10000	23	Core	Insulated	$\frac{3}{16}$ "	2	Fig. 2	14	15.00
638-271	110	60	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	14	16.00
638-272	110	25	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	18 1/2	21.00
638-273	220	60	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	14	16.00
638-274	220	25	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	18 1/2	21.00
638-275	110	50	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	14	16.00
638-276	70	30	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	14	16.00
638-277	220	50	250	12000	20	Core	Mid-Point Grd.	$\frac{1}{4}$ "	2	Fig. 2	14	16.00
638-291†	110	60	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	22	16.50
638-292†	110	25	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	31 1/4	22.50
638-293†	220	60	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	22	16.50
638-294†	220	25	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	31 1/4	22.50
638-295†	110	50	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	22	16.50
638-297†	220	50	450	15000	30	Shell	Mid-Point Grd.	(2) $\frac{1}{8}$ "	2	Fig. 3	22	16.50

†For heavy duty type—Add suffix HD to list number—price and size on application.

Note—When primary other than specified is required change sixth digit in List number to "9" and specify voltage and frequency. Example: No. 638-259, 250 volt, 40 cycle primary.

PORTABLE MASTER-LITES Automobile Spotlight

Powerful—Long Range



Type S.A.

Projects a broad beam half a mile or more, penetrates fog and can be used as a gutter light.

Light and bracket made of Aluminum.

Three-way switch gives a safety factor of two lights in one.

The careful construction of this

light assures long and hard service.

List No. S.A. List Price \$12.00

MOTOR BOAT SEARCHLIGHT AND UNDER-WATER LIGHT

A powerful and convenient searchlight especially designed for Launches and Power Boats.

This light will project a beam for half a mile or more.

Supplied with fifteen feet of cord and socket for attaching battery.

When sockets are located about the boat the light can be plugged in wherever necessary.

A two-position toggle switch controls a double filament bulb. When the switch is operating the smaller filament, a moderate light for all work about the boat can be obtained.

List No. L.X. List Price \$15.00



Type L.X.

LONG DISTANCE BEAM



Type H 5

Three
Position
Switch

Two
Filament
Bulb

A powerful portable searchlight using any 5-cell Hot Shot Dry Battery.

When the switch is operating the bright filament, a penetrating beam for one half-mile or more is obtained and when operating the dim filament a moderate light

which draws very little from the battery.

The lighting element is made of aluminum and is weather proof and rust proof.

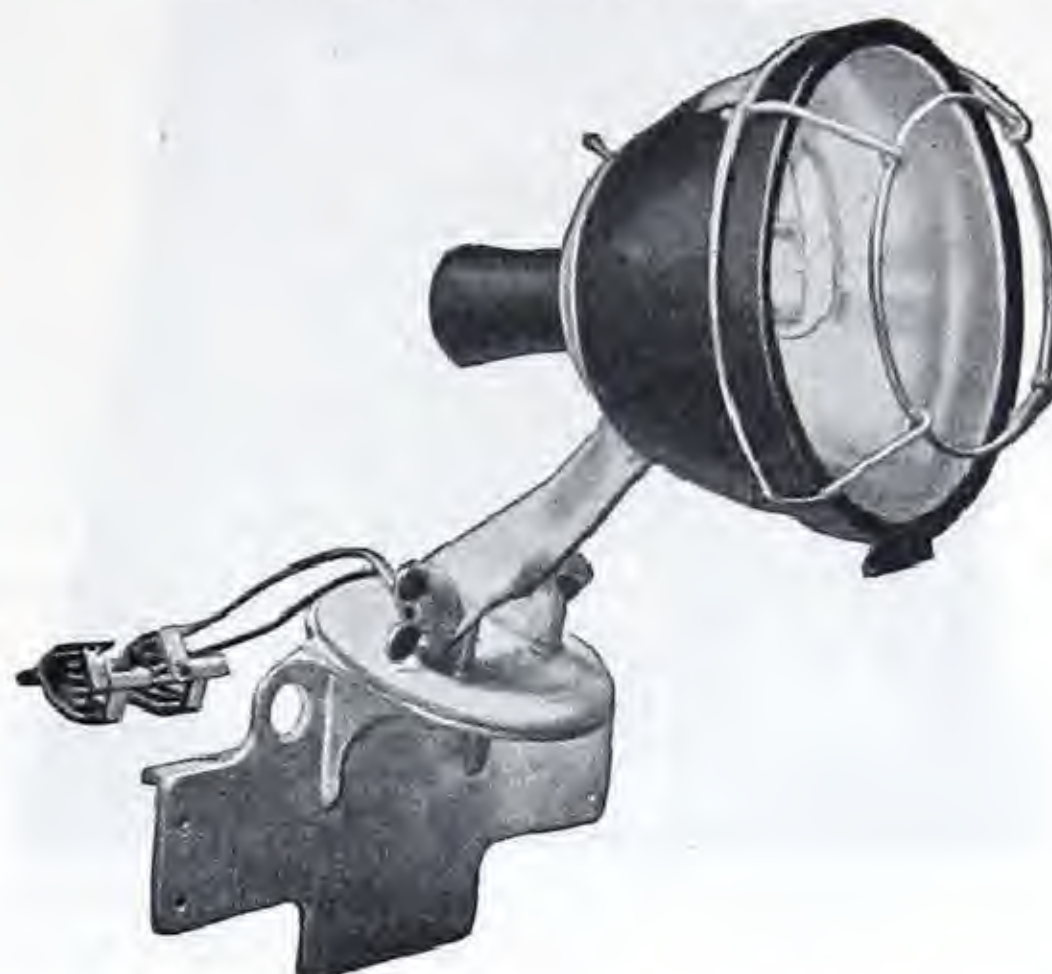
The reflector is 6 inches and triple silver plated.

A shield protects the reflector and a guard protects the switch.

This type is used among Municipal Departments, Yacht Clubs, Railroads, etc.

List No. H5. Weight 12½ lbs. List Price \$18.00

PORTABLE MASTER-LITES Portable Searchlight



Fits any storage battery, powerful portable lighting outfit furnished in black or nickel (no extra cost).

This unit is so designed that it can be attached to any six-volt storage battery. Either a flood, or a beam reflector can be furnished with this light.

The beam reflector will project a ray of light for one-half mile or more, and the flood reflector will light up a surrounding area or circle of 75 to 100 feet.

This type is used by sewer and water departments, contractors, etc. for all emergencies at night.

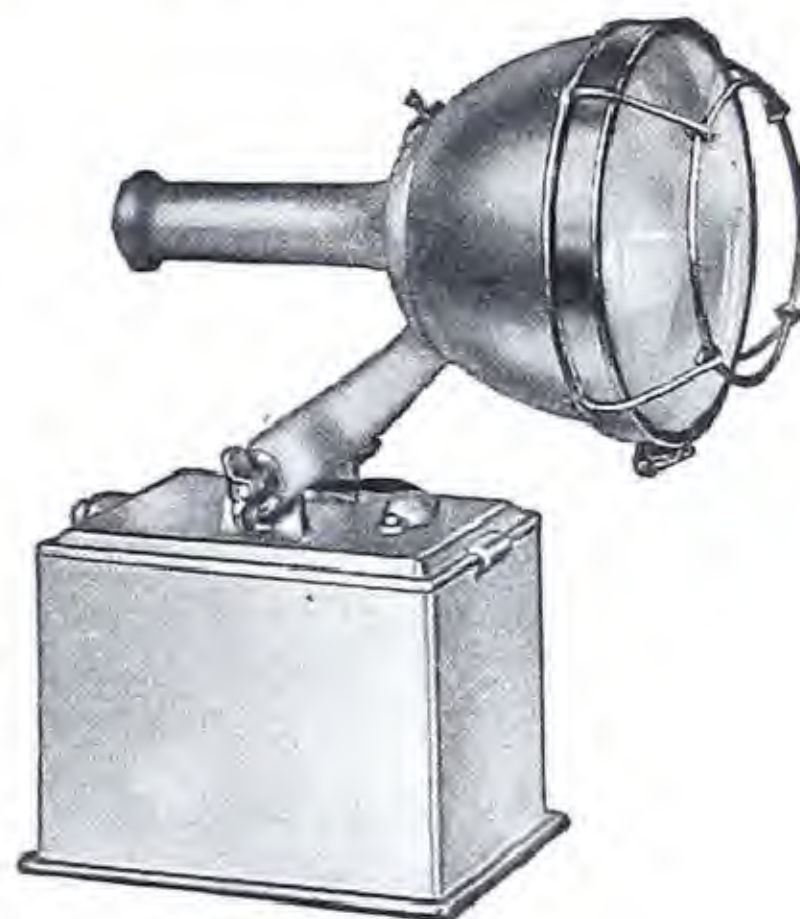
List No. "Adaptable," List Price, each \$20.00

Fire Department Hand Searchlight

3-Way Switch

2 Filament Bulb

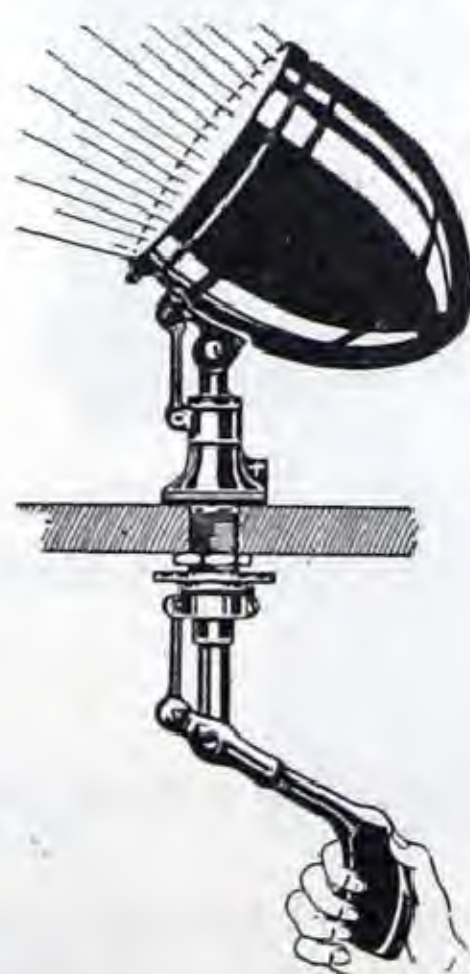
Will penetrate smoke, fog and steam. Equipped with a re-chargeable battery of the finest construction.



Type Super A

When using the large filament, the seventeen ampere hour capacity battery is capable of delivering 200,000 beam candle power continuously for six hours and longer intermittently or will furnish a good light when using the smaller filament for 25 hours or more when fully charged.

List No. "Super A," List Price, each \$35.00



Remote Control Spotlight

Mounted on top the car, illuminates over 360 degree circle.

Ideal searchlight for public utilities patrolling or repairing power lines. Extensively used for police cars.

Friction holds light in any position even over bumpy roads.

List No. Type T, List Price, each \$27.50

DELTA ELECTRIC LANTERNS



Counter Display Stand to hold 3 lights furnished upon request.

DELTA "SILVERLITE" LANTERN

Finished in rich silver enamel—equipped with focusing device to give a range of 600 feet—bail handle for hanging on nail and folding handles at rear—an ideal light for all flashlight uses. Operates on two No. 950 Batteries and No. 1161 Mazda Lamp. Size, $3\frac{3}{4}$ " high—lens is $2\frac{1}{2}$ " in diameter.

Unit package, 3.

List Price, Silverlite lantern with bulb but without batteries..... \$1.60

List Price, Silverlite lantern complete with bulb and batteries..... \$1.90

DELTA "HUSKY" LANTERN



The "Husky"

Size, $5\frac{1}{2}$ " x 4" x $7\frac{1}{2}$ ". Unit package, 1.

List Price, "Husky" Lantern with bulb but without batteries..... \$2.25

List Price, "Husky" Lantern complete with bulb and batteries..... \$3.25

DELTA "REDBIRD" LANTERN

with dual-reflection is the result of a unique and scientific combination of two reflectors. Snap forward the control lever and you get a brilliant floodlight—flip the lever back and you get a piercing 800 foot spot light. Instant action. Operates on 2 standard No. 6 Dry Cells and No. 1452 Eveready lamp. Body stands $7\frac{1}{2}$ " high and is ruggedly constructed of ribbed steel and finished in red enamel with chrome-plated trimmings. Reflector is $4\frac{1}{2}$ " in diameter and is finished in mat silver. Each lantern is packed in an individual container.

Size, $5\frac{1}{2}$ " x 4" x $7\frac{1}{2}$ ". Unit package, 1.

List Price, "Redbird" Lantern with bulb but without batteries..... \$2.25

List Price, "Redbird" Lantern complete with bulb and batteries..... \$4.60



The "Redbird"

DELTA ELECTRIC LANTERNS

DELTA "JUNIORLITE" LANTERN

The Delta "Juniorlite" 2-Reflector Electric Lantern embodies two light sources—one at the side giving a piercing spot beam of 600 feet, the other at the top giving a broad, wide flood light. Both lights operate from a single double action switch.



The "Juniorlite"

Finished in silver color with bright trim. Side reflector is $2\frac{1}{2}$ " diameter and silver plated brass. Top reflector is white enamel for spreading light.

Operates on 2 No. 950 Eveready Batteries and Everead 2.5 Volt Mazda Lamp, No. 1161.

Size, $4\frac{1}{2}$ " high. Unit package, 3.

List Price, "Juniorlite" Lantern with bulb but without batteries..... \$1.60

List Price, "Juniorlite" Lantern complete with bulbs and batteries..... \$2.25

EVEREADY ELECTRIC LANTERNS

Delta Powerlite 2-Reflector Electric Lantern embodies two light sources—one giving a sharp penetrating spot beam of 800 feet—the other a broad, brilliant floodlight. Both side and top lights operate from a simple double action switch—a distinct achievement in lantern design, finished in baked aluminum enamel, cadmium plated trimmings—side reflector is silver plated, top reflector baked white enamel—size $6\frac{1}{2}$ " high, not including bail—diameter of base $4\frac{3}{4}$ "—side reflector 4" diameter—top reflector 3".



Operates on Eveready No. 409 Lantern Battery and Eveready Mazda Bulb No. 1437. When top reflector is used a special lens guard which provides a base for the lantern can be supplied. This guard is ruggedly constructed and simply snaps on. With the use of an adapter it is permissible to use 4 No. 950 Eveready Flashlight Batteries as an alternative battery. Price of adapter given below.

Style	List Prices		
	Unit Pkg. Quan.	Lantern with Bulb but not B't'ries	Complete with B't'ries
Powerlite for No. 409 Battery, less accessories.....	1	\$4.50	\$5.10
Powerlite for No. 950 Batteries, less accessories, with adapter.....	1	5.25	5.85
Powerlite for general use, with accessories, including adapter and lens guard for No. 950 Batteries.....	1	5.90	6.50
Powerlite for railway use with accessories, including DeLuxe bail handle and lens guard for No. 409 Battery	1	5.80	6.40
DeLuxe railroad type bail handle...		.65	.65
Lens guard.....		.65	.65
Adapter for 4 No. 950 Batteries.....		.75	.75
Red top lens.....		.25	.25

EVEREADY FLASHLIGHTS



No. 352

cell focusing searchlight. 700 foot range. Size, 9" x 1½".
ndlelight feature. Bulb shock absorber. Uses three No.
Eveready Batteries. No. 1162 Eveready Mazda Lamp.
t package, 1.

Price, No. 352 Flashlight, without batteries, each. \$1.30
Price, No. 352 Flashlight complete with batteries. 1.75



No. 552

cell focusing searchlight. 2100 foot range. Size, 14" x 1½".
dle-light feature. Bulb shock absorber. Uses five No.
Eveready Batteries. No. 1163 Eveready Mazda Lamp.
t package, 1.

Price, No. 552 Flashlight, without batteries, each. \$1.50
Price, No. 552 Flashlight, complete with batteries. 2.25



No. 2619

cell miner. Finished in black with chromium fittings.
8 7/8" x 1½". Uses three No. 950 batteries. Eveready
Mazda Lamp No. 1162. Unit package, 1.

Price, No. 2619 Flashlight, without batteries.... \$2.05
Price, No. 2619 Flashlight, complete with batteries. 2.50



No. 2642

cell focusing searchlight. 800 foot range. Finished in
k with chromium fittings. Size, 9½" x 1½". Uses three
950 batteries. Eveready Mazda Lamp No. 1162. Unit
age, 1.

Price, No. 2642 Flashlight, without batteries.... \$2.55
Price, No. 2642 Flashlight, complete with batteries. 3.00



No. 2645

cell focusing searchlight. 2500 foot range. Chromium
h. Size, 14¼" x 1½". Uses five No. 950 batteries. Ever-
Mazda Lamp No. 1163. Unit package, 1.

Price, No. 2645 Flashlight, without batteries.... \$3.00
Price, No. 2645 Flashlight, complete with batteries. 3.75



No. 2663

cell baby focusing. 300 foot range. Chromium finish.
6" x 1½". Uses two No. 935 batteries. Eveready Mazda
p No. 1161. Unit package, 1.

Price, No. 2663 Flashlight, without batteries.... \$1.45
Price, No. 2663 Flashlight, complete with batteries. 1.75

EVEREADY FLASHLIGHTS



No. 2616

No. 2616 2 Cell Miner. Finished in black with chromium
fittings. Size 6" x 1½". Uses 2 No. 950 batteries. Ever-
eady Mazda Lamp No. 1161. Unit Package—1.

List Price—No. 2616 Flashlight without batteries.... \$1.45

List Price—No. 2616 Flashlight complete with batteries 1.75



No. 2672

No. 2672 3 Cell Focusing Spotlight. 500 ft. range. Finish-
ed in black with chromium fittings. Size 9½" x 1½".
Uses 3 No. 950 batteries. Eveready Mazda Lamp No. 1162.
Unit Package—1.

List Price—No. 2672 Flashlight without batteries.... \$2.00

List Price—No. 2672 Flashlight complete with batteries 2.45



No. 2697

No. 2697

EVEREADY "OFFICIAL"
BOY SCOUT FLASHLIGHT

Specially designed for Boy Scout re-
quirements. Can be worn on the belt
as a marching or hiking light, suspended
on a peg as a temporary tent light, or
stood up erect if desired. Equipped with
Eveready focusing device to give a range
of 200 feet. The case is finished in
Khaki color. Uses 2-950 batteries. Ever-
eady Mazda Lamp No. 1161.

List Price—No. 2697 Flashlight
without batteries..... \$1.95

List Price—No. 2692 Flashlight
complete with batteries..... 2.25



No. 351

Three cell focusing spotlight with an effective range of
450 feet. Size 9" x 1½". Uses three No. 950 Eveready
batteries and No. 1162 Eveready Mazda Lamp.

List Price—No. 351 Flashlight without batteries..... \$1.00

List Price—No. 351 Flashlight complete with batteries. 1.45



Auto Flashlight

List Price—Complete with batteries..... \$1.25

EVEREADY FLASHLIGHTS

Each light is equipped with a new type of Eveready switch providing both "Flash" and "Steady" light position. All are equipped with a substantial ring hanger which snaps securely out of the way when not in use.



No. 50 Display Package

No. 50 Display Package contains 6 No. 250 Eveready 2-Cell Non-Focusing Flashlights, completely nickel-plated. Size $6\frac{3}{4}$ " x $1\frac{1}{2}$ ". Bullseye Lens. Uses 2 No. 950 Eveready Batteries. No. 1161 Eveready Mazda Lamp.

List value No. 50 Display Package (6 lights without batteries)..... \$3.30

List Price No. 250 Flashlight, complete with batteries, each..... .85



No. 51 Display Package

No. 51 Display Package contains 6 No. 251 Eveready 2-cell Focusing Flashlights, completely nickel-plated. Size $6\frac{1}{8}$ " x $1\frac{1}{2}$ ". Candlelight feature. Uses 2 No. 950 Eveready Batteries. No. 1161 Eveready Mazda Lamp.

List Value No. 51 Display Package (6 lights without batteries)..... \$4.20

List Price No. 251 Flashlight, complete with batteries, each..... 1.00

EVEREADY FLASHLIGHTS



No. 04 Display Package

No. 04 Display Package contains 6 No. 2604 Eveready 2-cell Flashlights, finished in black with chromium-plate fittings. These lights are equipped with such Eveready features as the new small size safety-lock switch, octagonal non-rolling lens ring, ring hanger, and are made from heavy gauge seamless brass tubing. The No. 2604 Eveready throws a broad beam light and is for general indoor or outdoor use. Size $6\frac{3}{4}$ " x $1\frac{1}{2}$ ". Uses 2 No. 950 Eveready Batteries. Eveready Mazda Lamp No. 1161.

List value No. 04 Display Package of Flashlights (6 lights without batteries)..... \$5.7

List price, No. 2604 Flashlight complete with batteries..... each 1.2



No. 71 Display Package

No. 71 Display Package contains 6 No. 2671 Eveready 2-cell focusing Flashlights, finished in black with chromium plated fittings. No. 2671 carries all the standard Eveready features, such as octagonal non-rolling lens ring, lens retaining ring, new small size Eveready safety-lock switch and ring hanger. In addition, No. 2671 is equipped with the new Eveready Candle Light feature. This light throws a beam of light 400 feet and is particularly useful for motor sportsmen and everyone who works or plays out of doors. Size 7" x $1\frac{1}{2}$ ". Uses 2 No. 950 Eveready Batteries. Eveready Mazda Lamp No. 1161.

List value, No. 71 Display Package of Flashlights (6 lights without batteries)..... \$10.

List price, No. 2671 Flashlight complete with batteries..... each 2.

EVEREADY DISPLAY PACKAGES



No. 52 Eveready Flashlight Lamp Display Package, as illustrated, contains 40 No. 1161 Lamps for two-cell flashlights and 10 No. 1162 Lamps for three-cell flashlights. The display package is finished in red, blue and grey and when set up on display measures 5 inches high, 4 inches wide and 8 inches long. Ideal for displaying on store counter or table.

List Price—No. 52 complete assortment in Display Package..... \$7.50

List Price—No. 1161 and No. 1162 Lamps...Each .15



No. 53 Eveready Radio Panel Lamp Display Package, as illustrated, contains 10 No. 1135 6 to 8 volt, 30 No. 1148 2.5-volt and 10 No. 1149 2.5-volt Radio Panel Lamps. The display package is finished in red, blue and grey to harmonize in the same color scheme and design as the Eveready Flashlight Lamp Display Package, illustrated above. The lamps included in this assortment will take care of the requirements for the panels of all standard radio receiving sets on the market.

List Price—No. 53 complete assortment in Display Package..... \$7.50

List Price—No. 1135, No. 1148 and No. 1149 Lamps Each..... .15

Individual unit cartons of 10 lamps, mounted on blue cardboard forms, can be ordered as required for replacement purposes.

EVEREADY FLASHLIGHT BATTERIES



The new Eveready extra long life battery with the Metal Seal top replaces the old-style wax compound seals. With this new construction, the batteries will keep fresher on your shelf and will last longer in your customers' flashlights. Packed in a NEW display package containing 48 batteries, this brand new display unit is a very efficient "silent salesman," either for open table or counter use.

No. 950 New Eveready Flashlight Batteries

List No.	Unit Pkg. Quan.	List Price Each
950.....	48	\$0.15
935.....	12	.15

Flashlight Batteries

List No.	List Price Each	List No.	List Price Each
700.....	\$0.40	750.....	\$0.30
703.....	.30	751.....	.45
705.....	.50	771.....	.45
706.....	.20	775.....	.90
710.....	1.25	790.....	.35
711.....	.80	791.....	.35
714.....	.80	792.....	.45
734.....	.65	409.....	.60

Flashlight Lamps

List No.	Voltage	Bulb	Amp.	List Price Each
1180.....	2.2	F.E. 3 $\frac{3}{4}$	0.25	\$0.15
1181.....	3.3	F.E. 3 $\frac{3}{4}$	0.25	.15
1161.....	2.5	G. 3 $\frac{1}{2}$	0.30	.15
1162.....	3.8	G. 3 $\frac{1}{2}$	0.30	.15
1163.....	6.2	G. 4 $\frac{1}{2}$	0.30	.15
1451.....	1.25	G. 4 $\frac{1}{2}$	0.60	.15
1452.....	2.4	G. 5 $\frac{1}{2}$	0.80	.15
1191.....	2.65	G. 3 $\frac{1}{2}$	0.30	.15

Radio Panel Lamps

1135.....	6.3	T. 3 $\frac{1}{4}$	0.15	\$0.15
1149.....	2.5	T. 3 $\frac{1}{4}$	0.45	.15
1148.....	3.0	T. 3 $\frac{1}{4}$	0.45	.15
1136.....	6.3	T. 3 $\frac{1}{4}$	0.25	.15

Wherever you may be located in Canada, the Northern Electric Company is equipped to serve you in the prompt delivery of Wiring Devices and Electrical Supplies. Warehouses are conveniently located in the principal cities.

An order placed with the Northern Electric Company assures you that you will receive quality goods, proper packing, prompt deliveries from large stocks, and fairly priced.

You have also at your call an experienced and trained staff, whose duty it is to serve you satisfactorily.

It is because of this sound policy that the business of the Company has grown to its present large proportions.

EVEREADY RADIO BATTERIES "B" Batteries



No. 486

with low current drain. Tapped at 22½ and 45-volts.



No. 485



No. 870

No. 486—45-Volt Layerbilt "B" battery. The No. 486 Eveready Layerbilt battery with patented construction is designed for use on sets with heavy "B" battery drain. It is the largest and sturdiest "B" battery of its type on the market.

No. 485—45-Volt Layerbilt has the same construction as the heavy duty Layerbilt No. 486 and is designed especially for sets

List No.	Construction	Length	Width	Height
486	Layerbilt	8"	4-3/8"	8"
485	Layerbilt	8"	3-3/16"	7-15/16"
870	Round Cell	8"	4-3/8"	7-15/16"
770	Round Cell	8"	4-3/8"	7-15/16"
772	Round Cell	8"	3-3/16"	7-15/16"
782	Round Cell	6-5/16"	2-13/16"	6-3/8"
285	Layerbilt	4-5/32"	3-3/32"	7-13/16"
764	Round Cell	3-5/16"	2-13/16"	6-3/32"
762	Round Cell	4-7/32"	2-5/8"	5-7/8"

List No.	Voltage	Std. Pkg.	Wgt. lbs.	List Price
486	45	4	63	\$3.95
485	45	5	54	3.00
870	45	4	54	2.85
770	45	4	57	3.65
772	45	5	49	2.95
782	45	5	26	3.00
285	22½	5	29	2.00
764	22½	5	14	1.95
762	45	5	18	2.95

EVEREADY RADIO BATTERIES

"C" Batteries



No. 781

List No.	Construction	Length	Width	Height
781	Three-Cell	2½"	1½"	3½"
(Tapped at positive. Negative 1½, 3, and 4½ volts).				
773	Five-Cell	4-1/16"	7/8"	2 7/8"
(Tapped at positive. Negative 1½, 3, 4½, 6 and 7½ volts).				
783	Ten-Cell	4-5/16"	1 13/16"	2 7/8"
(Tapped at positive. Negative 3, 4½, 10½, 13½ and 15 volts).				
768	Fifteen-Cell	4-3/16"	2 9/16"	3 3/16"
(Tapped at positive. Negative 3, 4½, 9, 13½, 16½ and 22½ volts).				

List No.	Voltage	Std. Pkg.	Std. Wgt. Lbs.	List Price Eac.
781	4½	10	4	\$0.4
773	7½	5	5	1.0
783	15	5	11	1.5
768	22½	10	17	1.7

"A" Batteries



No. 7111—1½-volt Radio "A" Dry Cell

Specially designed to operate with dry cell tubes. Can be connected in various combinations to meet the requirements of the Northern Peanut Tube, WX-11, WX-12, an UX-199. Size, 2½ x 6 inches.

No. 7111—1½ volts, each..... \$0.6

No. 6 Eveready Dry Cell 1½ volt can be used as "A" Battery.

Air Cell Battery FOR AIR CELL RADIO SETS



No. A-600

This battery is specially designed for air cell (2 volt) tub and its high capacity of 600 ampere hours is sufficient operate an approved air cell radio set for at least 1000 hours. Size, 13½" x 6¾" x 10¾" high.

List No. A-600 Battery. List Price, each..... \$9.

NORTHERN DRY BATTERY

FOR OPEN CIRCUIT SERVICE

The Northern Dry Battery is especially designed for telephone service and will outlast any other dry cell made when applied to the talking circuit in standard telephone local battery equipment.

List No.	Size Inches	Wgt. Lbs. per Cell	Std. Pkg.	Wgt. Lbs. Std. Pkg.	List Price Each
6	2½ x 6	2	25	57	\$0.50

Screw binding posts will be furnished at no extra charge.

COLUMBIA DRY BATTERIES

The Gray Label Battery is designed especially for telephone and light drain service.

The Columbia Ignitor Battery is particularly adapted for motor ignition.

Fahnestock clips will be furnished when specified at no extra charge.



Columbia Gray Label			Columbia Ignitor		
Size Inches	Wt. Lbs. per Cell	Std. Pkg.	Wt. Lbs. Std. Pkg.	List Price Each	
2½ x 6¾	2	25	57	\$0.50	
2½ x 6¾	2	25	58	.50	

EVEREADY HOT SHOT BATTERIES



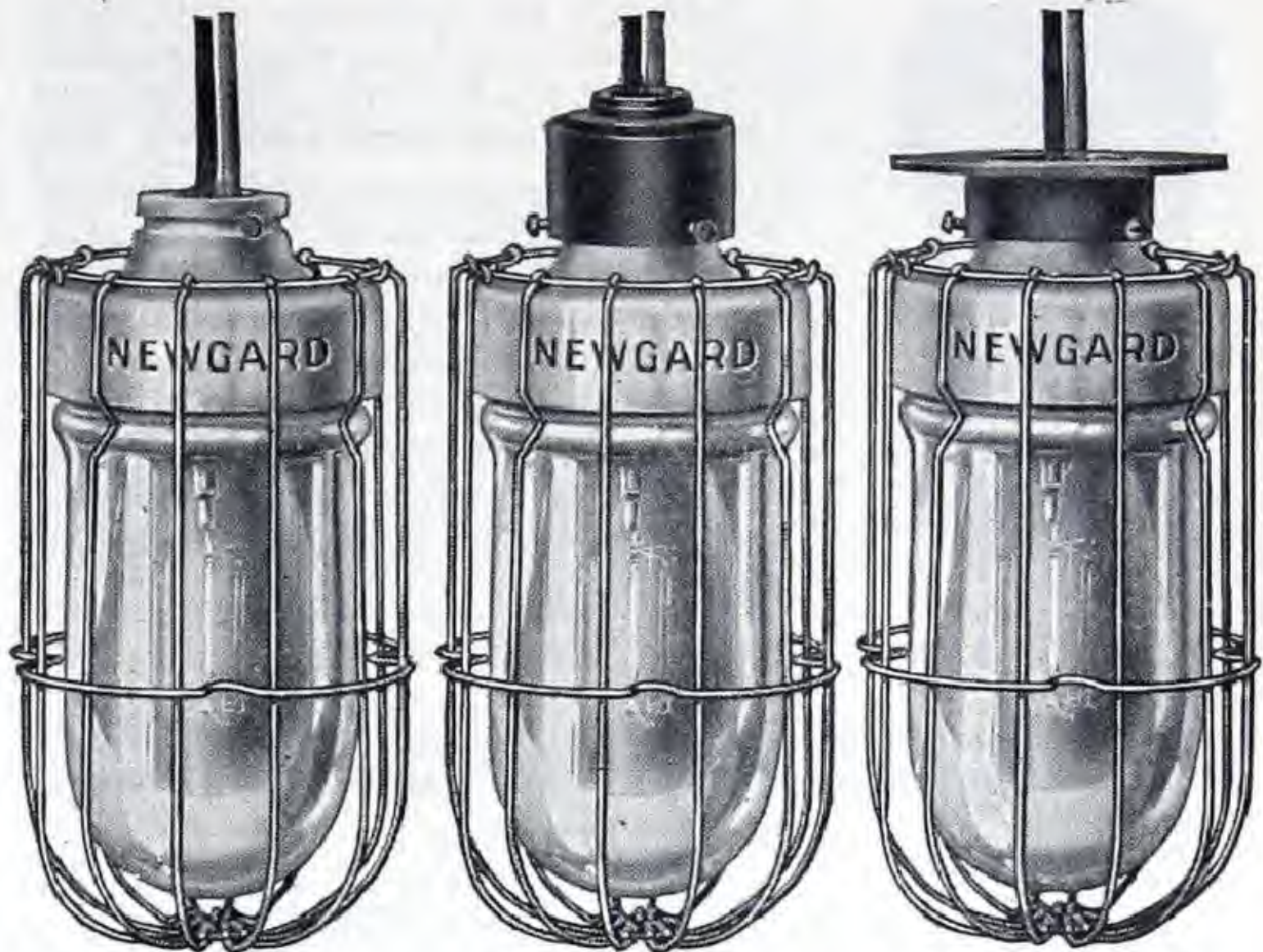
Eveready Steel Case Hot Shots are recommended for all purposes requiring four or more Dry Cells connected in series. It is only necessary to connect two wires to the two binding posts and the battery is ready for service.

Hot Shot Batteries are made up of specially selected cells assembled in a handsomely lithographed all-steel container. The rugged steel case will withstand the roughest usage. It is practically waterproof.

They are specially designed for small automobiles, gas engines, motor boats, blasting apparatus, fire and burglar alarms, gongs, bells, annunciators and signals and for portable lighting outfits in farm buildings, tents, out-houses, etc.

No.	Voltage	of Cells	Std. Pkg.	Wgt. Lbs. Std. Pkg.	List Price
1	6	4	6	63	\$2.40
1	7½	5	4	51	3.00
2	7½	5	4	51	3.00
2	9	6	4	62	3.60
	Length In.	Width In.	Height In.		
1	10⅝	2¾	7½		
1	13¼	2¾	7½		
2	8	5	7½		
2	8	5¾	7½		

"MULTI" WEATHERPROOF RECEPTACLES



Type A Receptacle with guard No. 902

Type B Receptacle with guard No. 912

Type C or D Receptacle with guard No. 922

Maximum Lamp Size to Fit in Glass Globe, 60 Watt Size

Type of Receptacle	Receptacle Complete, Including	List No.	Std. Pkg.	Ctn. Qty.	List per 100
Type A	Without guard and shade.....	901	24	6	\$150.00
	Guard.....	902	12	4	232.00
	Shade.....	903	12	4	300.00
Type B	Without guard and shade.....	911	24	6	180.00
Tapped for ½" Conduit	Guard.....	912	12	4	262.00
	Shade.....	913	12	4	330.00
Type C	Without guard and shade.....	921	24	6	190.00
For ¾" Box	Guard.....	922	12	4	272.00
	Shade.....	923	12	4	340.00
Type D	Without guard and shade.....	931	24	6	200.00
For 4" Round Box	Guard.....	932	12	4	282.00
	Shade.....	933	12	4	350.00

Parts for Above Receptacles

	List No.	Std. Pkg.	Ctn. Qty.	List per 100
Porcelain gap only.....	900	24	6	\$ 60.00
Rubber gasket.....	908	48	12	10.00
Wire guard.....	909	24	6	82.00
Porcelain shade.....	910	12	4	150.00
Clear glass globe.....	940	24	6	80.00
Ruby glass globe.....	941	12	4	175.00
Green glass globe.....	942	12	4	175.00
Opal glass globe.....	943	12	4	175.00
Type B casting only.....	947	48	12	30.00
Type C casting only.....	948	48	12	40.00
Type D casting only.....	949	48	12	50.00

R. & S. VAPORPROOF FIXTURES

Junction Box Screw Globe Type



No. 5045

Fixtures are complete with clear globe, brass guard and with the exception of the top feet type, are regularly mounted on iron junction box No. 333.

Keyless fixtures are equipped with No. 118 receptacles, so mounted that base of fixture and conduit system remains vaporproof, even though globe should become broken.

Iron bases and boxes galvanized; brass bases and guards, black oxidized.

Maximum conduit outlets $\frac{3}{4}$ -inch. Specify size and location of outlets when ordering.

List No.	Maximum Size Lamp	Junction Box Type	Approx. Net Wgt. Lbs.	List Price Each
5045	60 Watt	†Brass	4	\$8.10
431	60 Watt	†Brass	5 $\frac{1}{4}$	11.25
579	60 Watt	Brass	3 $\frac{3}{4}$	8.55
1580	100 to 200 Watt	Brass	6	18.00

†Regularly supplied with galvanized iron junction box No. 333. If desired with brass box No. 332, add \$1.55 to the list price.

For specifications, accessories and replacement parts of above fixtures, see index.

90° Wall Bracket Vaporproof Fixtures

SCREW GLOBE TYPES G

Fixtures are complete with clear globe, brass guard and regularly mounted on iron junction box No. 333.

Keyless fixtures are equipped with No. 118 receptacles, so mounted that base of fixture and conduit system remains vaporproof, even though globe should become broken.

Iron bases and boxes galvanized; brass bases and guards, black oxidized.

Maximum conduit outlet $\frac{3}{4}$ -inch. Specify size and location of outlets when ordering.

No. 5060
Type G

List No.	Maximum Size Lamp	Type G	Approx. Net Wgt. Lbs.	List Price Each
5060	60 Watt	†Brass	6	\$10.80

†Regularly supplied with galvanized iron junction box No. 333. If desired with brass box No. 332, add \$1.55 to the list price.

For specifications, accessories and replacement parts of above fixtures, see index.

Hand Portables
WATERTIGHT TYPES

No. 422

For 25-60 watt lamps. Cast brass body, hardwood handle with stuffing gland for cable. Fitted with No. 2383 globe. Ground connection for three wire No. 16 cord. Weight 3 $\frac{1}{2}$ lbs. List price..... \$7.90

BUNGHOLE LAMP



No. 445

Made for the convenient examination of interiors of casks, drums, etc., foreign material easily removed by means of pointed prong on end. Also well suited for boiler tube inspection.

Made entirely of brass and fitted with special 30 watt watertight lamp and stuffing gland for cable.

Length over all, 26 $\frac{3}{4}$ ", maximum diameter, 1 $\frac{3}{8}$ ".

List No.	Net Wgt. Lbs.	List Price
445	2 $\frac{1}{4}$	\$18.90

Arranged to accommodate 3 conductor No. 16 Tyrex Cord the 3rd conductor being connected to an extra terminal in base for grounding all exposed metal parts.

PORTABLE EXTENSION LAMPS



No. PGH



No. VGH

Protex Guards are protector guards that reduce lamp breakage.

Vaprotex Guards are protector guards that are designed for use where gases, dust and all explosives are present.

List No.	Watts	Description	List Price
PGH	60	Protex Rubber Handle, socket and wire guard with hook.....	\$2.50
PGRC	60	Protex Rubber Handle, socket and wire guard with clamps, and half shade reflector.....	4.50
PGHRM	50	Protex Rubber Handle, socket, wire guard with hook and half shade reflector.....	3.00
VGH	60	Vaprotex Rubber Handle, socket wire guard with hook and glass vaporproof globe.....	9.00

GRIPON LAMP GUARDS

(Approved by Underwriters)



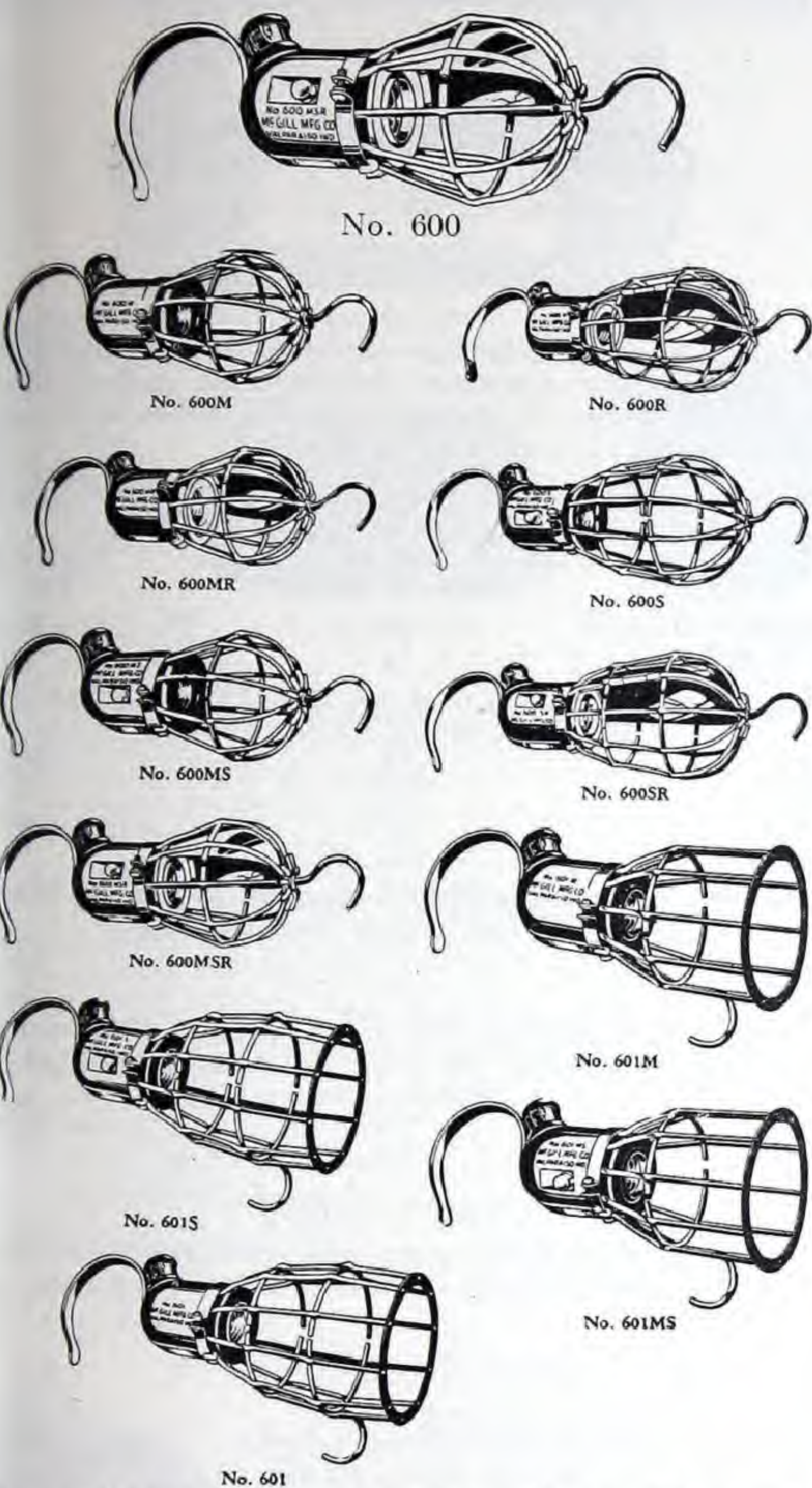
No. 1600

Gripon Lamp Guards are the same style as the Loxon type except that they have plain screws instead of the locking device for attaching to sockets. Gripon Lamp Guards are very strong and yet neat in appearance. The closed bottom feature discourages thievery, and protects the lamp from every angle from breakage.

Where lamp theft is a small item, and breakage is a real problem, the Gripon Guard will give 100 per cent satisfaction. They obstruct very little light. Made for both regular and mill type lamps and for brass shell and weatherproof sockets. Heavy tinned finish.

List No.	Lamp Size	Fits Socket	Weight per dozen	List Price per dozen
1608	25-40	Brass	2 $\frac{1}{4}$ lbs.	\$4.2
1608A	25-40	W. P.	2 $\frac{1}{2}$ lbs.	4.2
1608B	25-40	W. P.	3 lbs.	4.2
1600	50-60	Brass	2 $\frac{3}{4}$ lbs.	4.2
1602A	50-60	W. P.	2 $\frac{3}{4}$ lbs.	4.2
1602B	50-60	W. P.	3 $\frac{1}{4}$ lbs.	4.2
1601	60-100	Brass	2 $\frac{3}{4}$ lbs.	4.5
1603A	60-100	W. P.	3 lbs.	5.0
1603B	60-100	W. P.	3 $\frac{1}{2}$ lbs.	5.0
1605	100-200	Brass	3 lbs.	7.5
1606A	100-200	W. P.	3 lbs.	7.5
1606B	100-200	W. P.	3 $\frac{1}{2}$ lbs.	7.5

McGILL HOOK HANDLE PORTABLE GUARDS
660 Watts

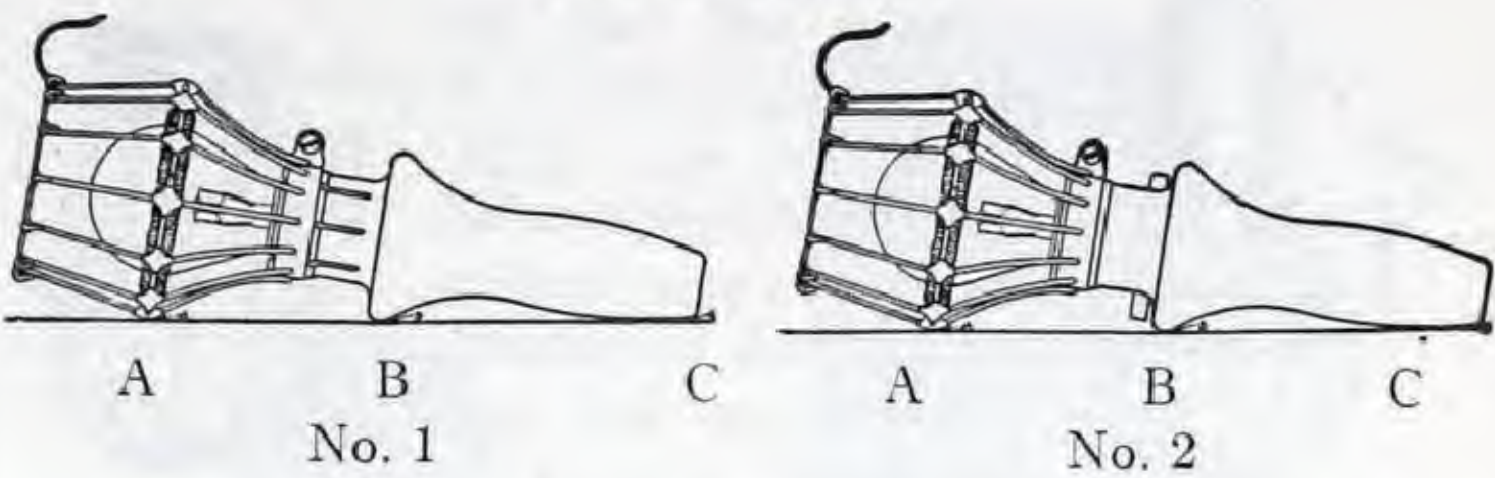


You will find this new type hook handle portable guard at least 50 per cent more practical. The socket holder, which also serves as a handle, is much thicker—it is easier to grasp and hold in your hand. It is made from soft, oil-resistant rubber. The large flat hook at the handle end is a big new feature. Hook it to a bench top, slip it into a crack, wedge it anywhere and your guard will stand upright as easily as it will hang. The broad flat surface of the hook holds it steady, and the larger angle enables you to hang it almost anywhere. Users find this new feature alone worth the cost of the entire guard.

		Description					
	Type	Lamp Size	Type	Length	Weight	List Price	
	Cage	Watts	Socket			Each	
* R*	Closed	40-100	Keyless	14 1/4"	1 lb., 7 oz.	\$2.75	
	Close and Reflector	40-75	Keyless	14 1/4"	1 lb., 8 oz.	3.25	
S	Closed	40-100	Lever Switch	14 1/4"	1 lb., 7 oz.	3.25	
SR	Closed and Reflector	40-75	Lever Switch	14 1/4"	1 lb., 8 oz.	3.75	
* S	Open	40-100	Keyless	11 3/4"	1 lb., 7 oz.	3.20	
	Open	40-100	Lever Switch	11 3/4"	1 lb., 7 oz.	3.70	
M*	Closed	40 Rough Service	Keyless	12 1/4"	1 lb., 4 oz.	2.50	
MR*	Closed and Reflector	40 Rough Service	Keyless	12 1/4"	1 lb., 5 oz.	3.00	
MS	Closed	40 Rough Service	Lever Switch	12 1/4"	1 lb., 4 oz.	3.00	
MSR	Closed and Reflector	40 Rough Service	Lever Switch	12 1/4"	1 lb., 5 oz.	3.50	
M*	Open	25-60	Keyless	10 1/4"	1 lb., 4 oz.	2.50	
MS	Open	25-60	Lever Switch	10 1/4"	1 lb., 4 oz.	3.00	

Can be supplied with grounding attachment, at 50c each additional net to the list price.

MATTHEWS HANDY HOLDFAST PORTABLES

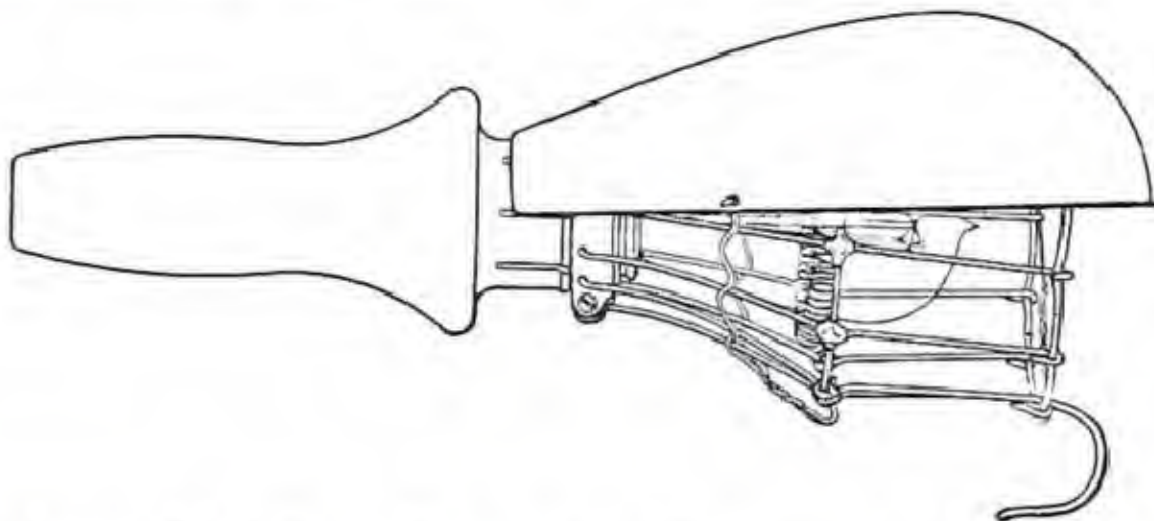


Matthews Handy Holdfast Portables Nos. 1 and 2 are a combination of a specially designed No. MT14 Matthews Holdfast Guard with a hook and an extra strong hardwood handle which completely covers and protects the socket. All contacts can be reached by loosening the set screw on the collar of the MT14 Matthews Holdfast Lamp Guard. Note that when Matthews Handy Holdfast Portable is lying on the floor it touches at three points, A, B and C and that for that reason no excessive strain will be put on the guard or the handle if it were accidentally stepped on.

List No.	List Price Each
1 Includes lamp guard, keyless socket and handle only.....	\$3.80
2 Includes lamp guard, push key socket and handle only.....	4.50

The No. 1 or No. 2 Matthews Handy Holdfast Portables will be furnished with 15 or more feet of flexible non-kinking rubber-covered cord and attachment plug for 15 cents per foot additional to above prices.

Different numbers of Matthews Holdfast Portables may be assorted to make quantity.

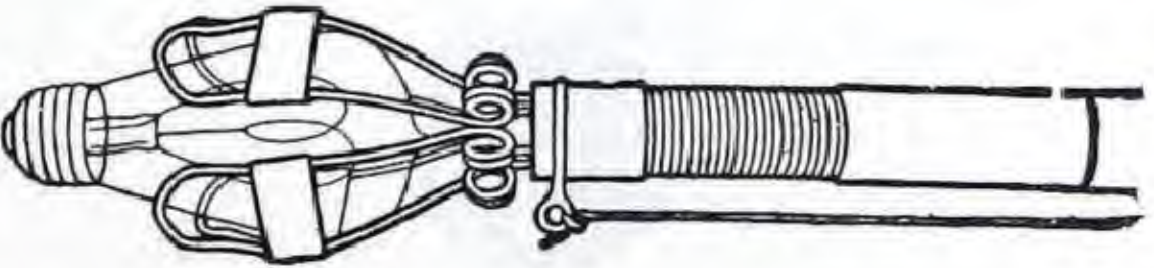


Matthews Holdfast Portables Nos. 4112 and 4112S are a combination of a specially designed No. 112 Matthews Holdfast Guard with a hook, a socket and an extra strong hardwood handle. Matthews Holdfast Shade is furnished with the No. 4112S.

List No.	List Price Each
4112 Includes lamp guard, socket and handle only	\$4.00
4112S Same as above with Matthews Holdfast Shade	4.50

MATTHEWS HOLDFAST (EASY) LAMP CHANGERS

For removing and replacing lamps in high places. Save time. Avoid accidents.



List No.	List Price Each
2 For 6, 8, 10 and 16 C.P. Lamps, and 15 to 60-watt and the new 25 and 50-watt Mill Type Mazda Lamps.....	\$12.00
3 For 32 to 50 C.P. Carbon Lamps 60 to 150-watt Mazda Lamps and other large and odd shapes up to 5 inches diameter.....	14.00

No poles furnished. Any 3/4" pole or pipe will fit them. Not adaptable to street series lamps.

LOXON LAMP GUARDS



No. 1420

Breakage and theft take a heavy toll from the users of large numbers of lamps. To stop breakage a sturdy guard is necessary. To stop theft an effective lock is required.

The Loxon line does this double duty at a very small original cost.

These dual-purpose lamp guards are made for all types of sockets. They are quickly and easily attached to the socket and locked with a key, one of which is furnished with each dozen guards. All guards are made of steel, heavily tinned.

Loxon Mill Type Guards, Nos. 1420, 1420A, 1420B, are exactly the same as the regular Loxon guards, except that the cages are built smaller to fit the regular 50 watt Mill Type Lamps.

List No.	Lamp Sizes	Fits Socket	Weight per dozen	List Price per dozen
1420	25-40*	Brass	2 1/4 lbs.	\$5.50
1420A	25-40*	W. P.	2 1/2 lbs.	5.50
1420B	25-40*	W. P.	3 lbs.	5.50

*Also 50 watt Rough Service, and 50 watt Mill Type.

1425	50-60	Brass	2 1/2 lbs.	5.50
1427A	50-60	W. P.	2 3/4 lbs.	5.50
1427B	50-60	W. P.	3 1/4 lbs.	5.50
1426	60-100	Brass	2 3/4 lbs.	5.75
1428A	60-100	W. P.	3 lbs.	5.75
1428B	60-100	W. P.	3 1/2 lbs.	5.75
2443	100-150	Brass	4 1/4 lbs.	7.00
2444	150-200	Brass	3 lbs.	9.00
2446A	150-200	W. P.	3 lbs.	9.00
2446B	150-200	W. P.	3 1/2 lbs.	9.00
2447	200 Old Style	Brass	5 lbs.	11.50
2447A	200 Old Style	W. P.	4 1/2 lbs.	12.50
2447B	200 Old Style	W. P.	4 3/4 lbs.	12.50

One key included with each dozen guards.

All numbers followed by "A" fit any W. P. Socket with bottom bead measuring 1 9/16 to 1 11/16 inches in extreme diameter.

All numbers followed by "B" fit any W. P. Socket with bottom bead measuring 1 3/4 inches in extreme diameter.

For W. P. sockets or receptacles with bottom bead measuring 1 1/2 inches in diameter specify regular catalog number of guard desired followed by letter "N", for example "1427-N". W.P. sockets not coming within the above dimension can be fitted by sending a sample socket and we will select the proper guard to fit.

Aluminum sockets can be fitted by giving the Catalog number and maker's name.



No. 1400

List No.	Lamp Size	Fits Socket	Weight per dozen	List Price per dozen
1400	25-40*	Brass	3 1/2 lbs.	\$ 8.50
1401A	25-40*	W. P.	3 1/2 lbs.	11.00
1401B	25-40*	W. P.	4 lbs.	11.00
1443	50-60	Brass	4 1/2 lbs.	8.50
1444A	50-60	W. P.	4 1/2 lbs.	11.00
1444B	50-60	W. P.	5 1/4 lbs.	11.00

*Also 50 watt Rough Service and 50 watt Mill Type.

MATTHEWS HOLDFAST LAMP GUARDS



For Brass Socket



For WP Socket

Guards for brass sockets are indicated by the letter B after the numbers; for porcelain weather-proof sockets by the letters WP; collars on B guards are 1 1/4 inches in diameter on WP guards 1 1/2 inches in diameter.

Guards for Protecting New 25 and 50-Watt Mill Type Mazda Lamps in Regular Bulb

List No.	Size of Wire, B. W. G.	List Price Per 100
MT14B	14	\$88.7
MT14WP	14	80.0

Guards for Protecting 6, 8, 10, 16, 32 C.P. Carbon and 15, 25, 40, 50 and 60-Watt Lamps

114B	14	\$83.7
114WP	14	76.2
112B	12	103.7
112WP	12	93.7

Guards for Protecting 50 C. P. Carbon, 75 and 100 Watt, Type C, Pear Shape Mazda Lamps

514B	14	110.0
514WP	14	97.5

Guards for Protecting 200 Watt, Type C, Pear Shape Mazda Lamps and 100 Watt Old Style Straight Side Mazda Lamps

714B	14	191.3
714WP	14	172.5

LAMP GUARDS

Strong, durable guards of expanded steel, reinforced, heavy tin coating. Open on hinge in base. Screws are rust-proof and self-retaining.

FLEXCO-LOK KEY LOCKING

For Lamps 4" Long or Less:

List No. 100 for Standard Brass Sockets

List No. 102 for 1 1/2 inch weatherproof

List No. 104 for 1 5/8 inch weatherproof

Wt. 1 3/4 lbs. Per carton of ten.

List Price..... \$6.00

For Lamps 60 Watt or Less

List No. 1160 for Standard Brass Sockets

List No. 1162 for 1 1/2 inch weatherproof

List No. 1164 for 1 5/8 inch weatherproof

Wt. 2 1/4 lbs. Per carton of ten.

List Price..... \$6.00

For Lamps 100 Watt or Less:

List No. 5600 for Standard Brass Sockets

List No. 5602 for 1 1/2 inch weatherproof

Wt. 2 1/2 lbs. Per carton of ten..... List Price \$7.50

FLEXCO NON-LOCKING

For Lamps 4" Long or Less:

List No. 200 for Standard Brass Sockets

List No. 202 for 1 1/2 inch weatherproof

List No. 204 for 1 5/8 inch weatherproof

Wt. 1 3/4 lbs. Per carton of ten.

List Price..... \$5.00

For Lamps 60 Watt or Less:

List No. 2160 for Standard Brass Sockets

List No. 2162 for 1 1/2 inch weatherproof

List No. 2164 for 1 5/8 inch weatherproof

Wt. 2 1/4 lbs. Per carton of ten..... List Price \$5.00

For Lamps 100 Watt or Less:

List No. 6700 for Standard Brass Sockets

List No. 6702 for 1 1/2 inch weatherproof

Wt. 2 1/2 lbs. Per carton of ten..... List Price \$6.00



SOLDER



Wire Solder Lengths



Commercial 40-60 Bar Solder



Bar Solder



Rosin Core Solder Spool



Wiping Solder



Rosin Core Solder

Description	List Price per lb.
Wire Solder 30-70, 25 lbs. spools.....	\$0.29
Wire Solder 40-60, 25 lbs. spools.....	.36
Wire Solder 45-55, 25 lbs. spools.....	.40
Wire Solder 50-50, 25 lbs. spools.....	.42
1 lb. spools 7c per lb. extra	
1 lb. spools 4c per lb. extra	
Cut in 16" lengths no extra charge.	
Solder 30-70, 100 lbs. lots.....	.25
Solder 38-62, 100 lbs. lots.....	.32
Solder 40-60, 100 lbs. lots.....	.33
Solder 45-55, 100 lbs. lots.....	.36
Solder 50-50, 100 lbs. lots.....	.39
Wiping Solder 5 lbs. bar.....	.35
Rosin Core Solder 1 lb. spool.....	.75
Rosin Core Solder 5 lbs. spool.....	.65
Rosin Core Solder 20 lbs. spool.....	.60
Rosin Core Solder 1 lb. spool.....	.75
Rosin Core Solder 5 lbs. spool.....	.65
Rosin Core Solder 10 lbs. spool.....	.85
Rosin Core Solder 20 lbs.....	.60

N. E. SOLDERING PASTE



This is a superior quality of soldering paste. It will not corrode or injure in any way the material that is to be soldered. It takes the place of injurious acids and is equally effective. It may be applied with a rag, a stick, or even with the fingers. It is particularly intended for those who prefer a soldering flux in paste form rather than the soldering stick, and in cases where it is inconvenient to heat joint in order to apply the stick flux. Furnished in tins.

List Price	Size	List Price
Each	Box	Each
\$ 0.15	1/2 lb.	\$0.35
.20	1 lb.	.60

N. E. SOLDERING SALTS

Our soldering salt combines in soluble crystal the most efficient soldering agents known to chemistry. It dissolves readily in water, and does not give off any obnoxious odors or gases. Instructions for dissolving in water to make a soldering agent of proper strength are included in each package.

Size	List Price	Size	List Price
Container	Each	Container	Each
1 lb.	\$0.30	6 lbs.	\$1.60
1 lb.	.40		

ANY STANDARD BRANDS OF SOLDERING SALTS, PASTE, AND STICKS CAN BE SUPPLIED AT PRE-ESTIMATED MARKET PRICES.



SOLDERING PASTE AND SALTS



Paste



Salts

Nokorode Soldering Paste

Will flux all metals except Aluminum. Takes the place of acid in all soldering jobs. Absolutely non-corrosive, safe as resin and rapid as acid. Not affected by heat and does not spatter. The solder will not turn dark after using, and the work has high tensile strength.

Nokorode Paste

Size of Can	Standard Package	List Price Each	Per Carton
2 Ounces	12 to Carton	\$0.15	\$1.20
1 Pound	6 to Carton	.90 lb.	4.50
10 Pounds	Any Quantity	.50 lb.	
25 Pounds	Any Quantity	.45 lb.	
50 Pounds	Any Quantity	.43 lb.	

Nokorode Soldering Salts

Eliminates the use of corrosive soldering acid and is the remedy for all soldering troubles—makes perfect, lasting and non-corrosive joints wherever used.

Extensively used by plumbers, tinsmiths and leading manufacturers in all lines.

Highly economical, and has no disagreeable fumes while under heat—will not burn the operators' hands or clothing.

Nokorode Salts

Size of Can	Standard Package	List Price Per lb.	Per Carton
6 Ounces	12 to Carton	\$0.30 each	\$3.60
1 Pound	6 to Carton	0.60 lb.	3.00
5 Pounds	Any Quantity	.45	
25 Pounds	Any Quantity	.35	
50 Pounds	Any Quantity	.32	
100 Pounds	In Drum	.24	

Barrel Lots

Nokorode Paste or Salts are Packed in 500 Pound Barrels (average).

List Price Paste	40 cents per pound
List Price Salts	20 cents per pound

Solderall



This is a complete metal solder and flux combined. A small quantity applied to the joints to be soldered when heated will flow and unite the parts the same as wire or bar solder. Furnished in collapsible tubes. Standard package 12.

No. 2 Size.....	List Price	\$0.25
No. 3 Size.....	List Price	.70

NORTHERN ELECTRIC TAPES

GRADE "A"
FRICTION TAPES

This tape is an exceptionally high quality friction tape, being made to our own specifications. The sheeting entering into the tape is a closely-woven, well-balanced, unbleached cotton, thoroughly impregnated with a special insulating compound of adhesive properties, which makes it an ideal tape.

Under actual test this tape has withstood 6000 volts before puncturing.

The standard $\frac{3}{4}$ " rolls are boxed in our white cartons with our BLUE SHIELD quality label. When required in greater widths than $\frac{3}{4}$ " the tape is simply wrapped in tinfoil or waxed paper.

Width $\frac{3}{4}$ "; Size Roll, $\frac{1}{2}$ lb.; List Price, per lb., \$0.75

NOR-EL-CO FRICTION TAPES

The fabric in this tape will not deteriorate with age and like all Northern tapes it will not dry out within a year if left in the original package. Possesses exceptional sticking properties and taken all around is an excellent low price tape. Furnished with customer's own name printed on box if ordered in suitable quantities.



Width	Size Roll	List Price per Pound
$\frac{3}{4}$ "	$\frac{1}{2}$ lb.	\$0.55
$\frac{3}{4}$ "	4 oz.	.55



NORTHERN ELECTRIC TAPES

NOR-EL-CO TIRE TAPE



* A regular Grade "C" Tape put in rolls weighing one or two ounces desired. Same grade as friction tape above.

Width	Size Roll	List Price per Pound
$\frac{3}{4}$ "	1 oz.	\$0.80
$\frac{3}{4}$ "	2 oz.	

VICTOR SPLICE

This grade of splicing compound is coated on red Holland sheeting the thickness being about .048 inch. It has a high insulation resistance, .048 inch showing a resistance of 10,000 volts at five amperes. Has not the stretching properties of the better grades, but is a good all-around splice for general work.



Width	Size Roll	List Price per Pound
$\frac{3}{4}$ "	$\frac{1}{2}$ lb.	\$0.60
$\frac{3}{4}$ "	4 oz.	.60



NORTHERN SPECIAL SPLICE

A very tough compound the basis of which is high grade Para rubber which toughened and has its insulation resistance increased the other components.

Width	Size Roll	List Price per Pound
$\frac{3}{4}$ "	$\frac{1}{2}$ lb.	\$0.80

ASBESTOS PAPER

Approx. Wt. per 100 sq. ft.	Approx. Thickness Inches	Approx. Wt. per 100 sq. ft.	Approx. Thickness Inches
6 pounds.....	.015	14 pounds.....	.025
8 pounds.....	.018	16 pounds.....	$\frac{1}{16}$
10 pounds.....	.020	35 pounds.....	$\frac{1}{16}$
12 pounds.....	.025		

Price on application.

ASBESTOS BRAIDED TUBING

This tubing is extensively used for covering electrical conductor wires, where a superior protection against heat and flame is required. It is very flexible, absolutely fireproof and will take any insulating compound.

List No.	To fit over bare Wires No.	Outside diameter of Tubing	Approx. No. of lineal ft. to lb.	List Price per lb.
1516	17 B & S	$\frac{1}{8}$ "	175	\$2.25
1517	10 "	$\frac{5}{32}$ "	100	2.25
1518	8 "	$\frac{3}{16}$ "	85	2.25
1519	5 "	$\frac{1}{4}$ "	65	2.25
1520	4 "	$\frac{5}{16}$ "	50	1.80
1521	2 "	$\frac{3}{8}$ "	45	1.80
1522	0 "	$\frac{1}{2}$ "	23	1.80
1523		$\frac{5}{8}$ "	20	1.80
1524		$\frac{11}{16}$ "	16	1.80
1528		$\frac{3}{4}$ "	15	1.80
1529		$\frac{7}{8}$ "	14	1.80
1530		1 "	12	1.80
1531		$1\frac{1}{4}$ "	10	1.80
1532		$1\frac{1}{2}$ "	9	1.80

Other diameters made to order.

When ordering please state our number or give diameter of wire to be covered.

ASBESTOS LISTINGS, SLEEVING AND TAPE

ATLAS STYLE No. 121 NON-METALLIC ASBESTOS LISTINGS

Selvaged edges $\frac{1}{16}$ " thick; widths $\frac{1}{2}$ ", $\frac{3}{4}$ ", 1", $1\frac{1}{2}$ ", 2" and 3".

Atlas Style No. 121 Non-metallic Asbestos Listings are proof, flexible and adaptable for wrapping wires, coils and cables in the electrical industry.

Material is supplied in 135 ft. coils.

List Price, per lb. \$0.90

FINE ASBESTOS LISTINGS

Atlas Style No. 34, $\frac{1}{2}$ " wide x .015"; Style No. 35, $\frac{3}{4}$ " wide x .015"; Style No. 36, 1" wide x .015"; Style No. 37, $1\frac{1}{4}$ " wide x .015" and Style No. 38, $1\frac{1}{2}$ " wide x .015".

The above style numbers are Fine Asbestos Listings, uniform in thickness, width and weave. Principally used for wrapping electric wires and coils. They are a standard product of the electrical manufacturer, contractor and all central stations.

Material is put up in coils of 72 feet and 108 feet each.

List Price, 72 ft. coil, per lb. \$3.50

List Price, 108 ft. coil, per lb. 2.60

ATLAS STYLE No. 40 BRAIDED ASBESTOS TUBING OR SLEEVING

This material is produced by braiding fine asbestos yarns into tubing form, having an inside diameter of from $\frac{1}{64}$ " to $\frac{1}{16}$ " inside diameter without outside walls of $\frac{1}{32}$ " and $\frac{1}{16}$ ".

Atlas Style No. 40 Asbestos Tubing has numerous uses, such as a covering for wires to protect them from heat or chemicals.

Material is supplied in 25 and 50 lb. coils.

List Price, per lb. \$1.25

ATLAS STYLE No. 268 ASBESTOS ELECTRICAL PAPER TAPE

This material is supplied in thicknesses from .007" to .020" and all widths from $\frac{3}{4}$ " to 2". Put up in rolls of approximately 36 yds. each.

Atlas Style No. 268 Asbestos Electrical Paper, in tape form, is largely used for insulating magnet wires of tramway motors, tramway motors, mill motors and welding transformers, or where excessive temperatures may be necessary.

Material is supplied in rolls approximately $7\frac{3}{4}$ " in diameter and any of the above widths.

List Price, per lb. \$0.65

ASBESTOS SHEET MILLBOARD

For general use where sheet or board is desired for protection against fire, heat, acid, fumes, etc.

Standard sheets 42 in. x 48 in.

Thickness Inches	Approx. weight per sheet 42" x 48" Pounds	Thickness Inches	Approx. Weight per sheet 42" x 48" Pounds
$\frac{1}{32}$	2.6	$\frac{5}{32}$	12
$\frac{3}{64}$	3.5	$\frac{3}{16}$	15
$\frac{1}{16}$	5	$\frac{1}{4}$	17.5
$\frac{5}{64}$	6.5	$\frac{5}{16}$	20
$\frac{3}{32}$	8	$\frac{3}{8}$	25
$\frac{1}{8}$	10	$\frac{1}{2}$	30

Made in three grades: hard, medium and soft. Medium grade finished unless otherwise specified. Prices on application.

COTTON SLEEVING

Width	List Price per lb.
$1/16$ "	\$1.28
$3/32$ "	1.28
$4/32$ "	1.28
$4/32$ "	1.28
$5/32$ "	1.28
$6/32$ "	1.28
$4/32$ "	1.28
$9/32$ "	1.28

ELECTRICAL TAPES

LINEN ELECTRICAL TAPE .005".

List No.	Width	List Price Per Gross Yds.
G-404	$\frac{3}{8}$ "	\$0.82
G-84	$\frac{1}{2}$ "	.88
G-9739	$\frac{5}{8}$ "	.96
G-10099	$\frac{3}{4}$ "	1.08
G-9744	1"	1.32
G-9949	$1\frac{1}{4}$ "	1.80

EXTRA SPECIAL ELECTRICAL TAPE .007".

List No.	Width	List Price Per Gross Yds.
G-9669	$\frac{1}{2}$ "	.86
G-3304	$\frac{5}{8}$ "	.96
G-89	$\frac{3}{4}$ "	1.08
G-9029	$\frac{3}{4}$ "	1.08
G-164	1"	1.20
G-9794	1"	1.20
G-9584	1"	1.30
G-940	$1\frac{1}{2}$ "	1.70

LINEN ELECTRICAL TAPE .010".

List No.	Width	List Price Per Gross Yds.
G-4824	$\frac{1}{2}$ "	.80
G-9419	$\frac{5}{8}$ "	.86
G-9324	$\frac{3}{4}$ "	.96
G-3564	1"	1.08
G-5074	1"	1.14
G-9534	$1\frac{1}{4}$ "	1.60
G-9544	$1\frac{1}{2}$ "	1.70
G-9699	2"	2.80

SILK TAPE .003".

List No.	Width	List Price Per 36 Yds.
G-9124	$\frac{3}{8}$ "	.60
G-8669	$\frac{1}{2}$ "	.70
G-8674	$\frac{5}{8}$ "	.90

COTTON ELECTRICAL TAPE

List No.	Thickness	Width	List Price per Gross Yds.
C.T. 2093	.005"	$\frac{5}{8}$ "	\$0.93
C.T. 2093	.005"	$\frac{3}{4}$ "	1.06
C.T. 2093	.005"	1"	1.19
C.T. 2099	.007"	$\frac{1}{2}$ "	.72
C.T. 2099	.007"	$\frac{5}{8}$ "	.83
C.T. 2099	.007"	$\frac{3}{4}$ "	.97
C.T. 2099	.007"	1"	1.12
C.T. 2099	.007"	$1\frac{1}{4}$ "	1.40
C.T. 2099	.007"	$1\frac{1}{2}$ "	1.42
C.T. 2100	.010"	$\frac{1}{2}$ "	.72
C.T. 2100	.010"	$\frac{5}{8}$ "	.83
C.T. 2100	.010"	$\frac{3}{4}$ "	.97
C.T. 2100	.010"	1"	1.12
C.T. 2100	.010"	$1\frac{1}{4}$ "	1.40
C.T. 2100	.010"	$1\frac{1}{2}$ "	1.42

BLACK VARNISH SATURATED SLEEVING

This material consists of woven cotton tubing heavily varnished with kettle bodied, pure linseed oil baking varnish. Contains no lacquer, starch or wax. Extremely flexible. Smooth interior wall takes stranded wires with ease. Average dielectric strength 1400 volts.

Standard stock lengths 36"—500 ft. bundles.

Different sizes may be aggregated for quantity prices.

Order by standard size numbers.

Std. Sizes	Approx. Inside Dia.	Std. Sizes	Approx. Inside Dia.	Std. Sizes	Approx. Inside Dia.
20	.034"	11	.095"	2	.263"
19	.038"	10	.106"	1	.294"
18	.042"	9	.118"	0	.330"
17	.047"	8	.133"	$\frac{3}{8}$"	.....
16	.053"	7	.148"	$\frac{7}{16}$"	.....
15	.059"	6	.166"	$\frac{1}{2}$"	.....
14	.066"	5	.186"	$\frac{5}{8}$"	.....
13	.076"	4	.208"		
12	.085"	3	.234"		

Prices on application.

"IRVINGTON" INSULATING VARNISHES

Because of the impossibility of embodying in one product all the demands of a modern Electrical Insulating Varnish, we offer a varied line of products, each one developed to fulfill some specific purpose and each one having some identifying characteristic, foreign to the other.

The "IRVINGTON" Insulating Varnishes described below are all manufactured to meet the general requirements of practice and are guaranteed to satisfy the chief demands from an electrical standpoint as well as from the physical, mechanical and chemical aspects. They offer the engineer a wide range of selection to determine the proper varnish for his particular purpose.

Due to varied conditions of shops and to special machinery, it may be necessary to obtain a varnish of somewhat different characteristics in order to meet new or changed conditions. In all cases of this nature submit your problems to our Research Staff who will cooperate with you in every detail in working them out. A product obtained through our Laboratory has the double advantage of being the correct article and of being employed in the correct way.

No. 109—"Irvington" Clear Baking Varnish

Baking Time on Surfaces—2 hours at 105°C (221°F)
Specific Gravity, 0.870; Baume 31°
Film Thickness .004"
Non-Volatile by weight—not less than 50%
Solvent—V.M. & P. Naphtha or Benzine

This varnish is recommended for the impregnation of automotive generators, small motors, and radio transformer coils because of its penetrating qualities and quick drying time.

No. 2—"Irvington" Clear Baking Varnish

Baking Time on Surfaces—6 hours at 105°C (221°F)
Specific Gravity, 0.885-0.889; Baume 28°
Film Thickness .004" to .005"
Non-Volatile by weight—not less than 50%
Solvent—V.M. & P. Naphtha or Benzine

Dries to a transparent film of high mechanical strength. It is very adhesive and especially suitable for the treatment of form wound coils which are formed or taped after being dipped. It produces a coating of high dielectric strength which is oil-proof, waterproof, non-corrosive and affords excellent acid protection to all surfaces.

No. 5—"Irvington" Black Baking Varnish

Baking Time on Surfaces—3 hours at 105°C (221°F)
Specific Gravity, 0.870; Baume 31°
Film Thickness—.005"
Non-Volatile by weight—not less than 45%
Solvent—V.M. & P. Naphtha or Benzine.

A quick baking Varnish which remains plastic indefinitely. Designed for the impregnation of assembled armatures and for coils treated before assembly. It should be used where strong mechanical properties, high dielectric strength and resistance to deleterious agents are desired in a minimum of time. It is waterproof, acid proof, alkali resistant and but slightly affected by hot oil.

Prices on application

"IRVINGTON INSULATING VARNISHES"**No. 8—"Irvington" Black Baking Varnish**

Baking Time on Surfaces—6-8 hours at 105°C (221°F)
Specific Gravity—0.865; Baume 32°
Film Thickness—.005"
Non-Volatile matter by weight—not less than 50%
Solvent—V.M. & P. Naphtha Benzine

This Varnish is recommended where maximum flexibility of the dried film is of extreme importance. It will withstand the highest operating temperatures to which windings may be subjected and will retain its flexibility and insulating properties. It is waterproof, oilproof, acid proof and long lived. It is recommended for railway mining and other heavy duty apparatus.

No. 9—"Irvington" Clear Air Drying Varnish

Air Drying Time—3 hours
Specific Gravity—0.887; Baume 28°
Film Thickness—.003"—.004"
Non-Volatile by weight—not less than 50%
Solvent—V.M. & P. Naphtha or benzine

This varnish is suitable for quick repairs on apparatus and may be used for the impregnation of automotive generators. It is waterproof, resistant to oil and produces a film of medium dielectric strength.

No. 1201—"Irvington" Black Air Drying Varnish

Air Drying Time on Surfaces—1 hour
Specific Gravity—0.825—0.830; Baume 38°-40°
Film Thickness—.005"
Non-Volatile by weight not less than 44%
Solvent—V.M. & P. Naphtha or Benzine

A black air drying Varnish which produces a hard surface coating of a glossy black. It is resistant to oil and will retain its dielectric and protective properties for an indefinite length of time. It is an excellent quick repair and maintenance varnish.

No. 15—"Irvington" Black Insulating Paint

Air Drying Time—30 minutes
Specific Gravity, 0.843-0.838; Baume 36°-37°
Solvent—V.M. & P. Naphtha or Benzine

This paint may be successfully applied by brushing, spraying or dipping and will protect the wood or metal from the action of acids and alkalis.

No. 19 "Irvington" Clear Oil Proof Finishing Varnish

Drying time—20 minutes
Specific Gravity, .934; Baume 20°
Film Thickness—.004"
Non-Volatile by weight—not less than 35%
Solvent—Denatured Alcohol

As its name implies, this varnish produces a coating which is absolutely oil proof and in addition provides excellent protection to the action of metal, dust and moisture.

No. 20—"Irvington" Black Oil Proof Finishing Varnish

This Varnish is exactly similar to No. 19 Clear O.P. Finishing Varnish except as to colour. The film is a glossy black, which will not fade.

Prices on application

IRVINGTON INSULATING VARNISH

2501—"Irvington" Clear Sticking Varnish

Specific Gravity—.980; Baume 13°
 Film Thickness—
 Non-Volatile matter by weight—not less than 60%
 Solvent—Denatured Alcohol.
 This Varnish is intended to cement linen tape, varnished
 wire or paper to armature coils. It is water and oil resist-

Irvington "Harvel" Insulating Varnishes

"Harvel" is the trade name given to products derived from
 the use of Cashew Shell Liquid as the main constituent.
 Cashew Shell Liquid has unusual properties of being able to
 combine chemically with various ingredients so as to produce
 maximum qualities of resistance.

Hencefore, manufacturers and those who maintain and
 repair electrical equipment have vainly sought an insulating
 varnish suited to their particular shop practice, which would
 provide adequate protection against deleterious elements encoun-
 tered in every day operation. These desired properties are:—
 Tough dryness of the Varnish film;—high dielectric
 strength;—Retention of dielectric strength after subjection
 to water;—Acid Resistance;—Absolute protection against
 action of hot and cold transformer oil and lubricating oils;
 flexibility and ability to withstand temperature variations;
 toughness of film;—Adhesion;—and High Insulation
 resistance.

Due to the limited range of raw materials at the disposal
 of the insulating varnish manufacturer it was impossible to
 combine all the desired properties in any particular varnish.
 For example a varnish developed particularly for oil resistance
 would produce a film which could not withstand mechanical
 stresses and operating temperatures without cracking, flaking
 or powdering; and another varnish yielding a dried film of
 great flexibility might not withstand the action of trans-
 former and lubricating oils without softening and eventually
 deteriorating.

The Research Department of the IRVINGTON VARNISH
 INSULATOR COMPANY has taken advantage of the
 properties of Cashew Shell Liquid to chemically combine
 by special processes and heat treatments, with the raw
 materials used in the general line of insulating varnishes and
 thereby produce "HARVEL" Insulating Varnishes.

IRVINGTON "HARVEL" INSULATING VARNISHES
 are manufactured in the four following types to meet the
 requirements of the Electrical Trade.

2502—"Harvel" Clear Baking Varnish

Baking Time on Surfaces—6 hours at 105°C (221°F)
 Specific Gravity—0.898; Baume 26°
 Film Thickness—.0035"—.004"
 Non-Volatile By Weight—not less than 55%
 Solvent—V.M. & P. Naphtha or Benzine

This Varnish contains Cashew Shell Liquid combined with
 other raw materials used in the general line of Irvington Insulat-
 ing Varnishes. The dried film is unaffected by hot oil or cold
 transformer or lubricating oils and is highly resistant to the
 action of fresh and salt water, acid and alkali solutions and the
 stresses produced by them. The film is durable, extremely
 tough and of high dielectric strength. It is recommended for
 use on motor and field coils, completely wound armatures, stators
 and oil immersed transformer windings.

Prices on application

"IRVINGTON" INSULATING VARNISH

No. 602—"Harvel" Black Baking Varnish

Baking Time on Surfaces—3 hours at 105°C (221°F)
 Specific Gravity—0.887; Baume 28°
 Film Thickness—.004"
 Non-Volatile by Weight—not less than 50%
 Solvent—V.M. & P. Naphtha or Benzine

This Varnish contains Cashew Shell Liquid, chemically
 combined to approved raw materials used in the manufacture
 of other IRVINGTON Black Baking Varnishes. In addition
 to its quick drying characteristics, it has the added advantages
 of oil, acid and water proofness, unusual flexibility and high
 dielectric strength. It is recommended for the impregnation
 of railway armatures and field coils and wherever prolonged
 flexibility and resistance to injurious elements are of prime
 importance.

No. 902 "Harvel" Clear Air Drying Varnish

Air Drying Time—5 hours
 Specific Gravity—0.876; Baume 30°
 Film Thickness—.003"
 Non-Volatile by Weight—not less than 50%
 Solvent—V.M. & P. Naphtha or Benzine

This Varnish contains Cashew Shell Liquid combined with
 other high grade raw materials. It is recommended when
 baking facilities are not available. It produces a coating which
 is oil, water and acid proof, of high dielectric strength and
 possesses unusual flexibility and heat endurance. It is recom-
 mended for the treatment of form wound coils, for trans-
 formers, field or armature coils and other purposes where a
 clear varnish is desired.

No. 1301—"Harvel" Black Air Drying Varnish

Air Drying Time—6 hours
 Specific Gravity—0.865; Baume 32°
 Film Thickness—.0035"
 Non-Volatile by Weight—not less than 40%
 Solvent—V.M. & P. Naphtha or Benzine

This Varnish is a black air drying varnish for general
 insulating and protective purposes which produces a tough,
 flexible coating. When dry it will not check or crumble and
 will retain its properties for an indefinite period.

This Varnish is highly recommended for the final treatment
 of motor, generator and transformer coils and for coating the
 assembled windings to enhance the appearance and to protect
 them against the action of oils, acids and water. It is being
 successfully used for the treatment of rubber covered cable
 with and without cotton braid. It may be used in place of
 asphaltum paint for the painting of storage battery trays,
 switch and signal boxes and other miscellaneous purposes.
 Because of its extreme flexibility it will withstand temperature
 changes without cracking, peeling or blistering.

Other "Harvel" Products

- "HARVEL" No. 621 OIL STOP (Regular)
- "HARVEL" No. 620 OIL STOP (Quick Setting)
- "HARVEL" No. 620-A Rubber Splice
- "HARVEL" No. 621 Slow Setting OIL STOP

New but THOROUGHLY TESTED products for cable
 jointing.

Seals completely against any kind of oil, against any kind
 of water, and adheres firmly to rubber and oil impregnated
 paper.

Prices on application

"IRVINGTON" YELLOW VARNISHED**Straight Cambrics and Tapes**

The same care is exercised in the manufacture of "Irvington" Yellow Varnished Cambrics as in the Black. They are furnished in waxy, dry and tacky finish according to the use or service required of the insulation.

While not the equal of the "IRVINGTON" Black Varnished in aging qualities, dielectric strength, insulation resistance or heat resistance, they are nevertheless superior in all these qualities to other yellow varnished cambrics procurable. Where shop practice, engineering requirements, or conformity of color require the use of yellow varnished cambric the "IRVINGTON" product will be found superior.

Cloth is supplied:

In rolls of 25 yards or more. 50 yard rolls are standard and will be furnished unless otherwise specified. Untrimmed approximately 37" wide. Trimmed 36" wide. Trimmed unless otherwise specified.

Straight Tape is furnished:

On paper cores, 1½" inside diameter—¾" to ½" wide up to 9" outside diameter.

⅝" to 1" wide, up to 10" outside diameter—1" and above up to 12" outside diameter.

Rolls of 72 lineal yards are standard and will be furnished unless otherwise specified.

All tapes are quoted on a basis of the gross yard of 144 lineal yards.

Thickness Inches	Average Volts per .001"	Average Tensile Strength 1" wide with warp	Approx. Weight per Sq. Yd.	Tearing Strength in grams across warp
.005	750-850	51	.32	124
.006	750-850	51	.34	196
.007	800-900	51	.40	204
.008	750-850	54	.45	188
.009	750-850	53	.50	195
.010	750-850	51	.54	208
.012	750-850	49	.68	217
.015	750-850	48	.82	...

"IRVINGTON"
YELLOW VARNISHED DUCKS

.018	600-800	120	.90	...
.020	600-800	103	1.05	...
.025	400-500	118	1.18	...
.030	400-500	140	1.45	...
.035	400-500	161	1.63	...

"IRVINGTON" Yellow Varnished Ducks have a rough finish, no effort having been made to attain smoothness. They are unaffected by moisture and are used for hoods over railway motor coils and for washers under field coils and wherever a very durable material is required.

When ordering indicate thickness, color, finish, width and size of roll.

"IRVINGTON SEAMLESS BIAS"
BLACK and YELLOW

Varnished Cambric Tapes

"Irvington Seamless Bias" Varnished Cambric Tapes possess the same characteristics of insulation as the straight tapes. The Black is furnished in three finishes, slightly tacky, dry and greasy; the yellow—slightly tacky, dry and waxy. Unless otherwise specified the slightly tacky finish will be supplied on both black and yellow.

"IRVINGTON" SEAMLESS BIAS

(Continued)

Thickness Inches	Average Volts per .001 Inch		Approx. Wgt lbs. per Gr. Y 1" Wide
	Yellow	Black	
.005	800	1000	1.28
.006	800	1000	1.36
.007	800	1000-1100	1.60
.008	800	1000-1100	1.76
.009	800	1000-1100	1.96
.010	800	1100	2.18
.012	800	1100	2.67
.015	800	1100	3.29

Standard rolls are ½ gross yard or 72 lineal yards and will be furnished unless otherwise specified.

Widths furnished ½" to 36".

All rolls dipped in paraffin to exclude moisture.

The 1½" core is standard.

All tape prices are quoted on the basis of the gross yard of 144 lineal yards.

Small diameter rolls for bus bar or emergency work can be supplied for a slight additional charge.

When ordering, state thickness, color, width, size roll as paraffined or unparaffined.

**"IRVINGTON" SEWED BIAS BLACK AND
YELLOW VARNISHED CAMBRIC TAPE**

"Irvington" Sewed Bias Tapes are made from the same base cloths as the straight tapes. "Irv-O-Flatseme" Sewed Bias Tape Seams lapped one quarter inch—double stitch and only .005 to .007 in. thicker than the body of the tape itself. The varnish used in coating is the same as used on "Irvington" products and the tapes are furnished in greasy, dry and tacky finishes in the black; waxy, dry and tacky finishes in the yellow. Unless otherwise specified, the slightly tacky finish will be furnished on both black and yellow.

Until the time of the production of "Irvington Seamless Bias," the sewed bias was the only material of its kind available and "Irvington" Sewed Bias Tapes met all the requirements of the electrical trade.

"Irvington" Sewed Bias Tapes

Thickness Inches	Average Volts Per .001 Inch		Approx. Wgt lbs. per Gr. Y 1" Wide
	Yellow	Black	
.005	750-850	1000	1.29
.006	750-850	1000	1.42
.007	750-850	1000-1100	1.64
.008	750-850	1000-1100	1.85
.009	750-850	1000-1100	2.02
.010	750-850	1100	2.25
.012	750-850	1100	2.71
.015	750-850	1100	3.55

Standard rolls ½ gross yards or 72 lineal yards will be furnished unless otherwise specified.

Widths furnished ½" to 36".

All rolls paraffin dipped to exclude moisture.

Furnished on 1½" inside diameter paper cores.

All tape prices are quoted on a basis of the gross yard of 144 lineal yards.

Small diameter rolls for bus bar and emergency work can be supplied for a slight additional charge.

"IRVINGTON" VARNISHED SILKS

"Irvington" Varnished Silks are made in both straight and bias types. The base cloths used in their manufacture are closely woven from pure imported silk. The varnish is compounded carefully to give a product of extreme flexibility and very high dielectric strength.

Varnished silk is used where a minimum of thickness combined with high dielectric and flexibility is desired—as in the manufacture of magneto armatures, ignition coils and small apparatus.

Made only in the slightly tacky and dry finishes.

"IRVINGTON" VARNISHED SILK ***Straight**

Average Dielectric Strength (all thicknesses) 1000-1200 volts per .001".

Average Tensile Strength (all thicknesses) 14 lbs. per 1 inch width (warp).

Furnished in 50 yard rolls, untrimmed unless specified otherwise.

Widths—1/4" to 36". 1 1/2" inside diameter paper cores.

Thicknesses—.002" to .008" inclusive.

"IRVINGTON" VARNISHED SILK **Bias**

Average Dielectric Strength—as above.

Furnished in 51" strips, cut on 45° angle widths—1/4" and up.

Packed 200 strips to bundle.

When ordering specify thickness, bias or straight, width and finish desired.

"IRVINGTON" VARNISHED PAPERS

Raw papers used in the manufacture of "Irvington" Varnished Papers are bought on strict specifications, conformity of thickness, total absence of metallic particles and harmful chemicals and maximum tensile strength and tearing resistance are required. The Varnishes used in coating the papers are manufactured with great care and absolute control of the coating process is exercised to make the finished product the very best possible for the requirements of the user.

The black varnished papers have the same amount of supremacy over the yellow papers as the black cambrics have over the yellow cambrics.

Up to and including .003" the papers are transparent and are furnished in one, two or three ply. Above .003" the papers are translucent or opaque and are furnished only in single ply.

For further information on application.

"IRV-O-SLOT" INSULATION

"Irv-O-Slot" Insulation is the trade marked name for "Irvington" Black or Yellow Varnished Cambric duplexed with fish-paper and bound together with a very thin film of plastic asphaltic cement. The binder retains its flexibility indefinitely and permits the forming of slot troughs without wrinkling.

The sandwiched "Irv-O-Slot" Insulation consists of a layer of "Irvington" Black or Yellow "Irvington" Varnished Cambric between two layers of fish-paper and joined with plastic asphaltic cement.

Economy and speed of assembly are effected by the use of "Irv-O-Slot" Insulation.

There is only one cutting operation and the material is ready for the slots.

The operator has only a unit insulation to handle and maintain in position without wrinkling or slipping.

"Irv-O-Slot" Insulation is furnished in sheets, strips cut to slot size.

Standard sheets 34" x 36".

Thicknesses—.010" to .030".

.010" to .015" can be furnished in roll form if so ordered.

Special "Irv-O-Slot" Insulation made to order.

Sandwiched "Irv-O-Slot" supplied on order in any desired insulation.

When specifying material cut to size, send sketch showing in which material is to be folded.

When ordering, specify type and combination required, of varnished cambric and size sheets desired.

"IRVINGTON" BLACK VARNISHED **Straight Cambrics and Tapes**

In the manufacture of "IRVINGTON" Varnished Cambrics the coating of varnish is applied by the use of specially designed machinery, operated under strict control conditions which assure the user of uniformity of thickness, dielectric strength and character of surface of the finished material.

The varnish is compounded to meet the requirements of each application of varnished cambric, viz., a slightly greasy surface for large cable and heavy coil work, which repels moisture, and acts as a lubricant between layers permitting drawing the layers into closer contact thus forming a more solid insulation; a "tacky" or slightly sticky finish where required to aid in holding the insulation in place temporarily, as in the manufacture of small conductor cables for ignition purposes; and a dry finish where required.

All "IRVINGTON" Black Varnished Cambrics are unaffected by atmospheric moisture, insulating and lubricating oils and acid vapours. They have great heat resistance, high dielectric strength and insulation resistance. Their aging qualities are much superior to those of yellow varnished cambric. They have proved their supremacy as insulation for power transmission cables, ignition and starter cables, transformers and heavy duty motors and generators and to a large extent have supplanted the yellow varnished cambrics in all fields of use.

Cloth is supplied:

In rolls 25 yards or more. 50 yard rolls are standard and will be furnished unless otherwise specified. Untrimmed approximately 37" wide. Trimmed 36" wide. Trimmed unless otherwise specified.

Straight Tape is furnished:

On paper cores, 1 1/2" inside diameter—3/8" to 1/2" wide up to 9" outside diameter.

5/8" to 1" wide, up to 10" outside diameter—1" and above up to 12" outside diameter.

Rolls of 72 lineal yards are standard and will be furnished unless otherwise specified.

All tapes are quoted on a basis of the gross yard of 144 lineal yards.

Thickness Inches	Average Volts per .001"	Average Tensile Strength 1" wide with warp	Approx. weight per Sq. yd.	Tearing Strength in grams across warp
.005	1000	51	.33	124
.006	1000	51	.37	196
.007	1000-1100	51	.40	204
.008	1000-1100	54	.45	188
.009	1000-1100	53	.50	195
.010	1000-1100	51	.54	208
.012	1000-1100	49	.68	217
.015	1000-1100	48	.82	...

"IRVINGTON" **BLACK VARNISHED DUCKS**

.018	800-900	123	.90	1
.020	800-900	119	1.05	...
.025	500-600	119	1.18	...
.030	500-600	121	1.45	...
.035	500-600	120	1.63	...

"IRVINGTON" Black varnished Ducks have a rough finish, no effort having been made to attain smoothness. They are unaffected by moisture and are used for hoods over railway motor coils and for washers under field coils and wherever a very durable material is required.

When ordering indicate thickness, color, finish, width and size of roll.

EBONY ASBESTOS

Ebony Asbestos is recommended for use as an insulating base for switchboards, panel boards, bus-bar barriers, switch bases and in other applications which these will readily suggest to the electrical man. It is offered in the form of composition sheets made up of asbestos fibre and binding cements and densely impregnated under heat and pressure into a compound of very high dielectric strength.

This material possesses the least possible surface leakage, being affected neither by oil nor atmospheric moisture, nor will it rot or rust even when exposed to the action of water, gas, oil, chemicals or ordinary acids. Although comparatively light in weight, Ebony Asbestos has great physical strength due to its fibrous structure, hence is free from ruptures due to rapid temperature change.

This material is supplied in standard size sheets 36" x 48" in all thicknesses and 42" x 48" and 42" x 96" in 1/2-inch to 2-inch thicknesses only.

Size Furnished	Thickness	Weight per Square Foot	List Price per Square Foot
36 x 48 only	1/8"	1.3 lbs.	\$0.90
	3/16"	1.09 lbs.	1.20
	1/4"	2.5 lbs.	1.30
	5/16"	3.3 lbs.	1.45
	3/8"	4.2 lbs.	1.60
36 x 48	1/2"	5.0 lbs.	1.90
	5/8"	6.3 lbs.	2.35
	3/4"	7.5 lbs.	2.50
42 x 48	7/8"	8.7 lbs.	2.65
	1"	10. lbs.	2.80
42 x 96	1 1/4"	12.5 lbs.	3.10
	1 1/2"	15. lbs.	3.65
	1 3/4"	17.5 lbs.	3.95
	2"	20. lbs.	6.20

Thickness above 2" on application
Electrical Characteristics

Thickness	Average Puncturing Voltages	Resistance in megohms as received	After 96 hours Immersion
1/8"	12,900	475,000	50,000
1/4"	25,000	1,700,000	1,000,000
3/8"	30,500	2,500,000	1,500,000
1/2"	37,000	3,000,000	1,900,000
5/8"	43,000	3,200,000	2,500,000
3/4"	54,000	3,500,000	3,000,000
1"	66,000	4,000,000	above 3,000,000
1 1/4"	80,500	5,000,000	above 3,000,000
1 1/2"	85,000	6,000,000	above 3,000,000
2"	96,000	7,500,000	above 3,000,000

TRANSITE ASBESTOS WOOD

Transite Asbestos Wood is recommended as a fireproof building material to be used instead of wood in all places where fire is a menace. This material has the same fibrous structure and the same physical properties as the Ebony Asbestos Wood—does not rot or rust and is not liable to warp, chip or buckle under service conditions. Though not impregnated with the insulating compound that gives to Ebony Asbestos Wood its extremely high dielectric strength, Transite Asbestos Wood nevertheless possesses a naturally high resistance by virtue of its rock fibre structure. It has the desirable properties of metal, yet is comparable to wood in its ease of handling and working.

TRANSITE ASBESTOS WOOD

This material is supplied in standard sized sheets, 36" x 48", 42" x 48" and 42" x 96" in all thicknesses.

Thick- ness	Wgt. per Sq. Foot	List Price per Sq. Foot	Thick- ness	Wgt. per Sq. Foot	List Price per Sq. Ft.
1/8"	1.41	\$0.15	5/8"	6.7	\$0.75
3/16"	2.	.22 1/2	3/4"	7.6	.90
1/4"	2.65	.30	7/8"	8.75	1.05
5/16"	3.28	.38	1"	9.93	1.20
3/8"	3.91	.45	1 1/4"	12.8	1.50
1/2"	4.41	.53	1 1/2"	14.	1.80
5/8"	4.7	.60	1 3/4"	16.8	2.10
3/4"	6.	.70	2"	19.65	2.40

MICA

No electrical insulation is more reliable than Mica which can be furnished as (a) Manufactured Mica or (b) Raw Mica

Manufactured Mica

Described under various terms such as, Micanite, Compressed Sheet Mica, Mica Plate, etc.

Consists of thin films or sheets of mica cemented together with various insulating compounds built to an even thickness and brought to a finished state with the application of heat and great pressure.

SOME FORMS of MANUFACTURED MICA

(1) Moulding

Hot-forming. This can be moulded with the application of heat and can be worked into various shapes, such as commutator rings, troughs, angles, etc. Cannot be used as insulation between commutator bars. Can be furnished in thicknesses .010 to 1/16".

Cold-forming. Can be formed without heating, adapted for transformers, field coils, etc., includes:

Flexible Plate
Mica Paper
Mica Cloth
Mica Tape
Fish Paper and Mica
Rope Paper and Mica
Pressboard and Mica

(2) Commutator or Segment

India Plate. Selected India Mica Films are used with a minimum of binder or cement. Will not ooze when subjected to high temperatures. Milled to an even thickness.

Amber Plate. Soft Canadian Amber Films are used with same methods of manufacture. Will wear even with copper bars and is specially recommended for this work.

(3) Heater Plate

(a) Amber or (b) India. This plate can be substituted for raw mica in the construction of electric irons and other heating devices when they are of the enclosed type. It affords a perfect insulation.

(4) Mica Tubes

Including All Mica, All Mica with 2% paper finish, 85% Mica 15% Paper, Asbestos and Mica and other combinations to meet requirements.

RAW MICA

Can be furnished in any form such as, Uncut Mica, Mica cut to size, Mica Washers, Condenser Films, Stampings & Patterns.

Can furnish any kind of Raw or Manufactured Mica specifically described. List Prices and Discounts on application.

FIBRE SHEETS, RODS AND TUBING

FIBRE RODS—RED, GRAY AND BLACK

Lengths about 60 inches



List Prices, per lb.						
9 ft. or less	10 ft. to 24	25 ft. to 49	50 ft. to 100	100 ft. to 499	500 ft. to 999	
\$0.22	\$0.18	\$0.14	\$0.12	\$0.10	\$0.09	
.22	.18	.14	.12	.10	.09	
.22	.18	.14	.12	.10	.09	
.23	.19	.15	.13	.12	.10	
.26	.21	.17	.14	.13	.12	
.28	.23	.19	.17	.15	.14	
.35	.29	.26	.23	.21	.18	
.42	.36	.28	.26	.23	.22	
.51	.42	.35	.28	.26		
.60	.51	.42	.36	.31		
.72	.60	.50	.44	.37		
.87	.73	.58	.49	.45		
1.03	.83	.65	.54			
1.20	.95	.73	.63			
1.41	1.08	.87	.74			
1.57	1.28	1.03	.87			
2.05	1.47	1.22				
2.56	1.92	1.54				
3.08	2.43	2.11				
3.60	3.27	2.95				
4.50	3.84					
5.77	5.13					
8.33	7.05					
10.89	9.60					

Intermediate sizes at next higher price.

Approximate Number of Feet per Pound of Rod					
Feet Per lb.	Diam.	Feet Per lb.	Diam.	Feet Per lb.	Diam.
241	5/8	5.4	1 3/8	1.1	
136	1 1/8	4.5	1 1/2	.94	
60	3/4	3.8	1 5/8	.80	
34	1 3/8	3.2	1 3/4	.69	
22	7/8	2.8	1 7/8	.60	
15	1 5/8	2.4	2	.53	
11	1	2.1	2 1/4	.42	
8.5	1 1/8	1.7	2 1/2	.34	
6.7	1 1/4	1.4			



Fibre Tubes

FIBRE SHEETS, RODS AND TUBING

FIBRE SHEETS—RED, GRAY AND BLACK

Hard and Flexible



Thickness	List Price Per lb.	Thickness	List Price Per lb.
.005 to 1/8"	.63	1 1/4"	\$1.25
1/16" to 5/16"	.64	1 3/8"	1.44
3/8" to 1/2"	.67	1 1/2"	1.63
1/2"	.70	1 5/8"	1.88
5/8"	.75	1 3/4"	2.25
3/4"	.83	1 7/8"	2.75
7/8"	.88	2"	3.25
1"	.95	2 1/8"	3.75
1 1/8"	1.08	2 1/4"	4.38
		2 3/8"	5.00

Intermediate thickness at price of next thinner.

Sheet sizes—Under 1/8", 48 x 80", over 1/8", 46 x 48".

APPROXIMATE WEIGHTS SHEET FIBRE			
Thickness	48 x 78	50 x 80	42 x 78
.005		7/8	
.010		1 3/4	
1/64		2 3/4	
1/32		5 1/2	6
1/16		11	12
1/8		22	24
3/16		33	36
1/4		44	48
5/16	55		60
3/8	66		72
7/16	77		
1/2	88		
5/8	110		
3/4	132		
7/8	154		
1	176		

FIBRE SHEETS—PEERLESS INSULATION

A very high-grade insulating fibre.

Thickness .004"	List Price, per lb.	\$0.69
Thickness .005" to 1/8"	List Price, per lb.	0.63

FIBRE TUBING

List Prices, Per Foot

Inside Diam.	Thickness of Wall								
	1/16	3/32	1/8	5/32	3/16	7/32	1/4	9/32	5/16
1/8	\$.32	\$.39	\$.51						
1/4	.32	.39	.51						
3/8	.15	.18	.23	.28	.33				
1/2	.17	.19	.24	.31	.36				
3/4	.18	.21	.27	.33	.40				
1	.19	.22	.28	.36	.42				
1 1/8	.21	.23	.31	.39	.46	.54	.62		
1 1/4	.22	.26	.33	.41	.50	.59	.67		
1 1/2	.23	.27	.36	.45	.54	.63	.72		
1 3/4	.26	.30	.39	.48	.58	.67	.77		
2	.27	.31	.41	.51	.62	.72	.82		
2 1/8	.28	.33	.44	.54	.66	.77	.87		
2 1/4	.30	.35	.46	.58	.69	.81	.92		
2 1/2	.31	.37	.49	.60	.73	.85	.98		
2 3/4	.32	.39	.51	.64	.77	.90	1.03		
3	.35	.42	.57	.71	.85	.99	1.13		
3 1/8	.37	.46	.62	.77	.92	1.08	1.23		
3 1/4	.39	.50	.67	.83	1.00	1.17	1.33		
3 1/2	.41	.54	.72	.90	1.08	1.26	1.44		
3 3/4	.45	.58	.77	.96	1.15	1.35	1.54		
4	.46	.62	.82	1.03	1.23	1.44	1.64		
4 1/8	.50	.66	.87	1.09	1.31	1.53	1.74		
4 1/4	.53	.69	.92	1.15	1.39	1.62	1.85	2.08	2.31

Standard stock lengths approximately 30 inches long.

Intermediate sizes take price of next larger diameter and next thicker wall excepting between 3/16 and 1/4 I.D. when they take the price of 3/16.

Minimum charge \$1.00.

SPRINGIN SPRING-WING TOGGLE BOLTS TYPE 5500



Toggles with brass screws, nickel-plated toggles, and rust-proof toggles can be furnished.

TYPES OF HEADS

R TYPE
With Round Head Screw.

F TYPE
With Flat Head Screw.

M TYPE
Mushroom Head, furnished in R type $\frac{1}{8}$ " diameter only.

NUT TYPE
Reverse R or F screw and add nut.

P TYPE
PLUMBER'S TOGGLE
Reverse R or F screw and add nut.
Capnuts extra

All toggle threads are National Standard Thread, not stove bolt threads.

The Resilient Wings—the distinctive feature of SPRINGIN—are made of tempered spring steel with a cam action against the saddle which throws them to open position. The wings are the springs and are very powerful so that the toggle will carry a much greater load than is ever required of a fastening of this type.

List No.	Dia. and Length of Screw	Size Drill Required	Shipping Weight Per 100	Quantity Number in a Box	List Price Per 100
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MADE M OR F HEAD SCREW ONLY

5506	$\frac{1}{8}$ x 2"	$\frac{3}{8}$ "	1 1/2 lbs.	100	500	\$6.50
5507	$\frac{1}{8}$ x 3"		1 3/4 lbs.			6.75
5508	$\frac{1}{8}$ x 4"		2 lbs.			7.00

Nos. 5510 TO 5528 MADE R, F, N OR P SCREW STYLES

5510	$\frac{3}{16}$ x 3"	$\frac{1}{2}$ "	3 lbs.	50	250	\$6.85
5511	$\frac{3}{16}$ x 4"		4 lbs.			7.15
5512	$\frac{3}{16}$ x 5"		5 lbs.			7.50
5513	$\frac{3}{16}$ x 6"		5 1/2 lbs.			7.80

5515	$\frac{1}{4}$ x 3"	$\frac{5}{8}$ "	6 lbs.	50	250	7.85
5516	$\frac{1}{4}$ x 4"		7 lbs.			8.15
5517	$\frac{1}{4}$ x 5"		8 lbs.			8.55
5518	$\frac{1}{4}$ x 6"		9 lbs.			8.95

5520	$\frac{5}{16}$ x 3"	$\frac{7}{8}$ "	10 lbs.	50	250	9.85
5521	$\frac{5}{16}$ x 4"		12 lbs.			10.15
5523	$\frac{5}{16}$ x 6"		15 lbs.			10.95

5525	$\frac{3}{8}$ x 3"	$\frac{7}{8}$ "	13 lbs.	50	250	11.50
5526	$\frac{3}{8}$ x 4"		15 lbs.			13.50
5528	$\frac{3}{8}$ x 6"		20 1/2 lbs.			16.50

MADE R OR N SCREW STYLES ONLY

5536	$\frac{1}{2}$ x 4"	$1\frac{1}{8}$ "	27 lbs.	25	125	\$20.00
5538	$\frac{1}{2}$ x 6"		36 lbs.			23.00

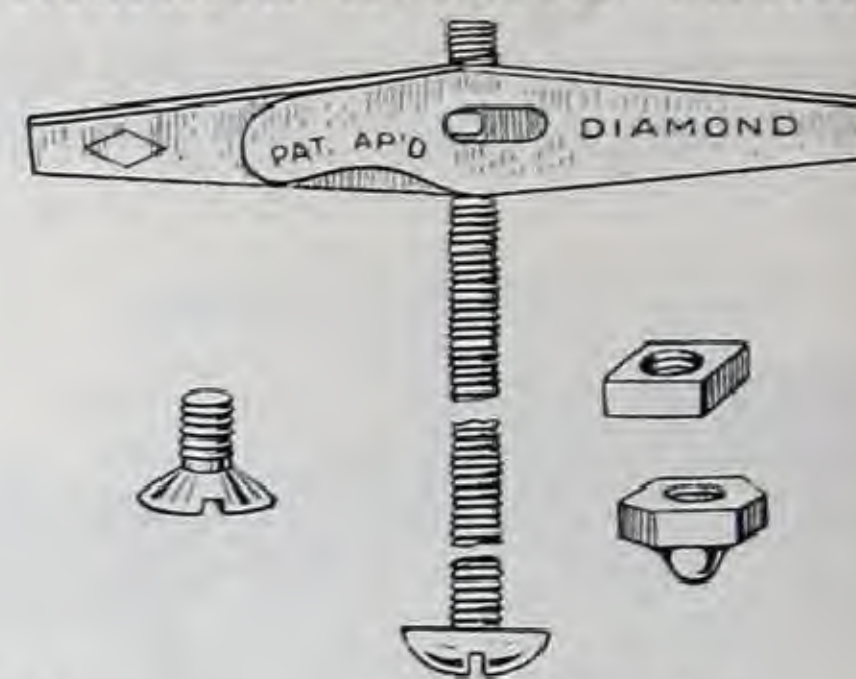
TOGGLE HEADS ONLY

5506-H	$\frac{1}{8}$ "	$\frac{3}{8}$ "	1/2 lb.	Bulk or to Order	\$6.25
5510-H	$\frac{3}{16}$ "	$\frac{1}{2}$ "	1 lb.		6.25
5515-H	$\frac{1}{4}$ "	$\frac{5}{8}$ "	2 lbs.		6.50

5520-H	$\frac{5}{16}$ "	$\frac{7}{8}$ "	3 lbs.	Bulk or to Order	8.20
5525-H	$\frac{3}{8}$ "	$\frac{7}{8}$ "	3 1/2 lbs.		10.00
5535-H	$\frac{1}{2}$ "	$1\frac{1}{8}$ "	4 lbs.		15.00

All toggle threads are National Standard Thread, not stove bolt threads.

DIAMOND SPRING TOGGLE



Diameter and Length of Screw	List Price per 100	Shipping Weight per 100	Number of pieces in a box
$\frac{1}{8}$ x 2"	\$6.50	2	100
$\frac{1}{8}$ x 3"	6.75	2 1/4	
$\frac{1}{8}$ x 4"	7.00	2 3/4	
$\frac{3}{16}$ x 3"	6.85	3 3/4	100
$\frac{3}{16}$ x 4"	7.15	4 1/2	
$\frac{3}{16}$ x 5"	7.50	5	
$\frac{3}{16}$ x 6"	7.80	5 3/4	100
$\frac{1}{4}$ x 3"	7.85	6	
$\frac{1}{4}$ x 4"	8.15	7	
$\frac{1}{4}$ x 5"	8.55	8	100
$\frac{1}{4}$ x 6"	8.95	9	
$\frac{5}{16}$ x 3"	9.85	10	
$\frac{5}{16}$ x 4"	10.15	12	100
$\frac{5}{16}$ x 5"	10.55	14	
$\frac{5}{16}$ x 6"	10.95	16	

R type—with Round Head Screws.

F type—with Flat Head Screws.

M type—Mushroom head, furnished in R type $\frac{1}{8}$ " diameter only.

N type—Reverse R or F screw and add nut.

P type—Reverse R or F screw and add acorn nut—nuts extra.

DIAMOND TOGGLE BOLTS

For making attachments to hollow brick, tile or lath wall



Size	List per 100		Style No. 1	
	List	Weights	List	Weight
* $\frac{1}{8}$ x 3"	\$ 9.00	3	\$ 9.00	3
* $\frac{1}{8}$ x 4"	10.00	3 1/4	10.00	3 1/4
$\frac{3}{16}$ x 3"	9.50	5	9.50	5
$\frac{3}{16}$ x 4"	10.50	5 1/2	10.50	6
$\frac{3}{16}$ x 5"	12.00	6	12.00	6 1/2
$\frac{3}{16}$ x 6"	12.50	7	12.50	7 1/2
$\frac{1}{4}$ x 3"	10.50	8	10.50	7 1/2
$\frac{1}{4}$ x 4"	11.75	8 1/2	11.75	9
$\frac{1}{4}$ x 5"	13.00	9	13.00	10
$\frac{1}{4}$ x 6"	14.00	11 1/2	14.00	11
$\frac{5}{16}$ x 3"	17.50	12 1/2	17.50	12
$\frac{5}{16}$ x 4"	18.00	13 1/2	18.00	13
$\frac{5}{16}$ x 6"	20.00	15 1/2	20.00	17
$\frac{3}{8}$ x 3"	20.00	19	20.00	19
$\frac{3}{8}$ x 4"	24.00	22	24.00	22 1/2
$\frac{3}{8}$ x 6"	31.00	25	31.00	27

*Mushroom Head furnished in Round Head Style No. $\frac{1}{8}$ " diameter only.

Diamond No. 5 Toggles are also furnished from stock with Steel Heads and Brass Bolts, also with Brass Toggle and Brass Bolts.

DIAMOND No. 5 TOGGLE HEADS ONLY

Diameter of Screw Thread	List per 100	Size of Drill to Use	Shipping Weight per
$\frac{1}{8}$ "	\$ 6.50	$\frac{5}{16}$ "	1 1/2 lbs.
$\frac{3}{16}$ "	7.50	$\frac{1}{2}$ "	2 1/2 lbs.
$\frac{1}{4}$ "	10.00	$\frac{5}{8}$ "	3 lbs.
$\frac{5}{16}$ "	15.00	$\frac{7}{8}$ "	9 lbs.
$\frac{3}{8}$ "	17.00	$\frac{7}{8}$ "	9 lbs.

DIAMOND HAMMER DRIVE ANCHORS



Sectional View of the Interior

Made of Aluminum Alloy, with steel nails, hot dipped galvanized by the Diamond Process.

Holds a greater load when fastened to stone than a wood screw of same diameter screwed into wood.

No special skill or tools needed; just drill hole, place shield through the hardware and hammer nail in.

Attaching trim, partitions, flooring and fixtures to concrete structures.

Holding Power Loads are Given in Pounds

Size of Anchor	Average Load Sustained	Working Loads	Size of Anchor	Average Load Sustained	Working Loads
"x 7/8"	500	100	5/16" x 2 1/4"	1750	350
"x 1 1/4"	650	130	5/16" x 2 3/4"	1750	350
"x 1"	1200	240	3/8" x 2"	2000	400
"x 1 1/4"	1300	260	3/8" x 3 1/4"	2000	400
"x 1 1/2"	1400	280	1/2" x 2 1/4"	3000	600
"x 1 1/4"	1450	290	1/2" x 3 1/2"	4000	800
"x 1 3/4"	1500	300			

INSTRUCTIONS FOR INSTALLATION



For Right results, Diamond Hammer Drive Anchors should be used only as follows:

1. Drill hole slightly deeper than length of shield.
2. Pass the anchor (without the nail in it) through the hardware and into the hole until the flange or lips of the anchor are flush against the outside of the hardware.

Then, with the thumb, push the nail in as far as it goes, and drive it home with a hammer.

Dimensions and Prices

Diameter and Length of Shield	Price per 100	Diam. of Standard Drill to use	Weight per 100
3/16" x 7/8"	\$ 8.00	3/16"	11 1/4 lbs.
3/16" x 1 1/4"	9.00	3/16"	11 1/2 lbs.
1/4" x 1"	10.00	1/4"	21 1/4 lbs.
1/4" x 1 1/4"	11.00	1/4"	23 1/4 lbs.
1/4" x 1 1/2"	12.00	1/4"	31 1/2 lbs.
5/16" x 1 1/4"	14.00	5/16"	31 1/2 lbs.
5/16" x 1 3/4"	16.00	5/16"	5 lbs.
5/16" x 2 1/4"	18.00	5/16"	6 lbs.
5/16" x 2 3/4"	20.00	5/16"	7 1/2 lbs.
3/8" x 2"	20.00	3/8"	8 lbs.
3/8" x 3 1/4"	25.00	3/8"	14 lbs.
1/2" x 2 1/4"	30.00	1/2"	17 lbs.
1/2" x 3 1/2"	35.00	1/2"	25 lbs.

When ordering, specify the two dimensions shown in the first column—for instance, 3/16" x 7/8". Use a drill of the diameter shown in the third column.

Diamond Hammer Drive Anchors are packed with nails in separate compartment in same container.

DIAMOND MULTI-SIZE SCREW ANCHORS



Diamond Multi-Size Screw Anchors are designed to accommodate in one anchor several diameters of wood screws. The purpose is to reduce the number of anchors required to accommodate all sizes of screws. They are made in several lengths, covering the majority of uses.

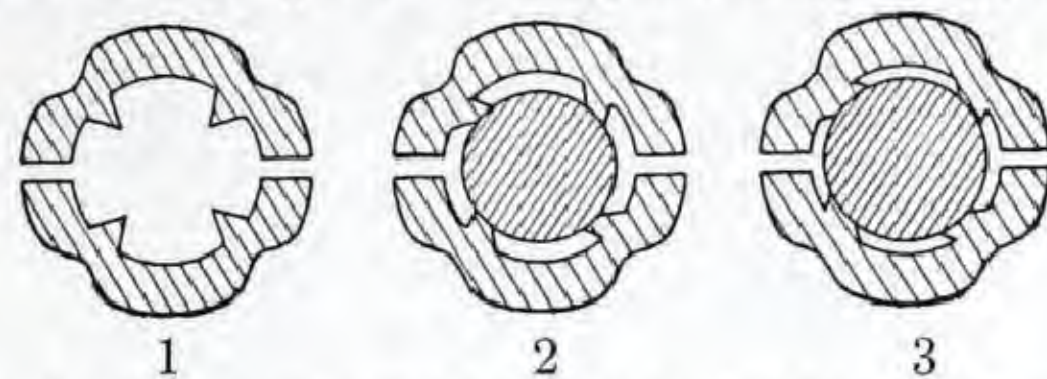


Figure 1 is a cross section showing the interior ribbing, in which the ribs are located over the valleys on the exterior of the anchor.

Figure 2 shows a comparatively small screw turned into the anchor, the ribs supporting the smaller screw.

Figure 3 shows a larger screw inserted. Where the larger screw is used, the ribs are pressed down and the valleys at the exterior are forced outward to permit the greater diameter of the screw to enter the shield.

Designating Sizes Numbers	List per 100	For Wood Screws Numbers	Lgth.	Size of Drill	Wgt. per 100
6 to 8x 3/4"	\$5.00	6 to 8	3/4"	1/4"	1 lb.
6 to 8x 1 1/2"	5.60	6 to 8	1 1/2"	1/4"	1 3/4 lb.
10 to 14x 3/4"	5.60	10 to 14	3/4"	5/16"	1 1/2 lb.
10 to 14x 1"	5.60	10 to 14	1"	5/16"	2 lb.
10 to 14x 1 1/2"	8.00	10 to 14	1 1/2"	5/16"	2 3/4 lb.
16 to 18x 1"	6.25	16 to 18	1"	5/8"	3 lb.
16 to 18x 1 1/2"	9.00	16 to 18	1 1/2"	3/8"	4 1/4 lb.
20 to 24x 1 3/4"	10.00	20 to 24	1 3/4"	1/2"	5 1/4 lb.

Put up in boxes of 100

DIAMOND CALKING ANCHORS

For Use with Machine Screws



How to Use

1. Drill Hole—See schedule for correct size of drill.
2. Calk Anchor in Hole with tool provided in each box.
3. Turn the screw into expanded anchor after passing it through the hardware or material to be fastened.

List per 100

Diameter of Bolt or Screw	List per 100	Hole Size Diam.	Depth	Suggested Safe Load	Weight per 100 lbs.
6-32	\$3.80	1/4"	3/8"	80	1
8-32	4.50	5/16"	1/2"	90	1 1/2
10-24	4.95	3/8"	5/8"	175	2
12-24	6.50	1/2"	3/4"	320	3 1/2
1/4-20	7.20	1/2"	7/8"	400	4 1/2
5/16"	9.75	5/8"	1"	480	11
3/8"	12.00	3/4"	1 1/4"	720	16
7/16"	15.00	7/8"	1 1/2"	950	24
1/2"	15.00	7/8"	1 1/2"	1000	24
5/8"	25.00	1 1/8"	2"	1250	41

Put up in standard packages of:

100 up to and including No. 10-24.

50—For No. 12-24 diameter and larger.

All suggested safe loads are based upon ideal conditions.



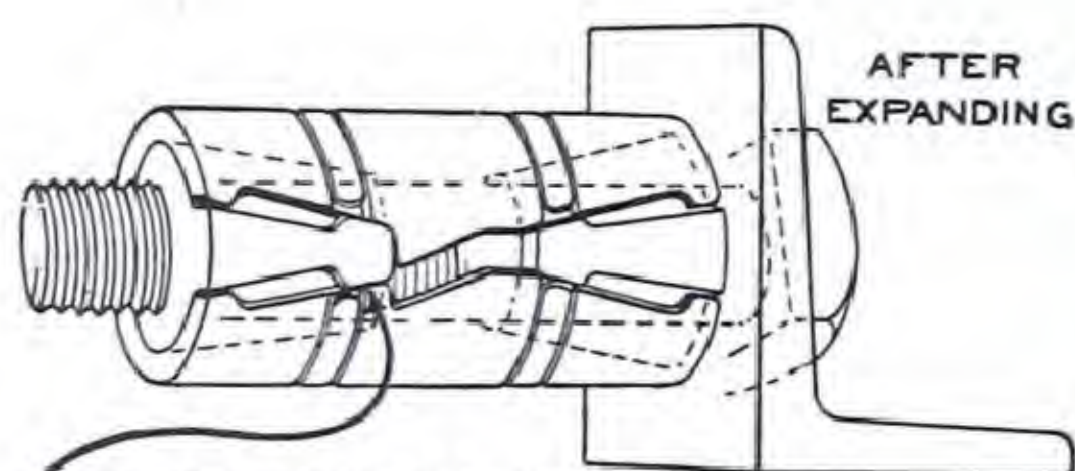
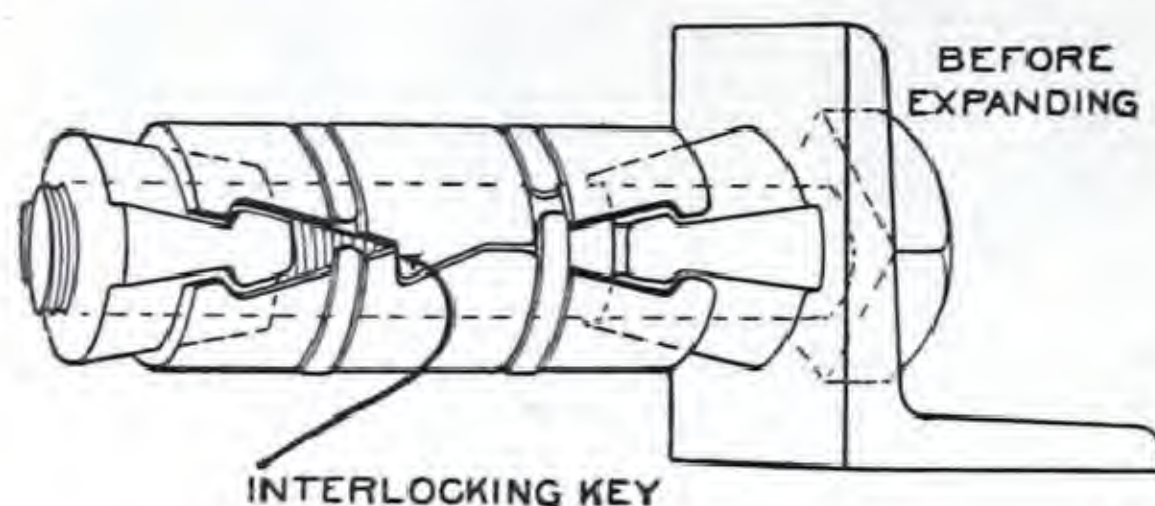
DIAMOND CALKING TOOL

One Diamond Calking Tool packed in each box of Anchors without extra charge.

NEW INTERLOCKING KEYSTONE EXPANSION SHIELD—DOUBLE



Makes Permanent Fastenings to Concrete, Brick or Stone



WHEN THE MAXIMUM LIMIT OF EXPANSION HAS BEEN REACHED THE NUT CANNOT TRAVEL FURTHER, NOR CAN IT BE EXTRACTED UNDER LOAD OR BY OVERTIGHTENING THE BOLT

Prevents the nut being drawn out of the shield when heavy loads are applied.

Guides the mechanic in determining when to stop tightening up the bolt. It tells him when he has reached the maximum expansion as the bolt cannot be turned further when the nut reaches the stop.

Prevents the nut being drawn past the point of maximum expansion, after which point further turning of the bolt would become ineffective and detrimental.

Locks the two shields and the nut into a unit of resistance against the load, making it impossible to pull out the nut without extracting the shield, also thus decreasing the holding power of the expansion.

Made of malleable iron for durability and strength.

"They hold as long as the wall lasts."

List Prices per 100 and Dimensions—Shields Only.

Diameter of Screw or Bolt.....	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{3}{8}$ "	$\frac{7}{16}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "
Length.....	$1\frac{1}{2}$ "	$1\frac{3}{4}$ "	2"	$2\frac{1}{2}$ "	$2\frac{1}{2}$ "	$2\frac{7}{8}$ "
Outside Diameter and Size of Drill to Use.....	$\frac{1}{2}$ "	$\frac{9}{16}$ "	$\frac{11}{16}$ "	$\frac{7}{8}$ "	$\frac{7}{8}$ "	1"
Weight per 100 lbs..	6	7	11	16	20	29
Price per 100.....	\$15.00	\$18.00	\$25.00	\$32.00	\$38.00	\$45.00

Diameter of Screw or Bolt..	$\frac{3}{4}$ "	$\frac{7}{8}$ "	1"	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "
Length.....	$3\frac{1}{4}$ "	$4\frac{1}{2}$ "	$4\frac{1}{2}$ "	6"	$7\frac{1}{2}$ "
Outside Diameter and Size of Drill to Use.....	$1\frac{1}{8}$ "	$1\frac{1}{2}$ "	$1\frac{5}{8}$ "	$2\frac{1}{8}$ "	$2\frac{1}{2}$ "
Weight per 100 lbs.....	52	88	114	300	450
Price per 100.....	\$65.00	\$95.00	\$110.00	\$250.00	\$350.00

DIAMOND TENAX EXPANSION SHIELD



A Four Way Expansion With Four Ways To Use



First Method—Insert shield in the wall and screw the bolt up tight with a wrench. This is the simplest and most regularly used method.



Second Method—Drill hole to depth to allow shield to project from wall a distance equal to half the diameter of the bolt. Drive the shield in against nut on bottom of hole until flush with face of wall causing it to expand ready to receive the bolt.



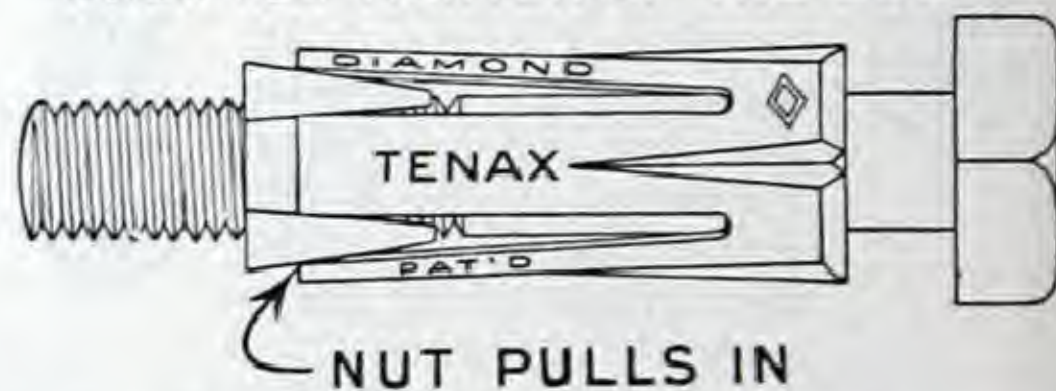
Third Method—Where a deeply set anchorage is required. Drill hole to greater depth than shield. Drive shield to bottom of hole and expand with driving expansion tool, supplied by us until shield is calked in tight.



Fourth Method—For deep or shallow holes. Place shield in bottom of hole and expand by means of a screw expanding tool furnished by us.



CONNECTIONS BREAK IN THE WALL WHEN YOU TIGHTEN UP THE BOLT



The One Piece Malleable Iron Expansion Shield
Smallest diameter of hole of any Malleable Iron Expansion of equal bolt diameter.

Diam. of Bolt	List Price per 100	Diameter of shield and size of drill	Length	Weight per 100 boxed	Num per box
$\frac{1}{4}$ "	\$15.00	$\frac{7}{16}$ "	$1\frac{1}{4}$ "	3 lbs.	100
$\frac{5}{16}$ "	18.00	$\frac{1}{2}$ "	$1\frac{1}{2}$ "	5 lbs.	100
$\frac{3}{8}$ "	25.00	$\frac{5}{8}$ "	2"	8 lbs.	100
$\frac{1}{2}$ "	38.00	$\frac{3}{4}$ "	$2\frac{1}{2}$ "	12 lbs.	100
$\frac{5}{8}$ "	45.00	$\frac{7}{8}$ "	$2\frac{7}{8}$ "	17 lbs.	100
$\frac{3}{4}$ "	65.00	1"	$3\frac{1}{4}$ "	24 lbs.	50

TENAX CALKING TOOL

Supplied only on order. This tool is employed when third method of attachment is used.

List	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "
Price Each	\$.75	\$.80	\$.90	\$1.00	\$1.10

TENAX SCREW EXPANDING TOOL

Supplied only on order. This tool is employed when fourth method of attachment is used.

List	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{3}{8}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ "
Price Each	\$1.50	\$2.00	\$2.00	\$2.00	\$2.25

DIAMOND LAG SCREW SHIELD



Patented

Made of malleable iron in two wedge shaped halves the inner wedge slides forward when the screw is turned creating powerful expansion.
Galvanized by Diamond Hot Dip Process.

Sizes and List Prices

	List Price per 100 (Without lag screws)	Length of Shield	Outside Diam. & Drill Required	Quantity in Std. Pkg.	Shipping Weight per 100
Long Standard Sizes					
1/4"	\$15.00	1 1/2"	1/2"	100	4 1/2 lbs.
5/16"	18.00	1 3/4"	1/2"	100	5 lbs.
3/8"	25.00	2 1/4"	5/8"	100	10 lbs.
1/2"	38.00	3"	3/4"	100	16 lbs.
5/8"	45.00	3 1/2"	7/8"	100	21 lbs.
3/4"	65.00	3 1/2"	1"	50	24 lbs.
Short Standard Sizes					
1/4"	15.00	1"	1/2"	100	3 lbs.
5/16"	18.00	1 1/4"	1/2"	100	3 lbs.
3/8"	25.00	1 3/4"	5/8"	100	7 1/2 lbs.
1/2"	38.00	2"	3/4"	100	10 lbs.

"DI-EN-KEY" EXPANSION SHIELDS

For Use With Machine Bolts



INTERLOCKING KEY

Closed Back or Bottom Bearing



INTERLOCKING KEY

Open Back

Bottom-Bearing Type Bolts give best service in making attachments where direct bearing of the work against the shield is not required, as is the case in suspension rods for chandeliers, steam and water pipes, sprinkler systems and similar lines. The smaller sizes are particularly adapted to use on chairs and school furniture work.

List per 100—"Di-En-Key" Expansion Shields Only—
—Malleable Iron

Diameter of Screw or Bolt	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"
List Price per 100	15.00	18.00	25.00	32.00	38.00	45.00	65.00
Length of Shield	1"	1 3/4"	2"	2 1/2"	2 1/2"	2 1/2"	3 3/4"
Outside Diameter and Size of Drill Use	7/16"	9/16"	1 1/16"	7/8"	7/8"	1"	1 1/4"
Weight per 100	3	6	10	19	19	24	40

When ordering, specify size of shield wanted by naming diameter of screw with which shield is to be used.

DIAMOND SUPER-GRIP EXPANSION BOLTS



Style B

May be Used With or Without Setting Tool

Note—Style B Super-Grip Bolts are sold complete and not separately. In this style, the brass cone-shaped nut for use with regular machine bolt is omitted. The shield is expanded by the long, tapered cone-shaped end of the bolt. The bolt and nuts are "Diamond" Intergalvanized. A hot dipped coating of pure zinc is applied to both, including the threads, and neither of the threads on the bolt or nut are recut after galvanizing. This prevents rust streaking the surface of the wall.

How to Use

1. Drill hole (See schedule for correct size of drill).
2. Insert Bolt with shield on—Head first, with threaded end of bolt outside.
3. Place calking tool over bolt and calk lead expansion shield into the hole.

List Price per 100—Complete with Galvanized Bolts

Outside Diameter	1 1/2"	2"	2 1/2"	3"
1/4"	\$15.50	\$15.65	\$15.80	\$15.95
5/16"	23.00	23.50	24.00	24.50
3/8"	.....	.....	29.25	30.00
1/2"	.....	.....	.....	44.40
5/8"	.....	.....	.....	76.40
Outside Diameter	3 1/2"	4"	5"	6"
3/8"	\$30.75	\$31.50	\$33.00	\$34.50
1/2"	45.65	47.00	48.20	49.40
5/8"	78.25	80.00	83.80	87.60
3/4"	111.90	114.60	120.00	125.40

One Calking Tool furnished in each box of Style B Bolts.

"DIAMOND N-Y" SCREW ANCHORS

For Use With Wood Screws



List Per 100, Without Screws

Diameter of Screw Fraction of Inch	By Standard Wood Screw No.	Length of Anchor	List Price per 100	Outside Diam. of Anchor	Weight per 100
1/8"	Nos. 5-6-7	1/2"	\$ 4.40	1/4"	1
		5/8"	4.40	1/4"	1
		3/4"	4.40	1/4"	2
		1"	4.40	1/4"	3
3/16"	Nos. 8-9-10-11	1/2"	5.00	5/16"	2
		3/4"	5.00	5/16"	3
		1" Light	5.00	5/16"	3
		1" H'vy.	5.00	3/8"	4.5
		1 1/4"	5.50	3/8"	4.5
1/4"	Nos. 12-13-14	1 5/8"	6.25	5/8"	4.5
		3/4"	5.60	7/16"	3.5
		1"	5.60	7/16"	4.5
		1 1/2"	8.00	7/16"	7
		2"	10.00	7/16"	10
		2 1/2"	12.00	7/16"	12
5/16"	Nos. 15-16-17-18	3/4"	6.25	7/16"	3.5
		1"	6.25	7/16"	4.5
		1 3/8"	10.00	1/2"	12
		1 1/2"	10.00	7/16"	7
		2"	13.00	7/16"	11
3/8"	Nos. 20-22-24	1"	13.00	9/16"	7
		1 1/4"	15.00	9/16"	9
		2"	15.00	9/16"	13
1/2"	Nos. 26-28-30	2"	25.00	3/4"	23
	1/2" Lag Screw	2 1/2"	30.00	3/4"	28
5/8"	5/8" Lag Screw	2"	30.00	7/8"	28
		3 1/2"	50.00	7/8"	50

Put up in wooden boxes; 100 to a box. Made of non-corroding, rust-proof composition metal.

RAWLPLUGS

Rawlplugs ensure the following advantages:

- An absolutely firm fixing.
- Reduction of labour costs.
- Invisibility, when in position.
- Smallness of hole to be drilled.
- Ability to drill through screw holes in articles to be fixed.
- No damage to walls, floors or decorations.
- No skilled handling required.
- Unaffected by atmospheric conditions.
- Rawlplugs will hold any fixture permanently to any material, including good plaster, when properly applied.

Length of Rawlplug should be equal to length of threaded portion of screw.

FOR USE WITH WOOD SCREWS

Rawlplug No.	3	6	8	10	12	14	16	18	20
No. Screw (A.S.S.G.)	3	6	8	10	12	14	17	20	24
	4	7	9	11	13	15	18	22	26
	5					16			
No. of Rawlplug Drill	3	6	8	10	12	14	16	18	20
Diam. of Rawlplug Drill	1/8"	5/32"	3/16"	7/32"	1/4"	9/32"	5/16"	11/32"	3/8"
Lengths	List Prices per 100								
1/2"	.85	.95	1.10	1.25	1.40	1.55	1.70	1.85	2.00
3/4"	1.05	1.20	1.35	1.50	1.65	1.80	1.95	2.10	2.25
1"	1.15	1.30	1.45	1.60	1.75	1.90	2.05	2.20	2.35
1 1/4"	1.30	1.45	1.60	1.75	1.90	2.05	2.20	2.35	2.50
1 1/2"	1.45	1.60	1.75	1.90	2.05	2.20	2.35	2.50	2.65
2"	1.60	1.75	1.90	2.05	2.20	2.35	2.50	2.65	2.80
2 1/2"	1.75	1.90	2.05	2.20	2.35	2.50	2.65	2.80	2.95
Assorted	1.85	2.00	2.15	2.30	2.45	2.60	2.75	2.90	3.05

FOR USE WITH GIMLET POINTED LAG SCREWS

No. of Rawlplug	20	22	26	28	30
Size of Lag Screw	5/16"	3/8"	1/2"	5/8"	3/4"
No. of Rawlplug Drill	20	22	26	28	30
Diam. of Rawlplug Drill	3/8"	7/16"	5/8"	3/4"	1"
Lengths	List Prices per 100				
1"	3.95	4.75	6.50	10.00	12.50
1 1/2"	4.75	6.50	10.00	12.50	17.00
2"	5.60	8.00	12.50	17.00	22.00
2 1/2"	6.50	9.00	14.00	17.00	22.00
3"	10.00	15.00	18.50	24.00	26.00
3 1/2"	15.75	20.00	26.00	28.00	
4"	16.75	22.00	28.00		
Rawlplugs Nos. 3 to 14	100 per Box				
16 to 20	50 "				
22 to 30	25 "				

A standard package consists of 12 boxes of Rawlplugs of the same size and length.

When ordering please state the size and length of Rawlplug required.

HOUSEHOLD OUTFIT

50 Rawlplugs, No. 8 (Assorted Lengths), supply of No. 8 Screws and Screw Hooks, combined Drill and Holder—List Price, .75.

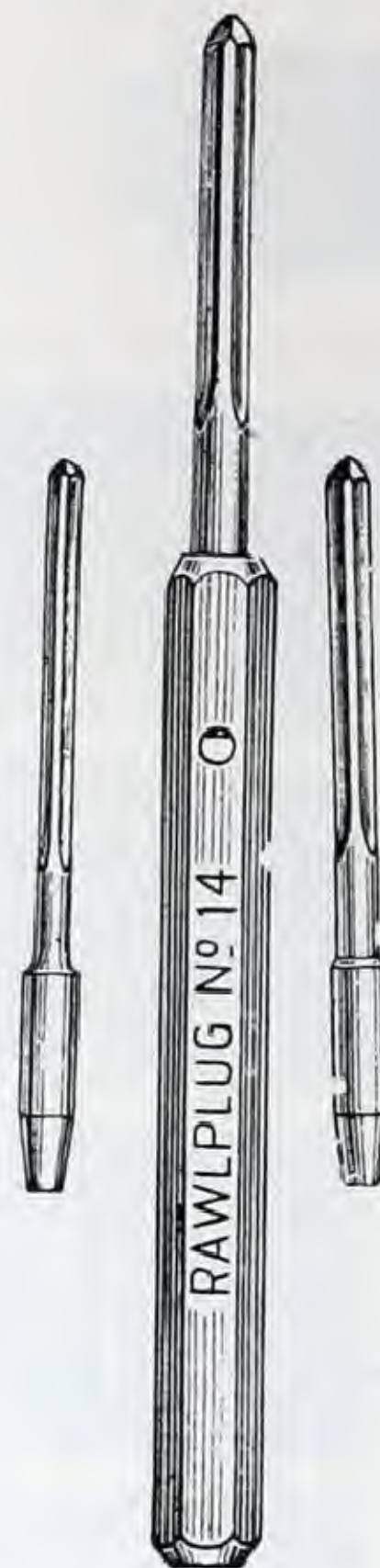
MECHANIC'S OUTFIT

Each outfit contains 100 Rawlplugs, assorted lengths, of the size stated, together with 50 No. 8 Rawlplugs, assorted lengths, also Drillholder, Rawl-drills, Bits, Ejector, Screws, Screw Hooks, Screw Nails, etc.

The No. 8 Mechanic's Outfit contains in addition to 100 Rawlplugs No. 8, 50 Rawlplugs No. 14, assorted lengths, one No. 14 Rawlplug and No. 14 Screws, etc.

List No.	3	6	8	10	12	14
List Price	\$2.50	\$2.75	\$3.00	\$3.50	\$4.00	\$4.75

RAWLPLUGS



Drills and Drill Holders			List Price	
No.	Dia.	Price	No.	per Doz.
3	1/8"	\$2.70	8	\$10.80
6	5/32"	2.80		
8	3/16"	3.00		
10	7/32"	3.30		
12	1/4"	3.70	14	12.00
14	9/32"	4.20		
16	5/16"	4.80		
18	11/32"	5.50		
20	3/8"	6.30	22	14.40
22	7/16"	10.00		
26	5/8"	18.00		
28	3/4"	30.00		
30	1"	35.00	30	22.80

Drill Ejectors		List Price
No.	1 for No. 8 Holders...	Each
No. 2	for No. 14 Holders...	.10
No. 3	for No. 22 Holders...	.15

No. 14 Rawlplug and Holder.
Also No. 12 Adaptable Rawlplug to fit No. 14 Holder.

Rawlplug Mechanical Hammer



List Price
\$12.90

Breast
Attachmer
\$1.50 Extra

Bulldog Bolt Anchor

As indispensable for the efficient fixing of bolts as Rawlplugs are for fixing screws.

When the lead is caulked, the hard metal segments forced outwards into the surrounding material, thus producing a mechanical "claw" anchorage. The tremendous holding power of the "Bulldog" Bolt Anchor is obtained through combination of Expansion Plus Mechanical Grip. This is its exclusive feature.

Exhaustive tests have demonstrated that one "Bulldog" Bolt Anchor will resist a strain equal to the elastic limit of high tensile steel bolt, and provided the caulking is properly performed in hard material, will break the bolt or the surrounding material before letting go.

"Bulldog" Bolt Anchor		
To Take	Dia.	Price
Bolts Size of Tool		per 100
1/4"	5/8"	\$ 9.50
3/8"	7/8"	14.00
1/2"	1 1/8"	21.00
5/8"	1 3/8"	27.50
3/4"	1 5/8"	38.50
1"	2"	70.00
1 1/4"	2 1/2"	175.00

Caulking Tool	
Dia.	Price
of Bolt	Each
1/4"	\$1.00
3/8"	1.25
1/2"	1.50
5/8"	Price on application
3/4"	
1"	
1 1/4"	

CINCH ANCHORS

Easy to Install in Any Position—Cinch anchoring devices are easy to install in any position. They can be set in masonry with the head of the bolt out of or in the hole. When the latter method is followed, expansion can be completed before work is lifted into place and bolted fast.

Stronger than the Strongest Bolt—Cinch anchoring devices give the only anchorage guaranteed to hold beyond the tensile and shearing strength of any wrought iron or steel bolt as well as the breaking strength of the nut. They will not crush or otherwise mar the face of masonry. Vibration will not loosen the grip of the anchorage.

Cut Drilling Costs—Cinch anchoring devices require a hole of less depth than any other expansion device, affording a great saving of labor and time in drilling, and a substantial saving of material, because of the shorter length needed.

Cinch anchorage simply can't pull out or vibrate loose. Greater the load sustained, the stronger the hold obtained. "Stronger than the Bolt."

Two-Unit Anchorages

Consisting of 4 pieces—2 irons and 2 lead alloys, one unit plain and one unit threaded, or two units plain.



Two-Unit Anchorage, Plain



Two-Unit Cinch Anchorage, Threaded

Use two units for anchorage of ordinary strength. (Bolts included).

	Price per 100 sets	Wgt. per 100 in lbs.	Qty. per box	Min. depth of Hole for 2 units	Diam. and Drill requ'd
2 Irons					
2 Leads					
.....	\$15.00	4.5	100	7/8	1/2
.....	17.00	7.5	100	1 1/16	5/8
.....	18.00	7.5	100	1 1/16	5/8
.....	25.00	13	100	1 1/2	3/4
.....	30.00	13	100	1 1/2	3/4
.....	38.00	24	100	1 3/4	1
.....	50.00	31	100	1 7/8	1 1/8
.....	70.00	59	50	2 1/2	1 3/8
.....	95.00	75	25	2 3/4	1 1/2
.....	125.00	98	25	3 1/4	1 5/8
.....	280.00	187	25	4 1/2	2
.....	300.00	234	25	4 3/4	2 1/8
.....	450.00	362	25	5 1/4	2 3/8

When ordering, specify plain or threaded.

CINCH ANCHORS

"Stronger Than the Bolt"

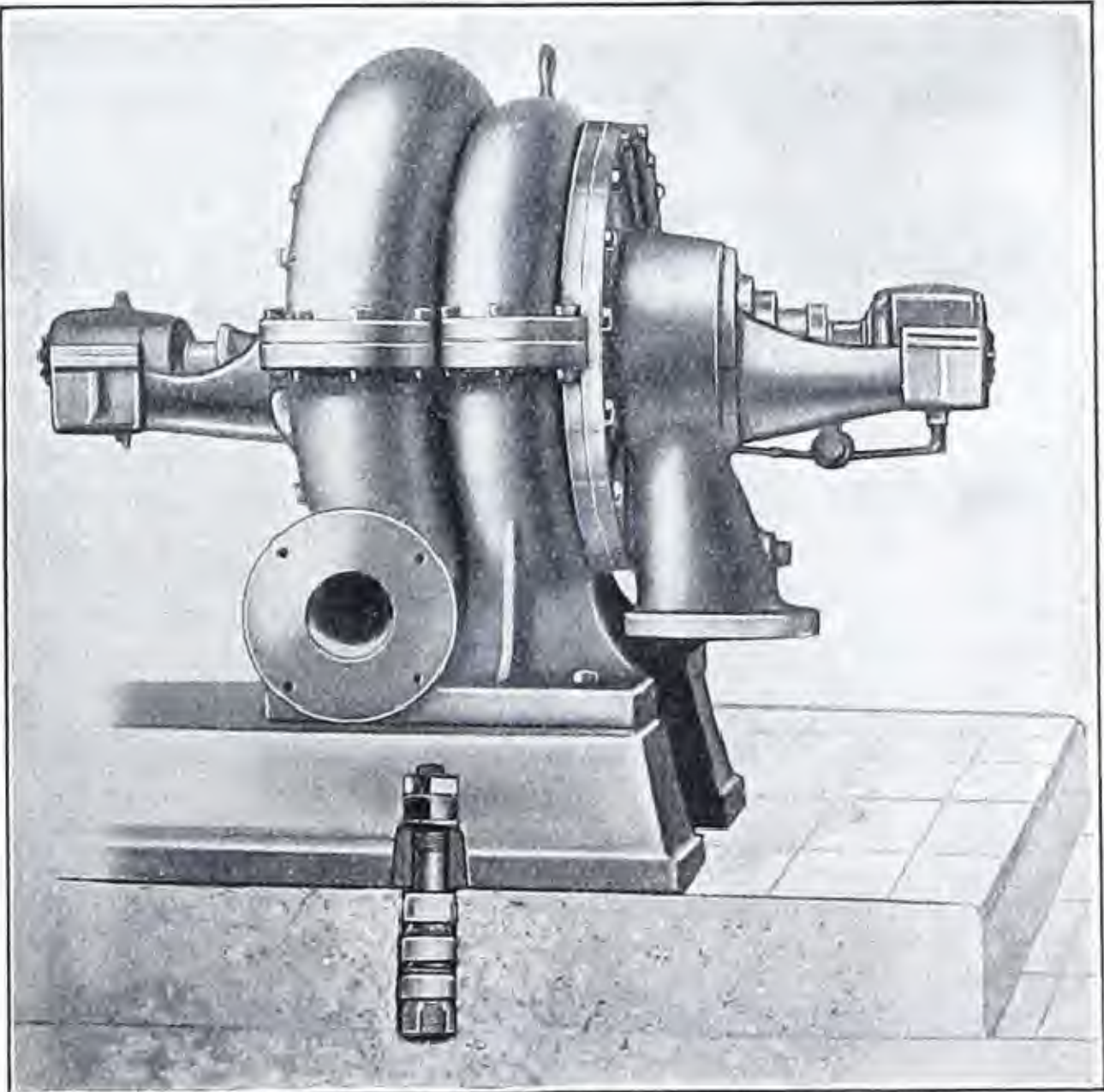
Three-Unit Anchorages

Consisting of 6 pieces—3 irons and 3 lead alloys—without bolts. Two units plain and one unit threaded, or all three units plain.



Use three units for extra heavy anchorages.
(Bolts not included)

Diam. of Bolt Sizes	Price per 100 sets 3 Irons 3 Leads	Weight per Hundred in lbs.	Minimum Depth of Hole for three-units	Diameter of Hole and Drill Required
3/16	\$22.50	7	1 1/8	1/2
1/4	25.50	11	1 5/8	5/8
5/16	27.00	11	1 5/8	5/8
3/8	37.50	20	2 1/4	3/4
7/16	45.00	20	2 1/4	3/4
1/2	57.00	36	2 5/8	1
5/8	75.00	46	2 7/8	1 1/8
3/4	105.00	88	3 3/4	1 3/8
7/8	142.50	112	4	1 1/2
1	187.50	147	4 7/8	1 5/8
1 1/8	420.00	280	6	2
1 1/4	450.00	351	6 1/4	2 1/8
1 1/2	675.00	543	7 1/4	2 3/8



Piece of Machinery Anchored with a Three-Unit Cinch Stud Anchor



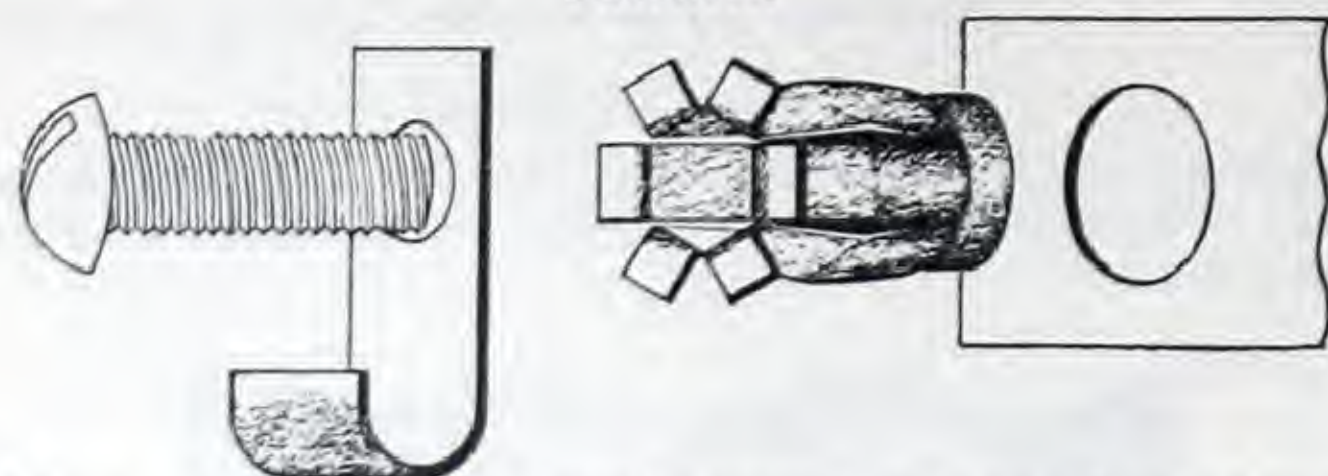
CINCH BRAND
CALKING TOOLS

For Expanding Cinch
Units

Diameter of Bolt....	3/16	1/4	5/16	3/8	7/16
Price each.....	\$1.00	\$1.00	\$1.00	\$1.25	\$1.25
Diameter of Bolt....	1/2	5/8	3/4	7/8	1"
Price each.....	\$1.50	\$1.75	\$2.50	\$7.00	\$9.75

DIAMOND CRIMP NUT

Patented



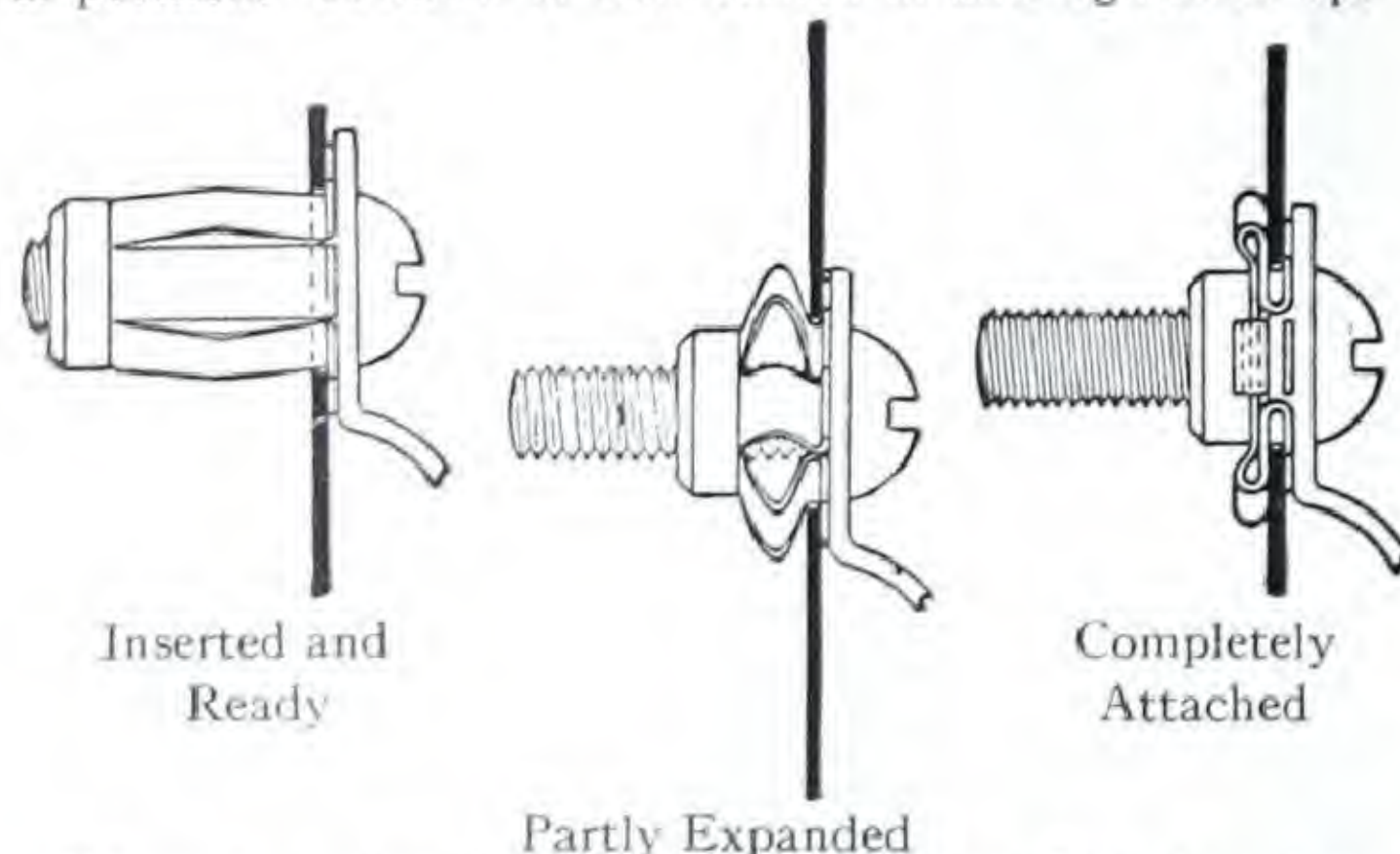
Meets the need for a really secure means of attachment which may be quickly placed in position on a partially or wholly completed sheet metal structure, even though the back or interior of same is not readily accessible.

It may be used in a hollow section where space is closely confined. Usually a $\frac{1}{2}$ " of space is sufficient.

Its holding capacity equals that of a standard bolt.

How to Use

Having access to only the face of structure, a hole is drilled or punched at the desired location; of a diameter sufficient to clear the threaded portion. The Crimp-Nut is then inserted. The slight bulge compresses so as to permit it to enter hole freely, afterward assuming its original form. This prevents accidental withdrawal. The work is then placed in position. A screw or bolt turned in and tightened up.



When fastening is complete the Crimp-Nut is crimped tightly to the metal and it will not turn when screw is entered or removed. This is particularly essential where provision must be made for removing and replacing work.



List Per 1,000—Without Screws

Screw Size	Hole Diameter	Length	List per 1000
8 —32	$\frac{3}{8}$ "	$\frac{9}{16}$ "	\$75.00
10 —24	$\frac{3}{8}$ "	$\frac{9}{16}$ "	75.00
10 —32	$\frac{3}{8}$ "	$\frac{9}{16}$ "	75.00
$\frac{1}{4}$ "—20	$\frac{1}{2}$ "	$\frac{1}{2}$ "	85.00
$\frac{3}{16}$ "—18	$\frac{1}{2}$ "	$\frac{1}{2}$ "	90.00

Other Sizes on Application

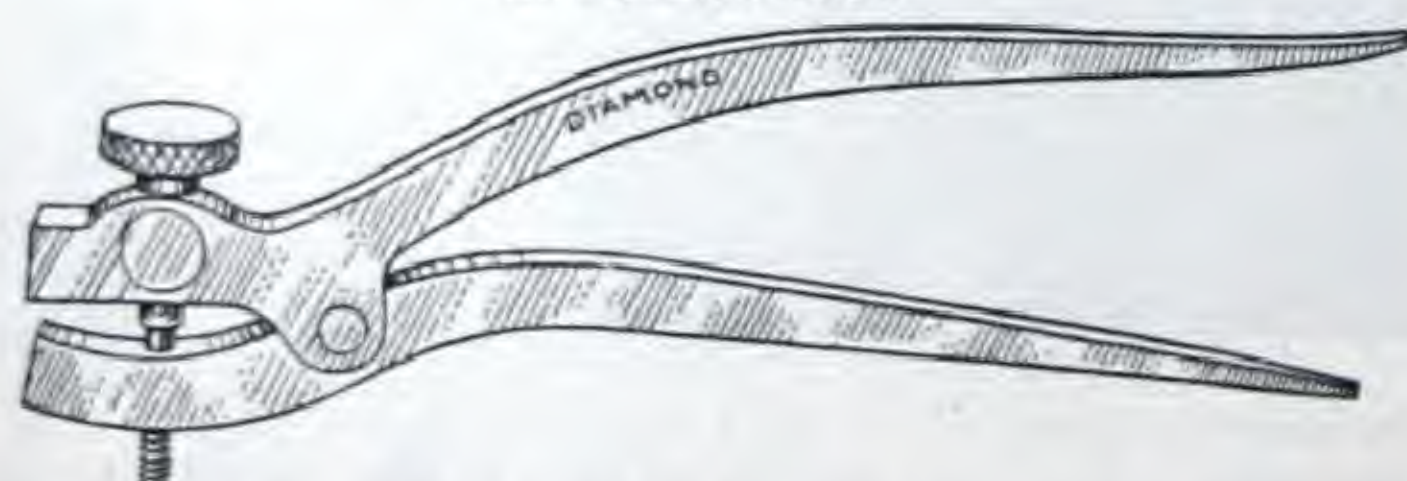
No tool is required for making ordinary attachments.

The simple turning up of the screw expands the Crimp-Nut.

For manufacturers and contractors making many uniform attachments, one of the two forms of attaching tools are recommended.

DIAMOND RAPID ATTACHING TOOL

List \$12.50 Each



Screw is engaged by turning knurled head and the handles are squeezed together, resulting in instantaneous attachment.

CINCH ANCHORS

One Unit Anchors

For light construction

Under many tests it has been established that a single unit anchorage will hold to upwards of 9,000 lbs.; therefore for light construction with horizontal holes

single unit anchorage should suffice.



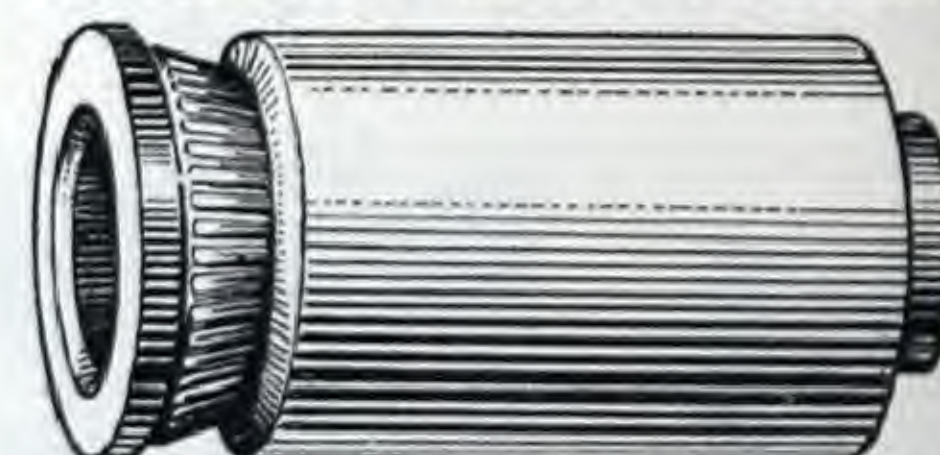
PLAIN ONE-UNIT ANCHORAGE

Diam. of Bolt sizes	List Price per 100 Sets	Weight per 100 in lbs.	Quantity per box	Min. depth of Hole	Diam. of Hole and Drill Size
	1 Iron				
	1 Lead				
$\frac{3}{16}$	\$7.50	2 $\frac{1}{4}$	100	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{4}$	8.50	3 $\frac{3}{4}$	100	$\frac{5}{8}$	$\frac{5}{8}$
$\frac{5}{16}$	9.00	3 $\frac{3}{4}$	100	$\frac{5}{8}$	$\frac{5}{8}$
$\frac{3}{8}$	12.50	6 $\frac{1}{2}$	100	$\frac{7}{8}$	$\frac{3}{4}$
$\frac{7}{16}$	15.00	6 $\frac{1}{2}$	100	$\frac{7}{8}$	$\frac{3}{4}$
$\frac{1}{2}$	19.00	12	100	1"	1"

THREADED ONE-UNIT ANCHORAGE

Diam. of Bolt sizes	List Price per 100 Sets	Weight per 100 in lbs.	Quantity per box	Min. depth of Hole	Diam. of Hole and Drill Size
	1 Iron				
	1 Lead				
$\frac{3}{16}$	\$9.38	2 $\frac{1}{2}$	100	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{1}{4}$	10.63	4	100	$\frac{5}{8}$	$\frac{5}{8}$
$\frac{5}{16}$	11.25	4	100	$\frac{5}{8}$	$\frac{5}{8}$
$\frac{3}{8}$	15.63	7	100	$\frac{7}{8}$	$\frac{3}{4}$
$\frac{7}{16}$	18.75	7	100	$\frac{7}{8}$	$\frac{3}{4}$
$\frac{1}{2}$	23.75	14	100	1"	1"

Cinch Drive Sleeve Anchors



Size of Bolt	Dia. of Hole	Depth of Hole	List Price Per 100
12 x 24	$\frac{1}{2}$ "	$\frac{7}{8}$ "	\$6.50
14 x 20	$\frac{1}{2}$ "	$\frac{7}{8}$ "	7.20

Cinch Brand Red Top Four-Point Drills



List Price per Dozen

Diameter	8" Length	12" Length	18" Length	24" Length
$\frac{1}{4}$	\$8.25	\$ 8.50	.....	.....
$\frac{5}{16}$	8.25	8.50	.....	.....
$\frac{3}{8}$	8.50	.....	.....
$\frac{7}{16}$	9.00	.....	.....
$\frac{1}{2}$	10.00	12.50	15.00
$\frac{5}{8}$	12.00	15.00	17.50
$\frac{3}{4}$	14.00	17.50	20.00
$\frac{7}{8}$	16.00	20.00	22.50
1"	18.00	22.50	25.00
$1\frac{1}{8}$	24.00	28.00	32.00
$1\frac{1}{4}$	30.00	35.00	40.00
$1\frac{3}{8}$	40.00	45.00	50.00
$1\frac{1}{2}$	50.00	56.00	62.00
$1\frac{5}{8}$	60.00	66.00	72.00
$1\frac{3}{4}$	75.00	81.00	87.00
$1\frac{7}{8}$	90.00	97.00	104.00
2"	105.00	112.00	120.00

DI \diamond FORGE

TWIST DRILLS

FOR HAMMER DRILLING



Style B—Drill Holder—\$24.00 per Dozen
6½ Lbs. per Dozen, Packed



Style C—Rubber Grip Holder—\$48.00 per Dozen
10 Lbs. per Dozen, Packed

Forged from a solid bar of Vanadium Tool Steel. This process produces a tougher and more durable drill than can be made by the machine process. It is intended to be used in a hand or electric hammer. Rotate clockwise between blows if used with hand hammer. Rotate continuously if used with electric hammer.

In extensive tests, this form of drill has proved its superiority over any other type.

Diamond Rubber-Grip Drill Holders

Made of Vanadium Steel, with a soft rubber grip with a cap to protect the hand of the operator.

List Price per Dozen

Diameter	List per Doz.	Length Over-all	Depth of Hole	Weight per Doz.
$\frac{3}{16}$ "	\$10.80	2 $\frac{5}{8}$ "	1 $\frac{1}{4}$ "	$\frac{1}{2}$ lb.
$\frac{1}{4}$ "	10.80	3 $\frac{1}{8}$ "	1 $\frac{1}{2}$ "	$\frac{3}{4}$ lb.
$\frac{5}{16}$ "	12.80	3 $\frac{7}{8}$ "	2 "	$\frac{7}{8}$ lb.
$\frac{3}{8}$ "	14.80	5 $\frac{1}{8}$ "	3 $\frac{1}{4}$ "	1 $\frac{1}{4}$ lbs.
$\frac{7}{16}$ "	18.80	5 $\frac{1}{4}$ "	3 $\frac{3}{8}$ "	1 $\frac{1}{2}$ lbs.
$\frac{1}{2}$ "	22.80	5 $\frac{1}{2}$ "	3 $\frac{1}{2}$ "	2 lbs.
$\frac{9}{16}$ "	26.80	5 $\frac{1}{2}$ "	3 $\frac{1}{2}$ "	2 $\frac{1}{4}$ lbs.

DI \diamond FORGE Twist Drills are also put up in sets containing one holder and one each $\frac{3}{16}$ ", $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ "

$\frac{1}{2}$ " DI \diamond FORGE Twist Drill Points.

List Price

Type "C" Rubber Grip Holder.....\$8.00 per Set
Type "B" Holder..... 7.00 per Set

"DIAMOND N" DRILLS



4-Point or Star Drills



Diamond or Single Point

"Diamond N" 4-Point Drills are manufactured only of the highest grade octagon drill rod. Our experience has indicated that the carbon content of steel used in the manufacture of tools of this class is most important. The quality of steel which we use is carefully tested for uniformity and on every batch put through our heat-treating process actual tests are made in various kinds of stones to insure a temper that will give the best average service in all.

The heat treatment of our Drills is scientifically conducted. Heats for hardening and drawing the temper are determined by pyrometer and thermometer, which methods give greater accuracy and uniformity than can be had under the old method of determining the heat by colour.

"DIAMOND N" 4-POINT DRILLS AND DIAMOND POINT DRILLS

Lists and Weights per Dozen

Length	$\frac{1}{4}$ "	$\frac{5}{16}$ "	$\frac{3}{8}$ "	$\frac{7}{16}$ "	$\frac{1}{2}$ "	$\frac{5}{8}$ " and $\frac{3}{4}$ "	$\frac{7}{8}$ "	1"	1 $\frac{1}{8}$ "
8"	8.25	8.25	8.25	8.70	9.65	11.65	13.70	15.30	23.00
12"	8.50	8.50	8.50	9.00	10.00	12.00	14.00	16.00	24.00
Wt. Lbs.	2	3	4	5	5	9	12	15	27
18"	11.00	11.00	11.00	11.50	12.50	15.00	17.50	20.00	28.00
Wt. Lbs.	3	4 $\frac{1}{2}$	6	7 $\frac{1}{2}$	7 $\frac{1}{2}$	13 $\frac{1}{2}$	18	22 $\frac{1}{2}$	41
24"	13.50	13.50	13.50	14.00	15.00	17.50	20.00	22.50	32.00
Wt. Lbs.	4	6	8	10	10	18	24	30	54

Length	1 $\frac{1}{4}$ "	1 $\frac{3}{8}$ "	1 $\frac{1}{2}$ "	1 $\frac{5}{8}$ "	1 $\frac{3}{4}$ "	1 $\frac{7}{8}$ "	2"	2 $\frac{1}{4}$ "	2 $\frac{1}{2}$ "
12"	30.00	40.00	50.00	60.00	75.00	90.00	105.00	135.00	165.00
Wt. Lbs.	27	35	42	42	43	53	54	55	79
18"	35.00	45.00	56.00	66.00	81.00	97.00	112.00	145.00	175.00
Wt. Lbs.	41	53	63	63	65	80	81	83	119
24"	40.00	50.00	62.00	72.00	87.00	104.00	120.00	165.00	195.00
Wt. Lbs.	54	70	84	84	86	106	108	110	158

"DIAMOND N" DRILL HOLDERS AND POINTS



The "Diamond-N" Drill Holder and loose points is a combination which will be found very convenient for electricians and in other lines of industry where numerous small holes must be drilled for fastening up small fixtures.

The Drills are very carefully tempered to insure sufficient hardness at the point to withstand the wear of cutting and the temper is drawn away toward the shank, so as to produce a softer steel where it enters the handle to prevent its breaking off at that point.

List Price and Weights Per Dozen

	Size	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"
Price	24.00	8.50	8.50	8.50	9.00	10.00	12.00	14.00	16.00	18.00
Length		4 $\frac{1}{2}$ "	4"	4 $\frac{1}{2}$ "	4"	5"	6 $\frac{1}{2}$ "	6"	6 $\frac{1}{2}$ "	6 $\frac{1}{2}$ "
Wt. Lbs.		8 $\frac{1}{2}$	1 $\frac{1}{4}$	1 $\frac{1}{8}$	1 $\frac{1}{4}$	1 $\frac{1}{2}$	2	2 $\frac{1}{8}$	4 $\frac{1}{4}$	4 $\frac{3}{4}$

SLATER WOOD SCREWS

Hot Galvanized

List No.	Size No.	Length Inches	Approximate Shipping Weight Lbs., 100 pcs.
1051½	16	1½	2.8
1052½	16	2½	4.2
1053	16	3	4.9

SLATER EXPANSION SHIELDS

FOR USE WITH WOOD SCREWS

When properly installed the Slater Expansion Bolt will develop the full strength of the retaining wall, such as brick or concrete.



List No.	Size of Screw	Dimensions in Inches Dia. Shield	Length Shield	Approx. Ship. Wt., Lbs., 100 Pcs.
31	Nos. 20 and 22	½	2	9.5

SLATER EXPANSION BOLTS

Hot Galvanized



No. 3

The Slater Expansion Bolt consist of two parts—the special bolt itself—and the lead sleeve. The bolt is formed with a conical head tapering toward the shank. This bolt is made of selected steel of great tensile strength. The lead sleeve is tamped over the bolt head by using the Slater Hammer Drill.

SLATER EXPANSION BOLTS

List No.	Dimensions in Inches Size	Length	Approx. Ship. Wgt. Lbs. 100 Pcs.
1	¼	1¾	7.1
2	¼	2	7.5
3	¼	2½	8.3
4	¼	3¼	9.5
4A	¼	4	10.7
4B	¼	5	12.3
5	⅜	2½	14.9
6	⅜	3	15.9
7	⅜	3½	16.9
8	⅜	4½	18.9
9	⅜	5	19.9
10	⅜	5½	21.0
11	½	2½	41.2
12	½	3½	47.2
13	½	4	50.2
14	½	4½	53.0
15	½	5	56.0
16	½	5½	59.0
17	½	6½	62.0
18	½	8	73.0

EXTRA LEAD SLEEVES

List No.	Size, Inches	Approximate Shipping Wgt. Lbs., 100 Pcs.
22	¼	2.75
23	⅜	5.9
24	½	21.5

SEAMLESS RUBBER GLOVES

12" Forefinger
Mitten

12" Glove

In the production of Hydro seamless rubber products first consideration has been to protect the wearer while handling or in contact with live wires.

Only new rubber, especially selected for its toughness and elasticity, together with the other ingredients necessary to make them tough and wear-resisting, are used in the manufacture of HYDRO products.

Every ingredient is electrically tested for its non-conducting qualities before being used.

Improved processes now give HYDRO Gloves still great dielectric and tensile strength. They are extremely tough yet very flexible and easy to wear.

HYDRO Gloves have been adopted almost exclusively in Canada after comparative tests, proving their reliability and economy. There is no better insurance against accidents than better value in actual service.

Every HYDRO Glove is tested at 10% over its rated voltage before leaving the factory.

Hydro Electricians' Gloves
(In sizes 9, 10, 11, 12)

	Length over all	Li Pri Ea
Tested to 2,000 volts.....	12 "	\$2.
" 2,000 volts.....	14½"	3.
" 6,000 volts.....	12 "	3.
" 6,000 volts.....	14½"	4.
" 10,000 volts.....	12 "	4.
" 10,000 volts.....	14½"	5.
" *10,000 volts.....	18 "	5.
" 18,000 volts.....	12 "	5.
" 18,000 volts.....	14½"	5.
" *18,000 volts.....	18 "	6.

*Size 10 only.

Hydro Electricians' Forefinger Mittens

	Length over all	Li Pri Ea
Tested to *10,000 volts.....	12 "	\$4.
" *10,000 volts.....	14½"	5.

*Size 10 only.

	Li Pri Ea
Hydro Alaska Leather Covers, sizes 9, 10, 11, 12	\$1.
Hydro Sleeves (shoulder length).....	3.

LINEMEN'S SLEEVES



To be worn over gloves when protection is wanted to shoulder. Reaches from wrist to shoulder.

19 inches Long Overall, List Price per pair..... \$6.00

HENDERSON EZ CONDUIT BENDERS



design of the deep, close-fitting bending groove, automatically grips the conduit and absolutely prevents slipping, flattening or slipping. One-half inch, three-quarter inch, and one-inch sizes can be used either as hickies or stationary benders. The three larger sizes, 1 1/4 inches, 1 1/2 inches, and 2 inches, are for stationary bending only.

	Std. Pkg.	List Price Each
Threaded for Pipe Handle.....	10	\$2.42
Threaded for Pipe Handle.....	5	3.03
Threaded for Pipe Handle.....	3	6.05
Threaded for Pipe Brace.....	1	12.68
Threaded for Pipe Brace.....	1	19.50
Threaded for Pipe Brace.....	1	26.00

Prices quoted are for bender heads only, and do not include pipe braces or handles, which should be about forty inches long.

HENDERSON XL CONDUIT BENDERS



The Henderson X L Conduit Bender is a stationary bender. It is held in place with lag screws or bolts through the clearance holes in the base, to any suitable support.

Henderson X L Conduit Bender is furnished with three detachable bending blocks for 1/2", 3/4" and 1" conduit, complete with lag screws.

No. 1—Net weight 18 lbs.—List Price.....\$12.68

Henderson Giant X L Conduit Bender is furnished with five detachable bending blocks for 1/2", 3/4", 1", 1 1/4" and 1 1/2" conduit, complete with lag screws.

No. 2—Net weight 100 lbs.—List Price.....\$58.18

THE "LAKIN" HICKEY

The shank has a bushed hole into which the end of the conduit enters when a short bend is made at its end, or a bend is to be worked down. The bushed opening in the shank fits snugly over the end of the conduit and protects its threads.

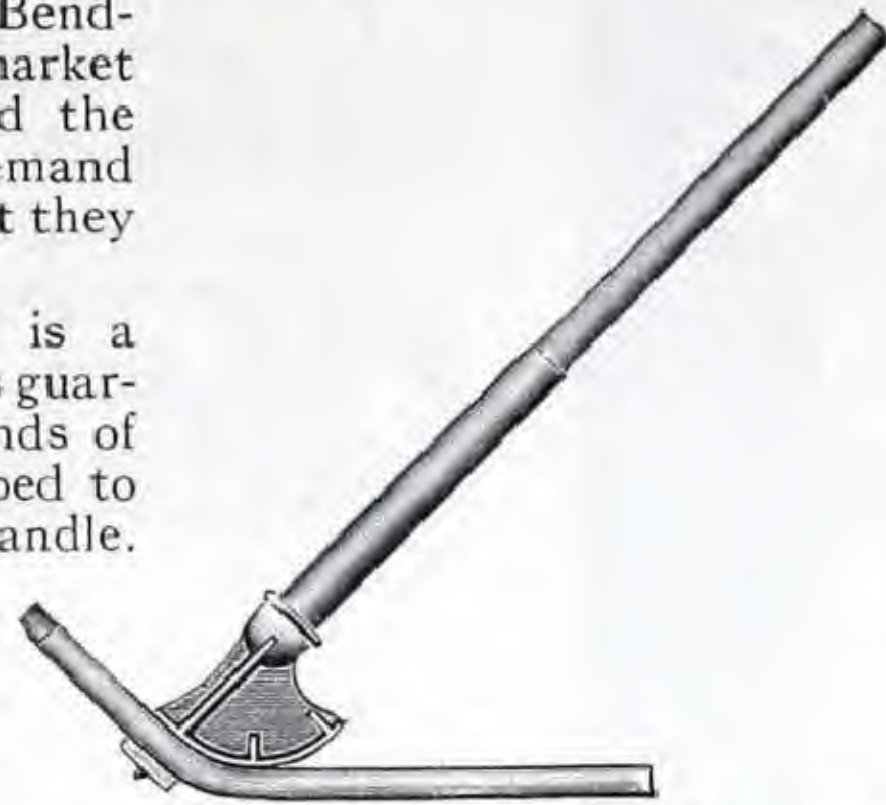
The NEW "LAKIN" HICKEY will not slip on the conduit while the bend is being made. This hickey will enable a workman to make bends having different radii. It will not kink the pipe when making the shortest bends. Made of malleable iron.

Size	Std. Pkg.	Wgt. per 100 in lbs.	List Price Each
1/2" for 1/2" Pipe.....	10	190	\$2.00
3/4" for 3/4" Pipe.....	10	220	2.56
1" for 1" Pipe.....	2	520	3.77

RITTENHOUSE CONDUIT BENDER

Rittenhouse Conduit Benders have been on the market over twenty years and the constantly increasing demand proves conclusively that they are giving satisfaction.

The Bender Head is a semi-steel casting and is guaranteed to stand all kinds of hard usage. It is tapped to take 1 1/4 inch pipe handle. Our stock handle is 1 inch pipe reinforced with a few inches of 1 1/4 inch pipe.



The curved bending bed (3 1/2 inch radius) will not kink or crush the conduit.

The adjustable bender has hardened steel points which prevent conduit from slipping. Adjustment can be changed from one size conduit to the other in a few seconds.

No. 1 Bender complete, for 1/2-inch pipe.....	\$5.50
No. 1 Bender head only, tapped for 1 1/4-inch pipe handle.....	4.00
No. 2 Bender complete, for 3/4-inch pipe.....	6.00
No. 2 Bender head only, tapped for 1 1/4-inch pipe handle.....	4.50
No. 5-A Adjustable (for 1/2 and 3/4-inch pipe) Bender..	7.50
No. 5-A Adjustable Bender head only.....	6.00

HENDERSON TURNBUCKLE PIPE AND CONDUIT BENCHES



No. 2

A portable bench, powerfully constructed for cutting threading and bending pipe and conduit. Held in place by a single hook or eyebolt. For each size of pipe, deep grooved detachable bending blocks are furnished, which automatically grip the sides of the pipe while bending, preventing kinking, flattening or slipping, a patented feature. Any bend can be made from a simple offset to a continuous spiral. To make a bend, slip the conduit between the bending bosses and press down; advance the conduit and repeat until the bend is finished.

No. 1. Furnished with two detachable bending blocks for 1/2 and 3/4" conduit; capacity of pipe vise, 2". Height, 45". Weight, 45 pounds.

List Price, each.....\$30.00

No. 2. Furnished with five detachable bending blocks for 1/2, 3/4, 1, 1 1/4 and 1 1/2" conduit; capacity of pipe vise, 3 1/2". Height, 45". Weight, 170 pounds.

List Price, each.....\$120.00

HENDERSON PATENT PORTABLE K-D PIPE BENCH

For electricians, gas-fitters, millwrights and all mechanics who cut and thread pipe. The K-D bench can be assembled in a few minutes, saving at least half an hour's time in starting a job, as no time is wasted in rigging up a place to mount a pipe vise. When not in use the K-D can be taken apart and stored in a small space.

Height, 39". Weight, 55 lbs. Top, 33"x9 1/2"x1 1/2", hardwood finished.

List Price, each.....\$30.00



PYRENE FIRE EXTINGUISHERS



For home, school, summer cottage, motor boat, automobile, truck, tractor, grain elevator and factory protection.

Particularly effective on fires in oils, gasoline or paints.

Safe for use on electrical fires.

Standard for street car, power station, railroad coach, sleeping car and motor bus equipment.

Approved by Dominion Railway Commission, U.S. Steamboat Inspection Service, U.S. Bureau of Standards, U.S. Bureau of Mines and Good Housekeeping Institute. Approved and labelled by Underwriters Laboratories.

Will not freeze to 50 degrees below zero.

Use only PYRENE LIQUID. Other liquids will damage mechanism.



Pyrene Extinguisher—Brass, complete with bracket. List Price, each.....\$14.00

Pyrene Extinguisher—Nickel-plated, complete with bracket. List Price, each.....\$16.00

Pyrene Liquid Refills. List Price, each.....\$2.00

Extra Pyrene Bracket. List Price, each.....\$1.25

Pyrene Metal Boxes—red or mahogany—for vehicles and factories. Prevents tampering with extinguisher. List Price, each.....\$3.00

Pyrene Extinguishers packed twelve to a case. Shipping weight, 90 lbs.

Pyrene Refills packed twenty to a case. Shipping weight, 74 lbs.

GUARDENE FIRE EXTINGUISHERS

Standard Soda and Acid Type (chemical) Extinguisher, Rated capacity, 2½ gallons.

Inspected and labelled by Underwriters Laboratories.

In the head is a cage holding bottle half filled with Sulphuric acid. Tank is filled to water mark with solution Bicarbonate of Soda. Lead stopper in bottle prevents acid from deteriorating.

To operate turn upside down—lead stopper falls from bottle, allowing acid and soda solution to mix, which forms gas pressure and expels liquid. No danger—tested to 350 lbs. pressure.

Never use on electrical fires unless current has been turned off. Packed individually. Shipping weight, 20 lbs.

Guardene—Polished copper, complete with charge and bracket. List Price, each.....\$20.00

Guardene Soda and Acid Rechargers (for any soda and acid extinguisher). List Price, each.....\$0.90



PHOMENE (FOAM TYPE) FIRE EXTINGUISHERS



Rated capacity, 2½ gallons.

Inspected and labelled by Underwriters Laboratories.

Operated by turning upside down—generates 20 gallons fire blanketing foam.

Effective on fires in oils, gasoline, paints, varnishes, lacquer enamels, etc., etc.

Recommended and approved for garage and filling static protection.

Instructions on name plate—simple to operate—effective hands of a novice.

Phomene extinguishers are packed individually—shipping weight, 27 lbs.

Phomene Extinguisher, polished copper, complete with charge and bracket. List Price, each.....\$25.00

Phomene (foam type) Rechargers. List Price, each... 2.00

"ACCURATE" FIVE-GALLON PUMP TANK



Fitted with heavy double action brass pump. Throws a continuous stream 40 to 50 feet. Charged with plain water for heated locations. For unheated locations freeze-proof compound is added to withstand temperature to 40 degrees below zero.

More effective than buckets or pails because stream can be directed and controlled. Nominal capacity, 5 gallons. Actual capacity unlimited where extra water is available, as tank may be refilled while being operated.

Inspected and labelled by Underwriters Laboratories.

Approved for protection of warehouses, freight sheds, lumber yards, camps and forestry protection. Packed individually, shipping weight, 16½ lbs.

"Accurate" 5-gallon Pump Tank. List Price, each... \$20.00

"Accurate" 5-gallon Pump Tank, polished copper. List Price, each.....\$25.00

"Accurate" 5-gallon Pump Tank, galvanized, painted red. List Price, each.....\$20.00

"Accurate" Freeze-Proof Compound (to prevent freezing 40 degrees below zero). List Price, each.....\$ 3.00

OVERHEAD *and* UNDERGROUND

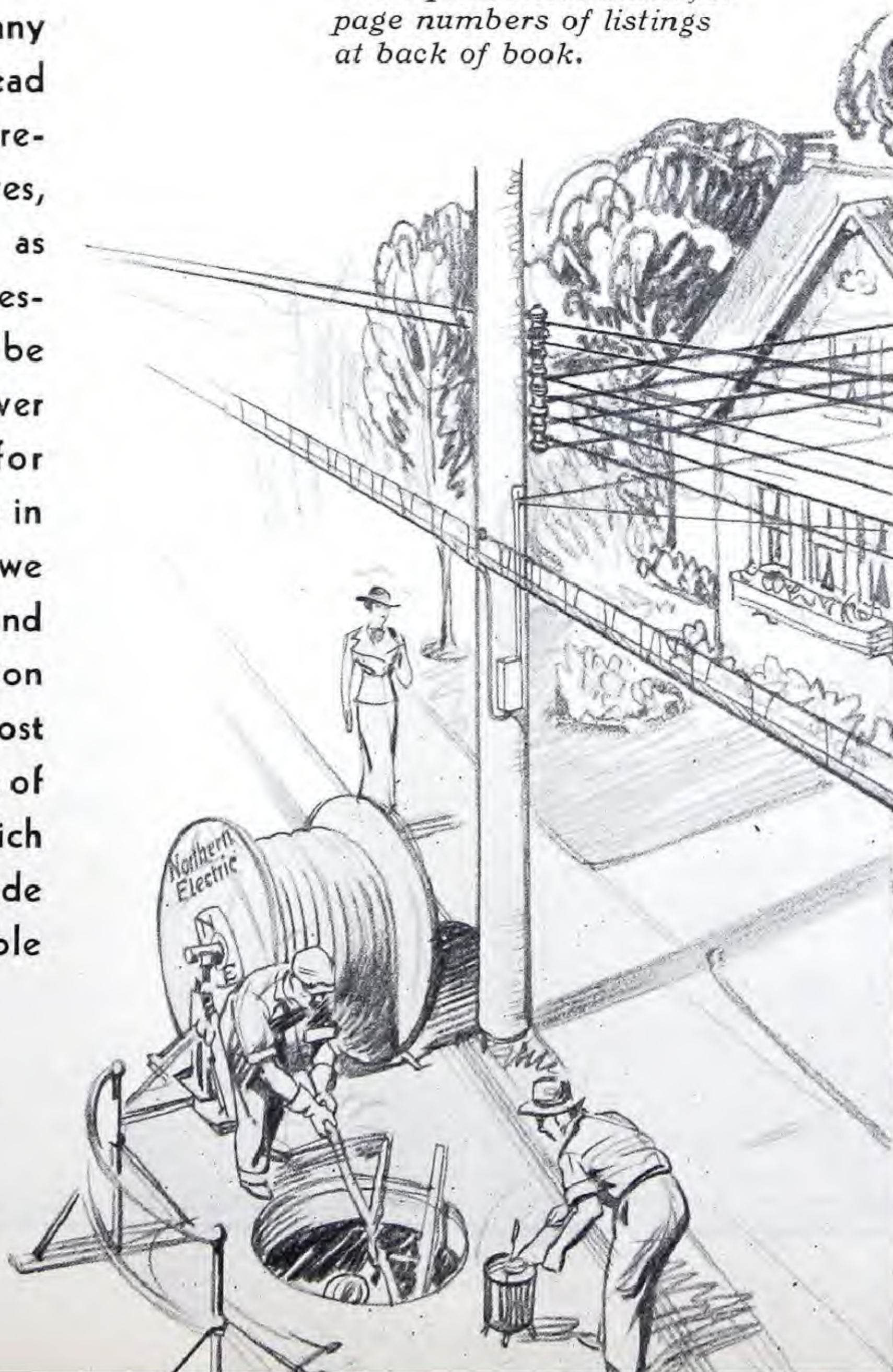
for
OVERHEAD and
UNDERGROUND
MATERIALS and
TOOLS INDEX



From the ground to the top of the pole, the Northern Electric Company is prepared to furnish your Overhead and Underground Construction Material requirements, including the poles themselves, and Underground Line Material as well. Tools also of all types necessary in the electrical field can be obtained from this source. Whatever your requirements, whether for standard or special line hardware in small or large tonnage quantities, we will quote most favorable terms and render prompt service. Our position in the line material market is most favorable, due to the large volume of business transacted in this field which is reflected in the Company's trade of quality goods at most reasonable prices.

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OVERHEAD AND UNDERGROUND MATERIALS AND TOOLS



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POLES



The large majority of poles used in Canada are either Western Red Cedar Poles, which are produced in British Columbia, or Eastern Cedar Poles, which are produced in several parts of Eastern Canada. The latter kind of pole is sometimes referred to as "Northern White Cedar."

The following are official specifications for the two kinds of poles:—

WESTERN RED CEDAR POLES

W.R.C.A. Official Specifications

Revised January 1—1929

Standard Western Red Cedar Poles 4-inch, 20-foot and larger

Live Timber—All poles must be manufactured from live growing cedar timber.

Manufacture—All poles must be peeled, knots trimmed and butts and tops sawed square.

Variation in Length—Poles may be 6 inches longer or 3 inches shorter than length specified.

Knots—Knots are not a defect, if sound, trimmed neatly and do not plainly impair the strength of the pole.

Discoloration—Discoloration is not a defect.

Miscellaneous Defects—No poles shall contain sap rot, woodpecker holes, plugged holes or evidence of having been eaten by ants.

Rot—Tops of poles must be free from rot. Butt rot in poles, including small ring rot, shall not exceed 10 per cent of the area of the butt. Butt rot of a character which impairs the strength of the pole above the ground line is a defect.

Cat Faces—Sound cat faces are not a defect if no part of cat face shows on the upper one-fifth of the length of the pole or within 2 feet above or 1 foot below the ground line.

Dead or Dry Streaks—A sound dead or dry streak is not a defect if it does not cover more than 25 per cent of the surface of the pole at any one point.

Minimum Measurements—(a) The tops of all poles shall have a minimum circumference measurement as shown in Table No. 1. (b) The extreme butt of all poles shall have a minimum measurement as shown in Table No. 2 (c) Poles having a decided swell or flare at the butt shall have a sufficiently larger measurement at butt to insure a reasonable measurement at the ground line.

Short Kinks—Short kinks are not permitted.

Reverse Sweep—Reverse sweep and two-way sweep, including a sweep in two planes, is permitted, provided a straight line drawn from the center of pole at top to center of butt at ground line does not leave the pole at any point.

One Way Sweep—One way sweep is permitted provided it does not exceed maximum shown in Table No. 3.

Method of Measuring Sweep—That part of the pole above the ground line not to be taken into consideration. To test, stretch a tape line from point at the ground line (see graph 15) on the side of the pole where the sweep is greatest to the upper surface at the top of the pole, and having one end, measure widest point from tape to surface of pole and record. Illustration, upon a 30-foot pole the widest point does not exceed 4 inches, this pole shall be accepted.

WESTERN RED CEDAR POLES

W.R.C.A. Official Specifications

(Continued)

15. Explanation of Term "Ground Line"—The term "Ground Line" as used in these specifications shall mean a point on the pole a distance of 4 feet on 20-foot, 5 feet on 25-foot and 30-foot, and 6 feet on 35-foot and longer poles from the extreme butt.

Table No. 1

Minimum Top Measurement

Top Designation	Circumference	Top Designation	Circumference
4" Top	12"	8" Top	25"
5" Top	15"	9" Top	28"
6" Top	18½"	10" Top	31"
7" Top	22"		

Table No. 2

Poles 35 feet and longer shall have a minimum circumference measurement at extreme butt as follows:

Length	7" Top	8" Top	9" Top	10" Top
35'	33"	36"	39"	42"
40'	34"	37"	40"	44"
45'	...	39"	42"	45"
50'	...	41"	44"	47"
55'	...	42"	45"	48"
60'	...	44"	47"	50"
65'	...	45"	48"	51"
70'	...	47"	50"	53"
75'	...	48"	51"	54"
80'	...	50"	53"	56"
85'	...	51"	54"	57"
90'	...	52"	55"	58"

Table No. 3

Length of Pole	Maximum Sweep Between Top and Ground Line	Length of Pole	Maximum Sweep Between Top and Ground Line
20'	3"	60'	9"
25'	3"	65'	10"
30'	4"	70'	10½"
35'	5"	75'	11"
40'	5½"	80'	12"
45'	6"	85'	13"
50'	7"	90'	14"
55'	8"		

WESTERN RED CEDAR POLE

(W.R.C.A. Specification)

ESTIMATED WEIGHT ONLY

Size Top	Wgt. Lbs.	Min. to Car	Size Top	Wgt. Lbs.	Minimum to Car
20'—5"	135	300	40'—7"	675	75
6"	190	215	8"	800	65
7"	250	160	9"	1000	50
25'—5"	200	200	45'—8"	1000	66 (2 Cars)
6"	250	160	9"	1200	55
7"	325	125	50'—8"	1200	55
8"	400	100	9"	1400	48
30'—6"	325	125	55'—8"	1400	48
7"	400	100	9"	1600	42
8"	550	75	60'—8"	1600	42
35'—6"	450	90	9"	1850	36
7"	550	75	65'—8"	1850	36
8"	650	65	9"	2200	30
9"	800	50			

Prices on application.

MINIMUM CARLOADS

WESTERN RED CEDAR

Cars loaded with 35' or shorter poles.....	40,000 lbs.
Cars loaded with 40' poles or 40' and shorter poles.	50,000 lbs.
Loads containing any 45' or longer poles (double or overhand loads).....	66,000 lbs.
Triple loads.....	99,000 lbs.

WESTERN RED CEDAR POLES

American Tentative Standard Specifications
and American Standard DimensionsWESTERN RED CEDAR POLES
A.S.A. Nos. 05c1-1931 and 05c2-1931

APPROVED

AMERICAN STANDARDS ASSOCIATION

JUNE 20, 1931

(We acknowledge our indebtedness to American Standards Association for their kind permission to publish the following specifications and dimensions).

0. Introduction

These specifications cover western red cedar poles. The poles are to be classified in accordance with the American Standard Dimensions of Western Red Cedar Poles (05c2-1931), which is a part of these specifications.

The length and class of the poles wanted shall be stated in the orders.

Poles furnished under these specifications may be either seasoned or unseasoned. If seasoned poles are specifically called for in an order, the purchaser shall specify the seasoning requirements to be met.

The details of any marking, including length and class marks, to be placed on the poles shall be in accordance with instructions from the purchaser.

Complete detailed instructions shall be given the supplier in all cases where modifications are to be made in these specifications to meet special requirements.

1. Material Requirements

1.1 Species

All poles shall be of western red cedar (*Thuja plicata*) cut from live timber.

1.2 Prohibited Defects.

All poles shall be free from sap rot, cracks, bird holes, plugged holes and injurious checks; from splits, shakes, hollow and decay in the tops; and from damage from marine borers. Nails, spikes, and other metal shall not be present in the poles unless specifically authorized by the purchaser.

1.3 Limited Defects.

1.31 Dead streaks. All poles shall be free from dead streaks that are wider than one-fourth ($\frac{1}{4}$) of the circumference of the pole at the point of measurement.

1.32 Decay. Poles shall be free from decay and from visible evidence of the presence of wood-rotting fungi except as permitted under Defective Butts.

1.33 Defective Butts. No poles shall have in the butt surface splits or checks extending from one point on the periphery to another point on the periphery and thence upward more than two (2) feet.

No pole shall have hollow heart, the diameter of which exceeds one-third ($\frac{1}{3}$) the butt diameter or the depth of which exceeds two (2) feet. The depth of hollow heart shall be measured from the butt surface.

Rot is permitted in the butt surface provided the aggregate area of rot and hollow heart does not exceed ten (10) per cent of the entire butt surface.

Complete circular shakes may be present on the butt surface provided the diameter of the ring which they follow is not more than one-third ($\frac{1}{3}$) of the diameter of the butt.

1.34 Grain. No pole shall have more than one (1) complete twist of grain in any twenty (20) feet of length.

1.35 Insect Damage. All poles shall be free from insect damage, except that pin holes circular in outline, not more than one-sixteenth ($\frac{1}{16}$) of an inch in diameter, and not greater in number than fifteen (15) in an area of four (4) square inches, are permitted.

1.36 Knots. All poles shall be free from unsound knots. The diameter of any single knot or knot cavity, or the sum of the diameters of all knots and knot cavities in any one (1) foot section, between the top and two (2) feet below the ground line, shall not exceed the limits set up in the following table. Knots and knot cavities one-half ($\frac{1}{2}$) of an inch or under in diameter shall be ignored in applying the limitations for sum of diameters.

WESTERN RED CEDAR POLES

American Tentative Standard Specifications
and American Standard Dimensions

(Continued)

Limitations of Knot Size

Maximum Sizes Permitted, Inches

Length of Pole	Diameter of any Single Knot or Knot Cavity	Sum of Diameters of All Knots and Knot Cavities in any one (1) Foot Section
All lengths	3	10

1.37 Scars. No part of a scar shall appear on the upper one-fourth ($\frac{1}{4}$) of the length of a pole or within two (2) feet of the ground line.

Sound scars and cat faces are permitted elsewhere provided the width of the scar or cat face at its widest point is not more than one-fifth ($\frac{1}{5}$) of the circumference of the pole at that point, nor in any case more than five (5) inches.

1.38 Shape. Poles shall be free from short crooks.

A pole may have sweep in the section above the ground line subject to the following limitations:

(a) Where sweep is in one (1) plane and one (1) direction only, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by an amount greater than one (1) inch for each six (6) feet of length between these points.

(b) Where sweep is in two (2) planes (double sweep) or in two (2) directions in one (1) plane (reverse sweep), a straight line connecting the mid-point at the ground line with the mid-point at the top shall not at any intermediate point pass through the external surface of the pole.

A pole may have offset in the section below ground line, provided that the projection of a straight line joining the mid-point at the top and the mid-point at the ground line does not fall outside the butt surface.

2. Dimensions

2.1 Length.

Poles under fifty (50) feet in length shall not be over three (3) inches shorter or six (6) inches longer than nominal length. Poles fifty (50) feet or over in length shall not be over six (6) inches shorter or twelve (12) inches longer than nominal length.

Length shall be measured between the extreme ends of the pole.

2.2 Circumference.

Poles shall be classified in accordance with the American Standard Dimensions of Western Red Cedar Poles. This standard gives the minimum allowable circumference at six (6) feet from the butt (except for Classes 8, 9 and 10), and at the top for each length and class of pole listed, but does not preclude the acceptance of poles having greater circumference at these points of measurement than those shown. The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

3. Manufacturing Requirements.

3.1 Bark Removal.

Outer bark shall be completely removed from all poles.

3.2 Sawing.

All poles shall be neatly sawed at the butt and top along a plane which shall not be out of square with the axis of the pole by more than two (2) inches per foot of diameter of the sawed surface. Bevelling at the edge of the sawed butt surface not more than one-twelfth ($\frac{1}{12}$) of the butt diameter in width, or an equivalent area unsymmetrically located, is permitted.

3.3 Shaving.

Shaved poles shall not be furnished under these specifications unless specifically called for by the purchaser.

3.4 Trimming.

Branch stubs, partially overgrown knots, and completely overgrown knots rising more than one (1) inch above the pole surface shall be trimmed close. Completely overgrown knots less than one (1) inch high need not be trimmed.

WESTERN RED CEDAR POLES

American Tentative Standard Specifications And American Standard Dimensions

(Continued)

4. Definitions of Terms

Following definitions shall apply in these specifications:

Angular Defects.

Decay. Decay* is disintegration of wood substance due to action of wood destroying fungi. Rot and Dote mean the same as Decay.

Hollow Heart. Hollow heart is a cavity in the heart of a pole resulting from decay.

Structural Defects.

Insect Damage. Insect damage is the result of boring insects or their larvae. Scoring or channelling of pole surface is not classed as insect damage.

Timber Defects.

Checks. Checks are lengthwise separations of the wood in a generally radial direction.

Cracks. Cracks are breaks or fractures across the grain of the wood.

Dead Streak.† A dead streak is any portion of the pole in which the life process had ended prior to the cutting of the tree.

Scars. Scars or cat faces are depressions in the surface of a pole, generally elliptical in shape, resulting from wounds where healing has not re-established the normal cross section of a pole.

Shakes. Shakes are separations of the wood, generally parallel with the annual rings.

Splits. Splits are separations between the fibers of the wood extending from surface to surface through the pole.

Twists.

Short Crook. A short crook is a localized deviation from straightness which, within any section of five (5) feet in length, is more than one-half ($\frac{1}{2}$) the mean diameter of the crooked section. (See Diagram 3 of the subsidiary drawing entitled "Measurement of Sweep and Short Crook in Poles").

Sweep. Sweep is the deviation of a pole from straightness. (See Diagrams 1 and 2 of the subsidiary drawing entitled "Measurement of Sweep and Short Crook in Poles").

Miscellaneous.

Knot Diameter. The diameter of a knot is its diameter measured on the surface of the pole measured in a direction at right angles to the lengthwise axis of the pole.

Live Timber. Live timber is that cut from a tree which was standing and living at the time of the cutting.

5. Subsidiary Drawing

The following drawing is subsidiary to the text of these specifications:

Measurement of Sweep and Short Crook in Poles.

6. Subsidiary Standard

The following standard is subsidiary to the text of these specifications:

American Standard Dimensions of Western Red Cedar (ASTM A 95-2-1931).

Note: The terms "sound" and "unsound" are used in these specifications to imply that "sound" fiber is unaffected by decay and that "unsound" fiber is or has been affected by decay.

† Note: A dead streak starts from the butt and differs from a wound, such as a cat face or scar, where the growth of new wood shows that life processes are still acting in the injured part.

From the ground to the top of the pole the Northern Electric Company is prepared to furnish you Overhead and Underground Line Construction Material requirements including the poles themselves, and underground line material as well. Tools also of all types necessary in the electrical field can be secured from this source. Whatever your requirements, whether for standard or special line hardware in small or large tonnage quantities, we can quote most favorable terms and render prompt service. Our position in the Overhead and Underground Line Material Market is most favorable, due to the large volume of business transacted in this field which is reflected in the Company's trade in quality goods at most reasonable prices.



WESTERN RED CEDAR POLES

American Tentative Standard Specification and American Standard Dimensions
(Continued)

MEASUREMENT OF SWEEP AND SHORT CROOK IN POLES

Diagram 1. Measurement of sweep in one plane and one direction.

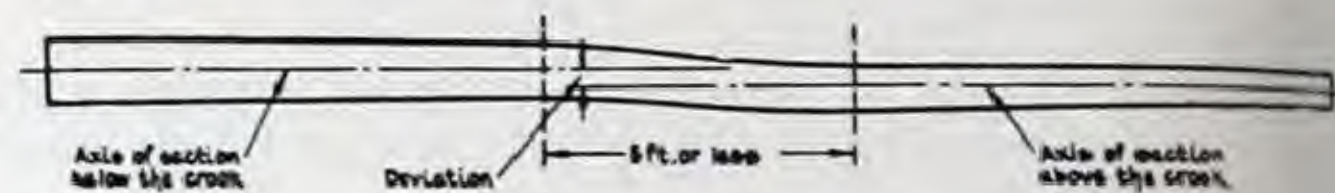


Diagram 2. Measurement of sweep in two planes (Double sweep) or in two directions in one plane (reverse sweep).

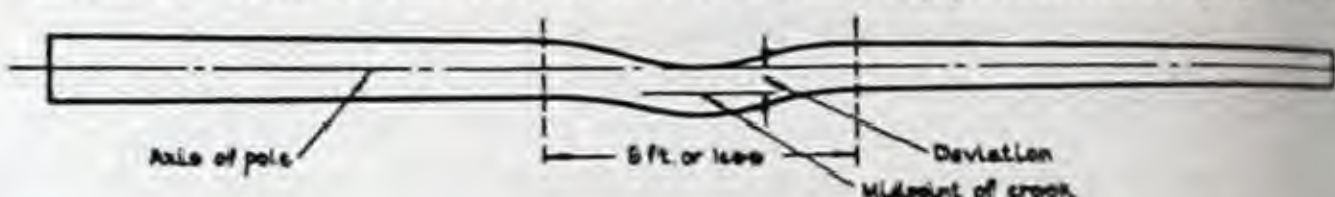


Note. This diagram applies to the measurement of double sweep in Western Red Cedar and Southern Pine poles. For measurement of double sweep in Northern White Cedar and Chestnut poles, see text.

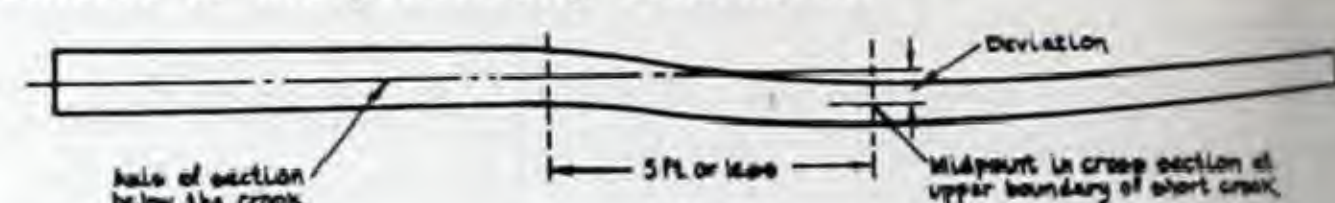
Diagram 3. Measurement of short crook (three cases shown).



Case 1. Where the reference axes are approximately parallel



Case 2. Where axes of sections above and below the crook coincide or are practically coincident.



Case 3. Where axis of section above short crook is not parallel or coincident with axis below the crook.

Note. The three cases shown under Diagram 3 are typical and are intended to establish the principle of measuring short crooks. There may be other cases not exactly like those illustrated.

American Standard Dimensions of Western Red Cedar Poles

05c2-1931

Class	1	2	3	4	5	6	7	8	9	10
Minimum Top Circ. (Inches)	27	25	23	21	19	17	15	18	15	12
Length Ground of Line Dist. Pole from Butt (Feet) (Feet)										
16 3½					23.0	21.5	19.5			
18 3½			28.5	26.5	24.5	22.5	21.0			
20 4	34.5	32.0	30.0	28.0	25.5	23.5	22.0			
22 4	36.0	33.5	31.5	29.0	27.0	25.0	23.0			
25 5	38.0	35.5	33.0	30.5	28.5	26.0	24.5			
30 5½	41.0	38.5	35.5	33.0	30.5	28.5	26.5			
35 6	43.5	41.0	38.0	35.5	32.5	30.5	28.0			
40 6	46.0	43.5	40.5	37.5	34.5	32.0				
45 6½	48.5	45.5	42.5	39.5	36.5					
50 7	50.5	47.5	44.5	41.0	38.0					
55 7½	52.5	49.5	46.0	42.5	39.5					
60 8	54.5	51.0	47.5	44.0						
65 8½	56.0	52.5	49.0	45.5						
70 9	57.5	54.0	50.5	47.0						
75 9½	59.5	55.5	52.0	48.5						
80 10	61.0	57.0	53.5	49.5						
85 10½	62.5	58.5	54.5							
90 11	63.5	60.0	56.0							

No Butt
Requirement

EASTERN CEDAR POLES

We wish to take this opportunity to thank the Canadian Engineering Standards Association for their kind permission to reprint the specification shown hereinafter.

Canadian Engineering Standards Association
"C.E.S.A."

Standard Specification for Eastern Cedar Poles
No. C15-1924

General

General—This specification covers poles of Eastern Cedar (Thuja Occidentalis) possessing the characteristics hereafter set forth, and divided into grades with respect to straightness, and into classes with respect to dimensions.

Orders—Orders for poles under this specification should state the length, grade and class desired.

When seasoned poles are required a notation should be made to that effect on the order.

Timber—All poles shall be cut from live timber and shall be free from defects, except as provided hereinafter. They should preferably be cut in the winter season.

Fire-killed or drowned poles may be accepted, if cut within one year after being killed.

Finish—All poles shall be completely peeled and notched. Knots shall be trimmed smoothly and butts and tops squared.

Defects

Knots—No pole shall contain loose or hollow knots, nor showing evidence of decay, or knots that plainly impair the strength of the pole.

Dead or Dry Streaks—A sound dead or dry streak is permissible if it does not cover more than one-fourth of the circumference of the pole at any section.

Cat Faces—Small cat faces are permissible if sound and peeled smoothly, and if no part of the cat face shows on the top or lower one-fourth of the pole.

Twist—Twist in the grain shall not be greater than one complete turn in 20 feet.

Defective Tops—Poles having tops of the required dimensions shall have sound tops, but where the top is larger than the required circumference by one inch or more, there shall be one pipe rot not more than one-half inch in diameter.

Poles with double hearts or tops shall be free from rot at the two parts join.

Defective Butts—Poles containing hollow hearts, butt rot, and shakes will be accepted in certain cases if the circumference is increased as shown in the following Table I.

Scattered rot shall be considered as equivalent to the defects compensated for in the following Table I, unless a portion of it lies within three inches of the outside surface of the pole, in which case the pole shall be rejected.

Table I

Compensation for Butt Defects

Add to circumference requirements at 6 feet from butt of Poles—inches.

	20 to 30 ft.	32½ to 45 ft.	50 to 65 ft.
Poles	Poles	Poles	
None	None	None	None
1 inch	None	None	None
2 inches	None	None	None
3 inches	1 inch	None	None
4 inches	2 inches	1 inch	1 inch
Reject	4 inches	2 inches	2 inches
Reject	6 inches	3 inches	3 inches
Reject	Reject	4 inches	4 inches
Reject	Reject	5 inches	5 inches
Reject	Reject	7 inches	7 inches
Reject	Reject	9 inches	9 inches
Reject	Reject	Reject	Reject

EASTERN CEDAR POLES

C.E.S.A. (Cont'd)

14. Checks—All poles shall be free from large checks. Checks radiating from the centre of the butt shall be permitted, provided they do not extend outward from the center to the pole surface in such a way as to split off a section of the butt.

15. Miscellaneous Defects—No pole shall contain woodpecker holes, plugged holes, insect damage, or evidence of fungus growth.

All sapwood shall be free from char, rot, circumferential cracks or other defects which plainly impair the strength or life of the pole.

Standard Specification for Eastern Cedar Poles

16. Percentage of Maximum Defects—Not more than 10 per cent of the poles of any lot or shipment shall contain maximum permissible crook or butt rot; and no pole shall contain more than one of the maximum permissible defects provided for above under "Dead or Dry Streaks," "Cat Faces," "Twist," "Defective Tops," "Defective Butts" and "Checks," or below under "Sweep."

GRADING AS TO STRAIGHTNESS

19. Sweep (Grade I) Poles required by the order to be of Grade I shall be free from all deviations from straightness except one-way sweep. The amount of such sweep between the top and six feet from the butt shall not exceed that specified for the corresponding length of pole for Grade I in the following Table II.

20. Sweep (Grade II)—Poles required by the order to be of Grade II may have sweep in two planes (two-way sweep) or sweep in two directions in one plane (reverse sweep) provided that a straight line connecting the centre of the top and the centre at 6 feet from the butt does not at any intermediate point leave the pole.

21. In the case of one-way sweep the amount of such sweep between the top and six feet from the butt shall not exceed that specified for the corresponding length of pole for Grade II in the following Table II.

Table II

Amount of One-way Sweep Permissible

Length of Pole feet	Maximum Sweep Grade I inches	Maximum Sweep Grade II Inches	Length of Pole feet	Maximum Sweep Grade I Inches	Maximum Sweep Grade II Inches
20 or less	4	4	45	9	13½
22 to 25	5	7½	50	10	15
30	6	9	55	11	16½
35	7	10½	60	12	18
40	8	12	65	13	19½

22. Sweep and crookedness shall be measured in accordance with the diagrams in Appendix A.

23. Short kinks or short crooks are not permitted.

Classification as to Dimensions

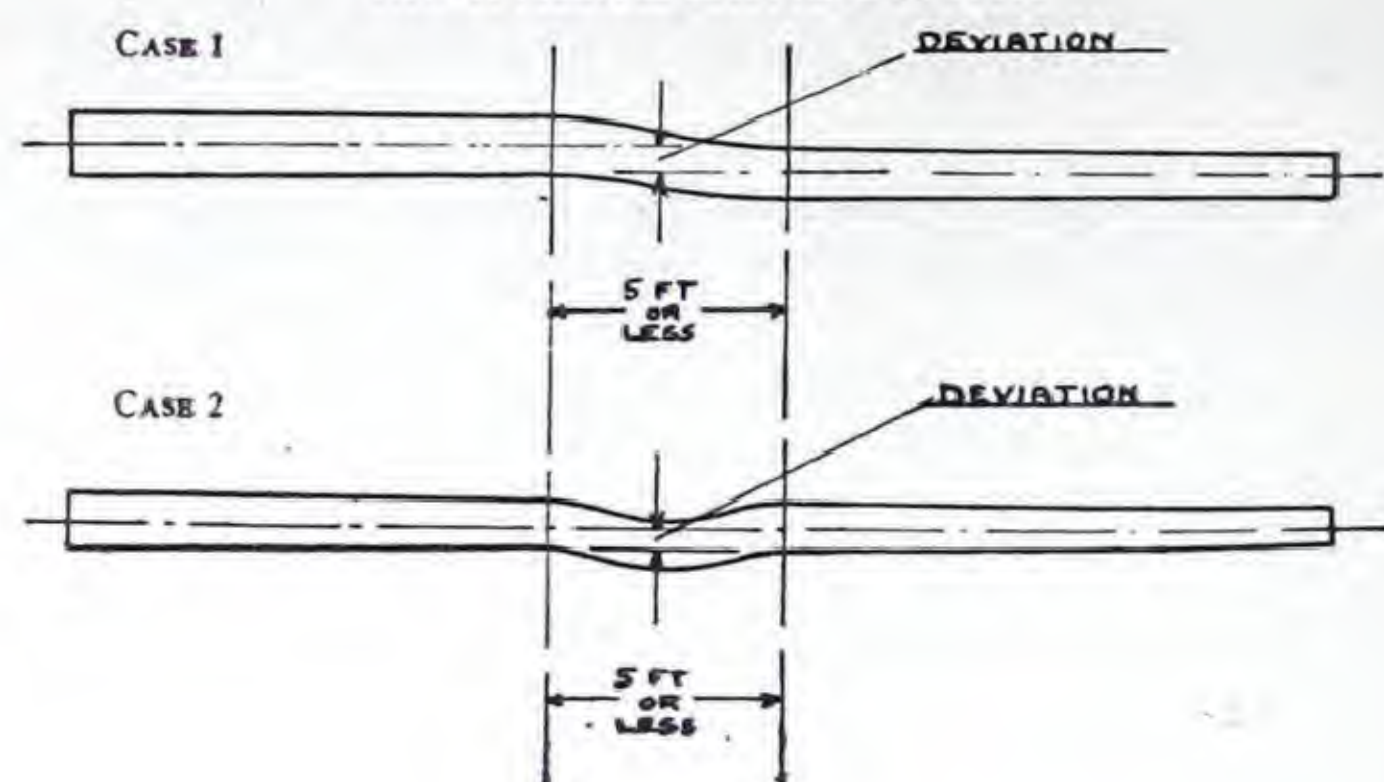
24. Minimum Dimensions—Poles shall be classified with respect to circumference 6 feet above the butt, and circumference at the top, in accordance with the following Table III.

EASTERN CEDAR POLES

C.E.S.A. (Cont'd)

DIAGRAM 2

HOW TO MEASURE SHORT KINK OR CROOK



Appendix B

The following explanations give the meaning of various terms used in this specification.

Pipe Rot is rot which affects the central portion of the heart wood; when visible at the butt it is commonly known as Butt Rot.

Heart Rot or Hollow Heart is of the same description, but may not be visible at either of the cut ends of the pole. It is often evidenced by small defective knots which show rot and lead into a central cavity.

Ring Rot generally follows one or more of the annual rings, and usually affects the butt of a pole. Within the annual rings affected there is a central core of sound wood.

Dead or Dry Streaks contain wood which has become brittle, lifeless, or deficient in density, through aging or decay.

Standard Specification for Eastern Cedar Poles

Cat Faces are surface depressions in the body of the pole, usually elongated in shape, resulting from tree wounds where the processes of healing have not re-established a normal cross section.

Insect Damage. The scoring or channeling of the pole surface by insects working under the bark is not classed as insect damage, but any penetration of the body of the pole by insects, worms or grubs is considered as insect damage.

A Shake is a split or opening between the adjacent fibres of the wood, paralleling the grain along the length of the tree, and extending laterally approximately parallel to the annual rings, though not necessarily parallel throughout to any single ring.

A Check is a split or opening between adjacent fibres of the wood, paralleling the grain along the length of the tree, and extending laterally in a radial direction, though not necessarily lying throughout in a single radial plane.

Sweep is the deviation of a pole from straightness. It is known as One-way Sweep, when it occurs in one plane, but the pole is curved in one direction only. (See diagram).

Sweep in one plane, but curving the pole in two directions like the letter "S," is known as Reserve Sweep.

In the case of Two-way Sweep the pole is curved in two planes, so that it will not lie flat on a plane surface.

Short Kinks or Short Crooks are localized deviations from straightness which, within any section of 5 feet or less in length, reach an amount of more than one-half the mean diameter of the pole within the crooked section.

EASTERN CEDAR POLES

C.E.S.A. (Cont'd)

Table II (Revised)†
Minimum Dimensions for Seasoned Poles
(Circumference in inches)

Length of Pole, Ft.	Class A or 2800 lb. *Class		Class B or 2200 lbs. *Class		Class C or 1600 lb. *Class		Class D	Class F	Class G
	At Top	At 6' from Butt	At Top	At 6' from Butt	At Top	At 6' from Butt	At Top	At Top	At Top
20	24	33	22	29	18¾	27	18½	15½	12½
22½	24	34	22	30	18¾	28½	18½	15½	12½
25	24	36	22	32	18¾	30	18¾	15½	12½
27½	24	38	22	34	18¾	31½	18¾	15½	12½
30	24	40	22	36	18¾	33	18¾		
32½	24	41½	22	37	18¾	34½	18¾		
35	24	43	22	38	18¾	36	18¾		
37½	24	45	22	40½	18¾	38	18¾		
40	24	47	22	43	18¾	40	18¾		
45	24	50	22	47	18¾	43	22		
50	24	53	22	50	18¾	46	22		
55	24	56	22	53	18¾	49	22		
60	24	59	22	56	18¾				

*These figures indicate the approximate breaking strength with 3600 lb. per sq. inch fibre stress, the load being applied 3 ft. from top of pole, and the pole secured up to 6 ft. from the butt.

†Note: Table III has been revised at the suggestion of one of the utility companies and the revision was approved by the C.E.S.A. Committee on "Wood Poles for Transmission Lines" in October, 1926.

The revisions are as follows:—

Class A—inclusion of circumference dimensions for poles 20' and 22½' long.

Class B—revision of circumference dimensions at 6' from butt for 20' pole.

Class C—revision of circumference dimensions at 6' from butt in poles 20' and 22½' long.

Class D—revision of circumference dimensions at top of poles 20' and 22½' long.

Class E—deleted.

Class F—deletion of circumference requirements for poles 30' to 60' long.

25. In Classes D, E, F and G, for which the butt circumference is not given, the poles shall be reasonably well proportioned throughout the entire length.

Standard Specification for Eastern Cedar Poles

26. Poles of Classes A, B and C, in which the top circumference is ½ inch less than that given, may be accepted up to 1 per cent of the lot or shipment.

27. No pole shall be more than six inches longer, or more than three inches shorter than the length ordered.

Inspection and Rejection

28. Inspection—The vendor shall afford the inspector representing the purchaser, all reasonable facilities to satisfy himself that the poles are being furnished and delivered in accordance with this specification.

29. Rejection—Poles which do not conform to all requirements of this specification may be rejected.

Note—appendices A and B attached form part of this specification.

Appendix A

Sweep and Crookedness

DIAGRAM 1

HOW TO MEASURE SWEEP



EASTERN CEDAR POLES (Northern White Cedar)

Diam. Top Inches	Length Feet	Approx. Weight Lbs.	No. to From	Carload To
4	16	85	340	400
5	16	105	300	400
6	16	135	230	300
7	16	165	200	250
8	16	200	150	225
9	16	300	100	130
10	18	95	325	400
11	18	125	250	300
12	18	155	200	250
13	18	200	150	225
14	18	325	95	125
15	18	425	90	125
16	20	100	300	400
17	20	130	230	300
18	20	130	230	300
19	20	190	150	225
20	20	250	125	150
21	20	350	90	125
22	20	450	75	100
23	22	175	175	250
24	25	150	200	250
25	25	200	150	225
26	25	200	135	190
27	25	250	125	150
28	25	250	100	130
29	25	350	90	125
30	25	425	90	125
31	30	275	110	175
32	30	275	100	130
33	30	350	90	125
34	30	350	75	100
35	30	450	75	100
36	30	600	50	75
37	35	400	75	100
38	35	400	75	100
39	35	450	75	100
40	35	450	60	80
41	35	600	50	75
42	35	850	40	60
43	40	625	50	75
44	40	625	45	60
45	40	850	40	60
46	40	1100	30	45

Following sizes require two cars for shipping

45	900	60	80
45	1100	50	70
45	1350	45	60
50	1150	50	70
50	1350	45	60
50	1700	35	45
55	1400	40	50
55	1700	35	45
55	2200	25	35
60	2200	25	35
60	2500	22	30
65	2500	22	30
65	3000	18	25

ices on application.

Minimum Carloads

Eastern or Northern White Cedar

le load	33,000 lbs.
le load	51,000 lbs.

NORTHERN WHITE CEDAR POLES American Tentative Standard Specifications and American Standard Dimensions

NORTHERN WHITE CEDAR POLES
A.S.A. Nos. 05b1—1931 and 05b2—1931

APPROVED
AMERICAN STANDARDS ASSOCIATION
JUNE 20, 1931

(We acknowledge our indebtedness to American Standards Association for their kind permission to publish the following specifications and dimensions.)

0. Introduction

These specifications cover northern white cedar poles. The poles are to be classified in accordance with the American Standard Dimensions of Northern White Cedar Poles (05b2—1931), which is a part of these specifications.

The length and class of the poles wanted shall be stated in the orders.

Poles furnished under these specifications may be either seasoned or unseasoned. If seasoned poles are specifically called for in an order, the purchaser shall specify the seasoning requirements to be met.

The details of any marking, including length and class marks, to be placed on the poles shall be in accordance with instructions from the purchaser.

Complete detailed instructions shall be given the supplier in all cases where modifications are to be made in these specifications to meet special requirements.

1. Material Requirements

1.1 Species

All poles shall be of northern white cedar (*Thuja occidentalis*) cut from live timber in the territory adjacent to the Great Lakes.

1.2 Prohibited Defects.

All poles shall be free from sap rot, cracks, bird holes, plugged holes, injurious checks; and from splits, shakes, hollow and decay in the tops. Nails, spikes, and other metal shall not be present in the poles unless specifically authorized by the purchaser.

1.3 Limited Defects.

1.31 Dead streaks. All poles shall be free from dead streaks that are wider than one-fourth ($\frac{1}{4}$) of the circumference of the pole at the point of measurement.

1.32 Decay. Poles shall be free from decay and from visible evidence of the presence of wood-rotting fungi except as permitted under Defective Butts.

1.33 Defective Butts. Decay in the butt within two (2) inches of the surface of the pole shall not exceed one (1) square inch in area. The total area of decay, including hollow heart, in the butt shall not exceed ten (10) per cent of the total butt area.

The restriction with respect to decay within two (2) inches of the surface of the pole shall not apply to poles which are to be butt treated.

Complete circular shakes in the butt may be present provided the area encircled by the shake does not exceed fifteen (15) per cent of the total butt area.

1.34 Grain. No pole shall have more than one (1) complete twist of grain in any twenty (20) feet of length.

1.35 Insect Damage. Insect injury consisting of scoring or channeling in the surface of the pole by insects or their larvae feeding in the cambium and outer sapwood and the holes and shallow galleries associated with the metamorphosis of the common flatheaded borer are permitted. All other forms of insect damage are prohibited.

1.36 Knots. All poles shall be free from unsound knots.

The diameter of any single knot or knot cavity, or the sum of the diameters of all knots and knot cavities in any one (1) foot section, between the top and two (2) feet below the ground line, shall not exceed the limits set up in the following table. Knots and knot cavities one-half ($\frac{1}{2}$) of an inch or under in diameter shall be ignored in applying the limitations for sum of diameters.

NORTHERN WHITE CEDAR POLES
American Tentative Standard Specifications
and
American Standard Dimensions
 (Continued)

Length of Pole	Limitations of Knot Size Maximum Sizes Permitted, Inches	
	Diameter of any Single Knot or Knot Cavity	Sum of Diameters of All Knots and Knot Cavities in any one (1) Foot Section
35' and under	2.5	9
40' and over	4.5	11

1.37 Scars. No part of a scar shall appear on the upper one-fourth ($\frac{1}{4}$) of the length of a pole or within two (2) feet of the ground line.

Sound scars and cat faces are permitted elsewhere provided the width of the scar or cat face at its widest point is not more than one-fifth ($\frac{1}{5}$) of the circumference of the pole at that point, nor in any case more than five (5) inches.

1.38 Shape. Poles shall be free from short crooks.

A pole may have sweep in the section above the ground line subject to the following limitations:

(a) Where sweep is in one (1) plane and one (1) direction only, a straight line joining the surface of the pole at the ground line and the edge of the pole at the top shall not be distant from the surface of the pole at any point by an amount greater than one (1) inch for each four (4) feet of length between these points.

(b) Where sweep is in one (1) plane and two (2) directions (reverse sweep), a line joining the mid-point at the ground line and the mid-point at the top shall not at any intermediate point pass through the external surface of the pole.

(c) Where sweep is in two (2) planes (double sweep), the sum of the sweeps in the two (2) planes (each sweep being measured as shown on Diagram 1 of the subsidiary drawing) shall not be greater than the allowance for sweep in one (1) plane and one (1) direction for a pole of the same length.

A pole may have offset in the section below ground line, provided that the projection of a straight line joining the mid-point at the top and the mid-point at the ground line does not fall outside the butt surface.

2. Dimensions

2.1 Length.

Poles under fifty (50) feet in length shall not be over three (3) inches shorter or six (6) inches longer than nominal length. Poles fifty (50) feet or over in length shall not be over six (6) inches shorter or twelve (12) inches longer than nominal length.

The length shall be measured between the extreme ends of the pole.

2.2 Circumference.

Poles shall be classified in accordance with the American Standard Dimensions of Northern White Cedar Poles. This standard gives the minimum allowable circumference at six (6) feet from the butt (except for Classes 8, 9 and 10), and at the top for each length and class of pole listed, but does not preclude the acceptance of poles having greater circumferences at these points of measurement than those shown. The top dimensional requirement shall apply at a point corresponding to the minimum length permitted for the pole.

3. Manufacturing Requirements

3.1 Bark Removal.

Outer bark shall be completely removed from all poles.

3.2 Sawing.

All poles shall be neatly sawed at the butt and top along a plane which shall not be out of square with the axis of the pole by more than two (2) inches per foot of diameter of the sawed surface. Beveling at the edge of the sawed butt surface not more than one-twelfth ($\frac{1}{12}$) of the butt diameter in width, or an equivalent area unsymmetrically located, is permitted.

3.3 Shaving.

Shaved poles shall not be furnished under these specifications unless specifically called for by the purchaser.

3.4 Trimming.

Branch stubs, partially overgrown knots, and completely overgrown knots rising more than one (1) inch above the pole surface shall be trimmed close. Completely overgrown knots less than one (1) inch high need not be trimmed.

NORTHERN WHITE CEDAR POLES
American Tentative Standard Specification
and
American Standard Dimensions
 (Continued)

4. Definitions of Terms

The following definitions shall apply in these specifications:

4.1 Fungous Defects.

4.11 Decay†. Decay is disintegration of wood substance due to the action of wood destroying fungi. Rot and Decay mean the same as Decay.

4.12 Hollow Heart. Hollow heart is a cavity in the heart of the pole resulting from decay.

4.2 Insect Defects.

4.21 Insect Damage. Insect damage is the result of boring in the poles by insects or their larvae. Scoring or channeling of the pole surface is not classed as insect damage.*

4.3 Timber Defects.

4.31 Checks. Checks are lengthwise separations of the wood in a generally radial direction.

4.32 Cracks. Cracks are breaks or fractures across the grain of the wood.

4.33 Dead Streak‡. A dead streak is any portion of the sapwood in which the life process had ended prior to the cutting of the tree.

4.34 Scars. Scars or cat faces are depressions in the surface of the pole, generally elliptical in shape, resulting from wounds where healing has not re-established the normal cross section of the pole.

4.35 Shakes. Shakes are separations of the wood, generally parallel with the annual rings.

4.36 Splits. Splits are separations between the fibers of the wood extending from surface to surface through the pole.

4.4 Shape.

4.41 Short Crook. A short crook is a localized deviation from straightness which, within any section of five (5) feet or less in length, is more than one-half ($\frac{1}{2}$) the mean diameter of the crooked section. (See Diagram 3 of the subsidiary drawing entitled "Measurement of Sweep and Short Crook in Poles.")

4.42 Sweep. Sweep is the deviation of a pole from straightness. (See Diagrams 1 and 2 of the subsidiary drawing entitled "Measurement of Sweep and Short Crook in Poles.")

4.5 Miscellaneous.

4.51 Knot Diameter. The diameter of a knot is its diameter on the surface of the pole measured in a direction at right angles to the lengthwise axis of the pole.

4.52 Live Timber. Live timber is that cut from a tree which was standing and living at the time of cutting.

5. Subsidiary Drawing

The following drawing is subsidiary to the text of these specifications:

Measurement of Sweep and Short Crook in Poles.

6. Subsidiary Standard

The following standard is subsidiary to the text of these specifications:

American Standard Dimensions of Northern White Cedar Poles 05b2—1931.

†Note. The terms "sound" and "unsound" are used in these specifications to imply that "sound" fiber is unaffected by decay and that "unsound" fiber is or has been affected by decay.

*Note. The flatheaded borers that work occasionally on this species of timber make a short curved gallery about three-quarters ($\frac{3}{4}$) of an inch long in the sapwood where the larva (grub) stage of the insect changes to the adult (beetle) form. The holes connecting these galleries with the outside are elliptical in shape with their long axes at right angles to the long axis of the pole.

‡Note. A dead streak starts from the butt and diffuses therein from a wound, such as a cat face or scar, where the growth of new wood shows that life processes are still acting to repair the injured part.

NORTHERN WHITE CEDAR POLES

American Tentative Standard Specifications and American Standard Dimensions

(Continued)

MEASUREMENT OF SWEEP AND SHORT CROOK IN POLES

Diagram 1. Measurement of Sweep in One Plane and One Direction.

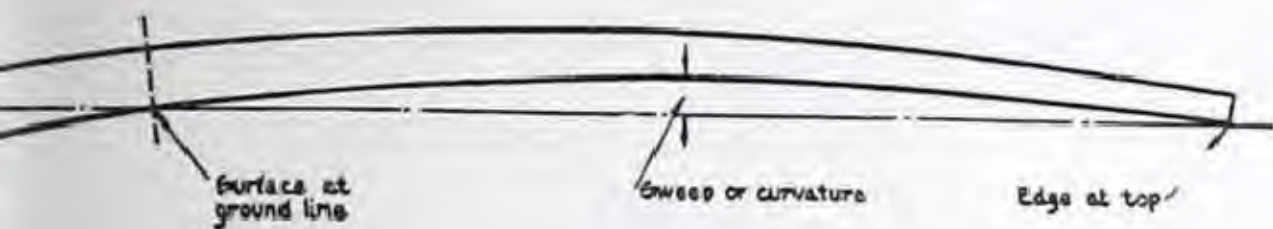
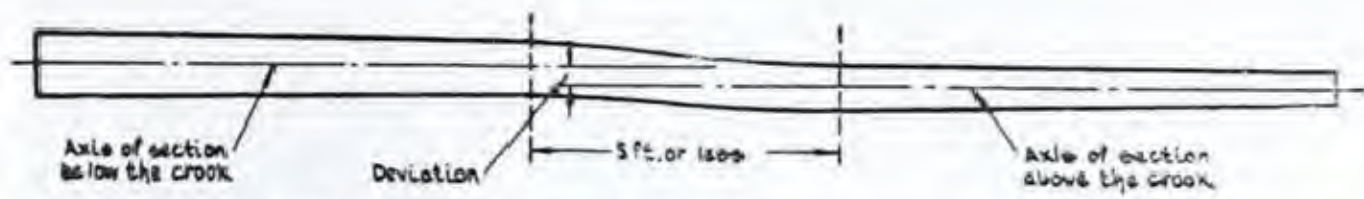


Diagram 2. Measurement of Sweep in Two Planes (Double Sweep) or in Two Directions in One Plane (Reverse Sweep).

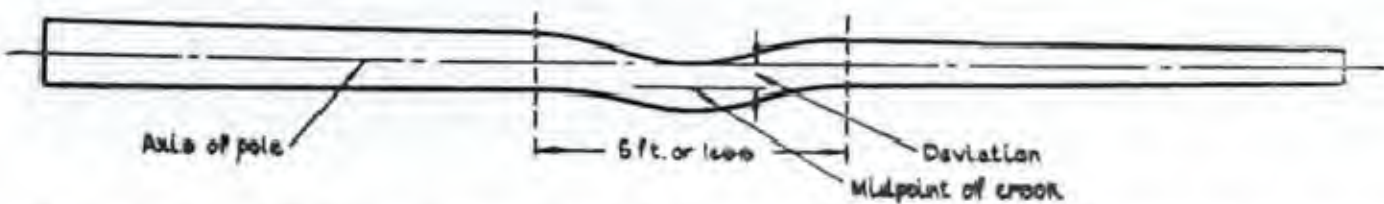


e. This diagram applies to the measurement of double sweep in Western Red Cedar and Southern Pine Poles. For measurement of double sweep in Northern White Cedar and Nut Poles, see text.

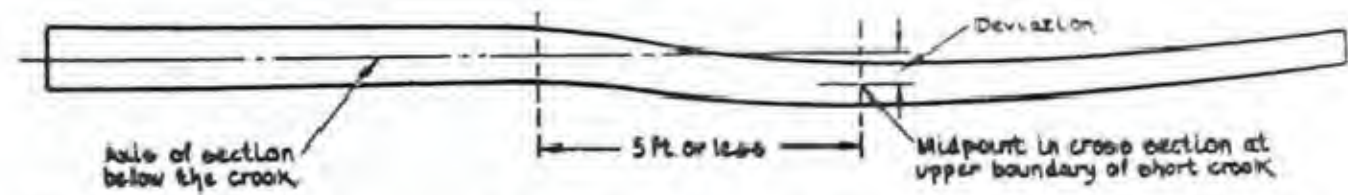
Diagram 3. Measurement of Short Crook (Three Cases Shown).



Case 1. Where the reference axes are approximately parallel.



Case 2. Where axes of sections above and below the crook coincide or are practically coincident.



Case 3. Where axis of section above short crook is not parallel or coincident with axis below the crook.

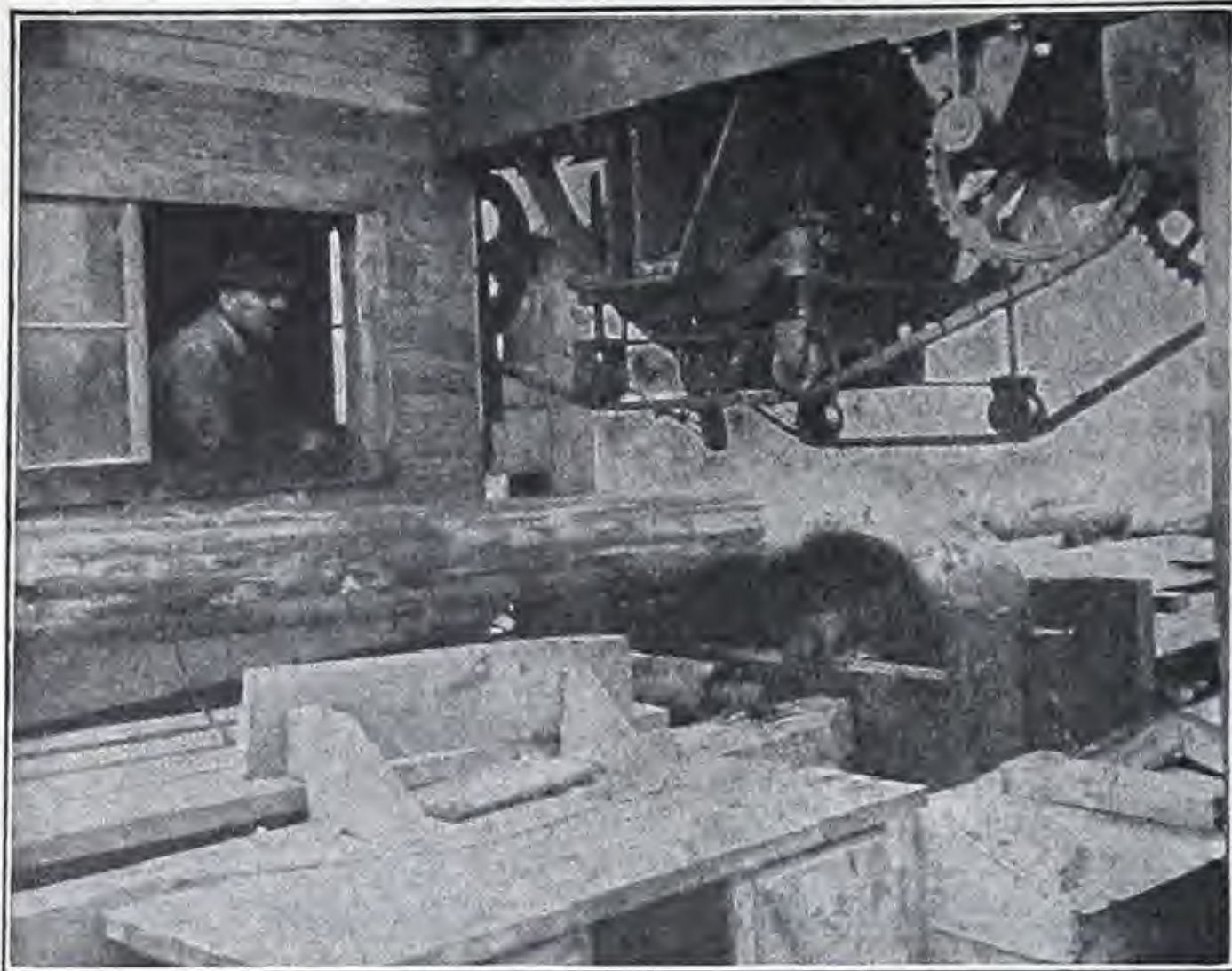
Note. The three cases shown under Diagram 3 are typical and are intended to establish the principle of measuring short crooks. There may be other cases not exactly like those illustrated.

American Standard Dimensions of Northern White Cedar Poles

05b2-1931

	1	2	3	4	5	6	7	8	9	10	
um Top Circ. (Inches).....	27	25	23	21	19	17	15	18	15	12	
th Ground Line Dist. e from Butt (t) (Feet)	Minimum Circumference at Six Feet from Butt (Inches)										
3½	26.0	24.0	22.0	No Butt Requirement			
3½	32.5	30.0	28.0	25.5	23.5				
4	39.5	37.0	34.0	31.5	29.0	27.0				25.0
4	41.0	38.5	36.0	33.0	30.5	28.0				26.0
5	43.5	41.0	38.0	35.5	32.5	30.0				28.0
5½	47.5	44.5	41.5	38.5	35.5	33.0				30.5
6	50.5	47.5	44.0	41.0	38.0	35.0	32.5			
6	53.5	50.0	46.5	43.5	40.0	37.0				
6½	56.0	52.5	49.0	45.5	42.0					
7	58.5	55.0	51.5	47.5	44.0					
7½	61.0	57.5	53.5	49.5	46.0					
8	63.5	59.5	55.5	51.5						

POLE PRESERVATIVE TREATMENTS



Pentrex Machine with Pole in Position Ready for Puncturing

Over fifteen years of careful and scientific observation of experimental pole lines, by engineers of the largest pole users has demonstrated that the life of poles can be greatly increased by the proper butt-treatment. A prominent engineer, after making a careful study, made the following statement: "If a satisfactory penetration is obtained in the ground line area, I am convinced that the life of a pole, butt-treated in creosote, will depend upon the mechanical wear of the pole above."

Another prominent engineer says, "The depth of penetration of the preservative exercises the controlling influence on the durability of the poles. At least ninety per cent of the poles butt-treated with creosote by the open-tank process were sound after approximately eleven to fourteen years' service. The slight decay in the relatively small number of the poles affected was usually in small pockets and occurred in checks through the treated wood. The penetration of the creosote in the slightly decayed poles was only about one-half the average penetration obtained in all the poles treated. The desired results are a certain penetration of the creosote oil, using the proper kind of oil, with a uniform impregnation at the part of the pole intended to be treated."

It was with this end in view that led to the development of the puncturing process or as it is called, "Pentrex Treatment."

An additional expenditure for treating poles with preservative is a sound investment because the initial investment for the pole itself and the cost of erection has been amortized at the end of its natural life as an untreated pole. The percentage of increased life depends largely on the soil and climatic conditions existing in the locality in which they are set, the size of the pole and the kind of treatment given.

After years of experimenting four standard ways of treating poles have been accepted:—

- 1 AA treatment with open tank (15 minutes hot creosote).
- 2 A treatment with open tank (15 minutes hot carbolineum).
- 3 B treatment with open tank (4 hours hot—2 hours cold creosote).
- 4 Puncturing treatment guaranteeing penetration (Pentrex Treatment).

If the best material and workmanship is used, any one of these methods is beneficial but varies in degree of efficiency with the grade of treating material and workmanship. Authorities agree that penetration and oil stability are essential to lasting results. Any method selected insures greater line life if pure distillate of coal tar is used. The purity of the distillate is of paramount importance.

POLE PRESERVATIVE TREATMENTS

(Continued)

AA Treatment

Provides for an immersion of butts of poles in hot creosote oil for a minimum duration of fifteen minutes.

This is a process treatment, no minimum penetration guaranteed.

SPECIFICATIONS TREATMENT AA

Creosote as Preservative

Condition and Preparation of Poles for Butt-Treatment:

Poles shall be seasoned at least four seasoning months before treatment. (See Seasoning Calendar hereinafter). All fibrous inner bark and foreign substances must be thoroughly removed from that portion of the pole between the points one foot above, and two feet below the ground line. (For ground line see Table 2 hereinafter.)

Method and Duration of Treatment:

The poles shall then be placed in an upright tank with the butts fully and continuously submerged in the preservative to the height as shown in Table 2, for not less than fifteen minutes when the atmospheric temperature is 70 deg. F. or higher and a proportionately longer time when the temperature is below that point; that is, during the colder weather the time of immersion must be sufficiently longer to result in the wood becoming as thoroughly heated as it would be under a fifteen-minute Treatment when the atmospheric temperature is 70 deg. F. or higher.

Preservative:

The preservative is to be known as "Creosote" which must conform to the specifications shown hereinafter.

Temperature of the Preservative:

The preservative shall be heated to a temperature of 230 deg. F., and shall not be allowed to fall below 180 deg. F. or reach above 230 deg. F.

A TREATMENT

This is also a process treatment and differs from the AA Treatment only in the grade of preservative. Carbolineum is used instead of Creosote.

SPECIFICATIONS OF TREATMENT A

Carbolineum as Preservative

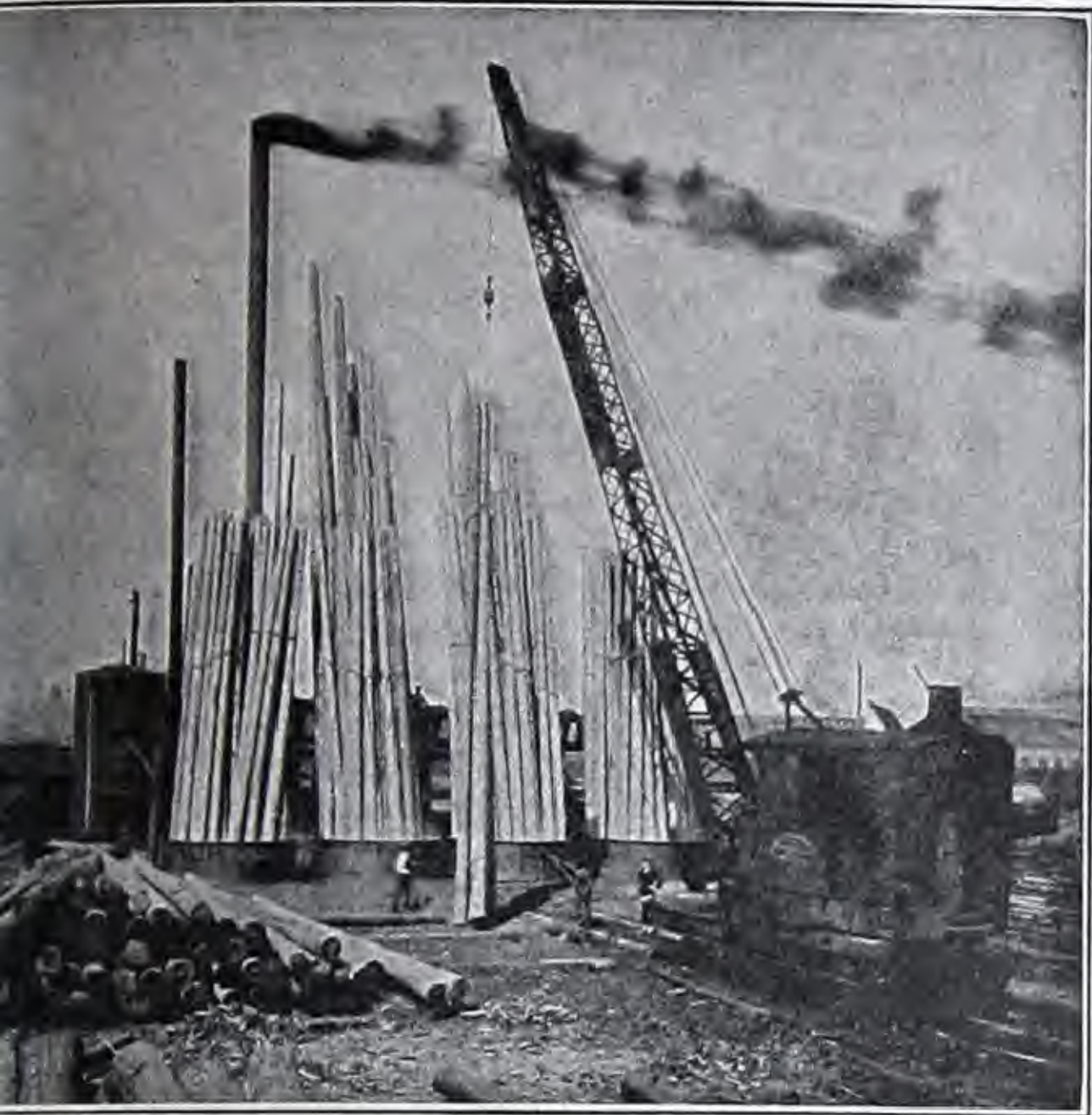
Specifications for this treatment same as Treatment AA specifications, except that the preservative used will be the known as Carbolineum.

B TREATMENT

This treatment, which is sometimes called "Hot and Cold Process," provides for the continuous submersion of the butts of the poles in hot creosote oil, for a minimum duration of four hours, followed by the immersion in cold creosote oil for an additional period of two hours. The theory is that subjecting the pole to the hot bath expels the moisture and expels the air in the cells of the sap wood. The cold bath which follows contracts the air, forming a partial vacuum which draws the preservative into the wood.

POLE PRESERVATIVE TREATMENTS

(Continued)



One of the Butt Treating Vats Showing View of 130,000 Gallon Reserve Creosote Tank

SPECIFICATIONS—TREATMENT B

ate Hot and Cold Treatment for a Mimimum Duration of Six Hours Creosote as Preservative

ion and Preparation of Poles for Butt-Treatment s shall be seasoned at least four seasoning months before ent. (See Seasoning Calendar Table 1 shown here- All fibrous inner bark and foreign substances must be ghly removed from that portion of the pole between nts one foot above, and two feet below the ground line. round line see Table 2 shown hereafter).

Method and Duration of Treatment:

poles shall be placed in upright tanks with the butts nd continuously submerged in the preservative, to the as shown in table on Table 2 shown hereafter. The on of treatment shall be divided between hot and cold The poles shall remain in the hot bath for a minimum continuous hours, after which they shall be subjected cold bath in which they shall remain for a minimum of urs. Experience has shown that, due to the variance density of the sapwood, some poles will not take a ation as readily as others. Therefore, if necessary, the n of treatment may be extended.

Preservative:

preservative is to be that known as "Creosote" which onform to the specifications shown hereafter.

Temperature of the Preservative:

preservative constituting the hot bath shall be heated mperature of 212 deg. F. at least once every four hours all not be allowed to fall below 180 deg. F. or reach 230 deg. F. mperature of the preservative constituting the cold all not exceed 112 deg. F. at the conclusion of the nt.

POLE PRESERVATIVE TREATMENTS

(Continued)

Required Analysis of Creosote

A.W.P.A. SPECIFICATIONS—GRADE ONE

- 1. The oil shall be distillate of coal-tar or coke oven tar. It shall comply with the following requirements:
- 2. It shall not contain more than 0.5% of matter insoluble in benzol.
- 3. The specific gravity of the oil at 38 deg. C., compared with water at 15.5 deg. C., shall not be less than 1.03.
- 4. The distillate, based on water-free oil, shall be within the following limits:
 - Up to 210 deg. C., not more than 5%.
 - Up to 235 deg. C., not more than 25%.
- 5. The residue above 355 deg. C., if it exceeds 5%, shall have a float-test of not more than 50 seconds at 70 deg. C.
- 6. The oil shall yield not more than 2% of coke residue.
- 7. The foregoing tests shall be made in accordance with the standard methods of the American Wood-Preservers' Association.

Table No. 1
Seasoning Calendar

Poles that have been properly piled for seasoning for a period of four seasoning months, shall be considered seasoned. In arriving at a seasoning month, the calendar month shall be rated as follows:

Month	Equals	Month	Equals
January.....	1/8 month	July.....	1 month
February.....	1/8 month	August.....	1 month
March.....	1/4 month	September....	1 month
April.....	1/2 month	October.....	3/4 month
May.....	3/4 month	November....	3/8 month
June.....	1 month	December....	1/8 month

Table No. 2

Ground Line and Minimum Length of Treated Section

Length of Pole (Feet)	Distance of Ground-line Above Butt (Feet)	Minimum Length of Treated Section Measured from Butt of Pole (Feet)
20 or less	4	5 1/2
25	5	6
30	5 1/2	6 1/2
35	6	7
40	6	7
45	6 1/2	7 1/2
50	7	8
55	7 1/2	8 1/2
60	8	9
65	8 1/2	9 1/2
70	9	10

Pentrex Treatment

For years engineers have experimented with puncturing the ground line area of cedar poles to be able to guarantee penetration by open tank creosoting.

Pentrex is a revolutionary departure from old methods. It overcomes entirely objections to puncture-treating. Never before has it been possible to secure such uniform penetration. A conservative estimate of the life the Pentrex treatment adds to Western Red Cedar Poles is from fifteen to twenty-five years.

POLE PRESERVATIVE TREATMENT

Pentrex Treatment

(Continued)

The cells of cedar wood grow one above the other, opening lengthwise one into the other. It is well therefore to puncture the poles scientifically to enable the creosote to flow through the greatest distance up and down with the least possible rupturing of the wood fibres. In no case will the penetration be greater than the thickness of the sap wood. Creosote will not penetrate the heart of cedar. Frequently, sap wood does not exceed a thickness of three-eighths of an inch.

A Special Pentrex Machine minimizes the tearing of the cells. The perforations are so made that they practically seal themselves up in the treating tanks, overcoming another objection of the early stages of Pentrex development. Puncturing makes possible the treating of green poles and certain other poles known as case-hardened poles. Case-hardened poles are those that will not ordinarily take a satisfactory penetration due to their peculiar wood structure. Care should be taken to dry green poles while in the process of treating, otherwise it is possible to encourage interior rot which is the most dangerous form of deterioration in a pole.

SPECIFICATIONS FOR PENTREX TREATMENT

Revised January 1st, 1927

Guaranteed Penetration of $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch Creosote as Preservative

General:

All poles treated under these specifications shall bear the trade-mark "Pentrex" and show year treated. This trade-mark and year date shall be placed on poles within the area between ground line and point not exceeding ten feet above ground line.

These specifications cover the puncturing of the surface of poles by Pentrex method over an area of three feet; one foot above and two feet below ground line, to facilitate the entrance into the pole of the preservative for the purpose of prolonging its serviceable life.

1. Preservative

The preservative to be used is that known as Creosote and shall conform to the A.W.P.A. Grade one.

2. Treatment

The treated section of a pole shall include its entire surface below a plane whose distance from its butt shall not be less than that shown for the length of the pole as shown in table below. The temperature of the preservative shall not exceed 250 degrees F. during the period of treatment.

3. Penetration

"Three-Eighths Inch"

The depth of penetration in the punctured section of any pole shall not be less than three-eighths ($\frac{3}{8}$) inch or more. When the depth of sapwood is less than three-eighths ($\frac{3}{8}$) inch the depth of penetration shall not be less than the thickness of the sapwood.

"One-Half Inch"

The depth of penetration in the punctured section of any pole shall not be less than one-half ($\frac{1}{2}$) inch when the thickness of the sapwood is one-half ($\frac{1}{2}$) inch or more. When the depth of sapwood is less than one-half ($\frac{1}{2}$) inch the depth of penetration shall not be less than the thickness of the sapwood.

Table No. 2

Ground Line and Minimum Length of Treated Section		
Length of Pole (Feet)	Distance of Ground-line Above Butt (Feet)	Minimum Length of Treated Section Measured from Butt of Pole (Feet)
20 or less	4	5½
25	5	6
30	5½	6½
35	6	7
40	6	7
45	6½	7½
50	7	8
55	7½	8½
60	8	9
65	8½	9½
70	9	10

Prices on application.

POLE PRESERVATIVE TREATMENTS

Butt-Treatment

Specifications for the Butt-Treatment of Western Red and Northern White Cedar Poles. Incised Process (Pentrex) A guaranteed penetration as adopted by Western Red Cedar Association and Northern White Cedar Association.

A. Seasoning. Poles shall be satisfactorily air seasoned under proper sanitary conditions.

B. Shaving. All inner bark shall be removed from the groundline area of the pole; i.e., that portion of the pole surface terminating one foot above and two feet below the standard groundline indicated in Paragraph F. The amount of wood shaved off in the removal of the inner bark shall be limited to a minimum.

C. Incising. All poles shall be incised throughout the portion of the pole surface terminating one foot above and two feet below the standard groundline indicated in Paragraph F. The depth of incisions shall be $\frac{1}{2}$ inch. A variation of $\frac{1}{32}$ of an inch in the depth of the incisions shall be allowed. The sapwood shall not be splintered nor loosened by the incising operation. The pattern and spacing of the incisions shall be such as to insure a uniform depth of penetration of the preservative throughout the incised area.

D. Preservative. The preservative used shall be a distillate of coal-tar or coke-oven tar. It shall comply with the following requirements:

1. It shall not contain more than 3% water.
2. It shall not contain more than .5% of matter insoluble in benzol.
3. The specific gravity of the oil at 38 degrees C. compared with water at 15.5 degrees C. shall not be less than 1.03.
4. The distillate, based on water free oil, shall be within the following limits:
Up to 210 degrees C.—Not more than 5%
Up to 235 degrees C.—Not more than 25%
5. The residue above 355 degrees C., if it exceeds 5% shall have a float test of not more than fifty seconds at 7 degrees C.
6. The oil shall yield not more than 2% of coke residue.
7. The foregoing tests shall be made in accordance with the standard methods of the A. W. P. A.

TREATING OPERATIONS

E. Plant Equipment. Treating plants shall be equipped with thermometers to indicate and record accurately the temperature of the preservative during all stages of treatment. The apparatus and chemicals for making necessary analyses and tests shall be available for use by the purchaser or purchaser's representative. All equipment shall be maintained in good working order.

F. Length of Treated Sections. Poles shall be immersed in the preservative so as to completely cover the groundline area. The depth of immersion shall not exceed by more than two feet the height of treatment given in the table below. The following table shows the relationship between the height of groundline and the height of treatment from the butt end of the pole:

Length of Pole	Height of Groundline	Height of Treatment
16 ft.	3½ ft.	4½ ft.
18 ft.	3½ ft.	4½ ft.
20 ft.	4 ft.	5 ft.
22 ft.	4 ft.	5 ft.
25 ft.	5 ft.	6 ft.
30 ft.	5½ ft.	6½ ft.
35 ft.	6 ft.	7 ft.
40 ft.	6 ft.	7 ft.
45 ft.	6½ ft.	7½ ft.
50 ft.	7 ft.	8 ft.
55 ft.	7½ ft.	8½ ft.
60 ft.	8 ft.	9 ft.
65 ft.	8½ ft.	9½ ft.
70 ft.	9 ft.	10 ft.
75 ft.	9½ ft.	10½ ft.
80 ft.	10 ft.	11 ft.

POLE PRESERVATIVE TREATMENTS

Butt-Treatment

(Continued)

Manner of Treatment. The treatment shall consist of two immersions; first, the hot immersion; second, the cold or cooling immersion.

TEMPERATURE AND DURATION OF HOT IMMERSION

Poles shall be continuously immersed in the preservative at a temperature of 230 degrees F. plus or minus five degrees for not less than eight (8) hours and such period in addition to that as will insure impregnation of the sapwood of the incised area with preservative to a depth of $\frac{1}{2}$ inch. In the case where the sapwood of the incised area is less than $\frac{1}{2}$ inch thick, the impregnation shall be to the full depth of the sapwood.

TEMPERATURE AND DURATION OF COLD OR COOLING IMMERSION

When the preservative of the hot immersion may be allowed to remain in the treating tank or it may be replaced with cold preservative. When the preservative of the hot immersion is replaced with cold preservative, the exchange must be completed within ten minutes.

When the preservative of the hot immersion is replaced with cold preservative, the poles shall be continuously immersed in the cold preservative for a period of not less than two hours, and the temperature of the preservative for the entire period shall be between 150 degrees F. and the temperature at which solids form in the preservative.

When the preservative of the hot immersion is allowed to remain in the treating tank, the poles shall be continuously immersed in the cooling preservative at least two hours and the temperature of the preservative has been reduced to a point between 150 degrees F. and the temperature at which solids form in the preservative. The poles shall be immersed at this temperature for a period of not less than ten minutes.

The height of the preservative in the hot, cold, or cooling immersion shall be maintained at the same levels required in paragraph F.

Impregnation. The results obtained under this specification shall be a uniform impregnation of the incised area with preservative to a depth of $\frac{1}{2}$ inch, except where the thickness of the sapwood is less than $\frac{1}{2}$ inch, in which case the impregnation shall be to the full depth of the sapwood. The depth of the impregnation shall be determined by probing with an increment borer at any point within the incised area. All such holes shall be filled with tight-fitting, thoroughly creosoted plugs.

Conformance to this specification results in not only the required depth of impregnation, but also in a very large quantity of preservative in the sapwood of the incised area, affording maximum protection against decay. No specific preservative content is mentioned owing to the difficulty of accurately making volume tests in the field. The quantity of a large volume of preservative can be determined by weighing the borings taken for penetration tests.

Handling. The use of any tools which might puncture treated wood shall not be applied within one foot above or one foot below the groundline area. See paragraph B.

Storing. Treated poles held in storage shall be piled on treated or other non-decaying skids in a clean, well-ventilated location free from vegetation and decaying wood. The skids shall be of such strength as to support the poles without causing injurious distortion of any of them, and of such height that no part of any pole shall be less than one foot above the surface of the soil.



EVERYTHING For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."



WOOD CROSS ARMS

ELECTRIC LIGHT OR TELEPHONE ARMS $3\frac{1}{4}" \times 4\frac{1}{4}"$

List No.	Pin Holes		Centre Bolt Hole	Brace
	Centre	Sides		
1	28	—	4	1 $\frac{1}{2}$
2	16	12	4	1 $\frac{1}{2}$
3	18	17	4	1 $\frac{1}{2}$
4	22	21	4	1 $\frac{1}{2}$
5	16	12	4	1 $\frac{1}{2}$
6	18	17 $\frac{1}{2}$	4	1 $\frac{1}{2}$
7	16	12	4	1 $\frac{1}{2}$
8	16	9 $\frac{3}{4}$	4	1 $\frac{1}{2}$
9	17 $\frac{1}{2}$	15 $\frac{3}{4}$	4	1 $\frac{1}{2}$
10	16	12	4	1 $\frac{1}{2}$
11	16	9 $\frac{5}{8}$	3 $\frac{7}{8}$	1 $\frac{1}{2}$

List No.	Size and Length	Weight Per Arm Fir	List Price Per 100 Arms
1	3 ft. 2 pin	10.62 lbs.	\$ 39.375
2	4 ft. 4 pin	14.16 "	52.50
3	5 ft. 4 pin	17.7 "	65.625
4	6 ft. 4 pin	21.24 "	78.75
5	6 ft. 6 pin	21.24 "	78.75
6	8 ft. 6 pin	28.32 "	105.00
7	8 ft. 8 pin	28.32 "	105.00
8	8 $\frac{1}{2}$ ft. 10 pin	30.09 "	118.125
9	10 ft. 8 pin	35.4 "	131.25
10	10 ft. 10 pin	35.4 "	131.25
11	10 ft. 12 pin	35.4 "	131.25

RAILROAD ARMS— $3" \times 4\frac{1}{4}"$

List No.	Pin Holes		Centre Bolt Hole	Brace
	Centre	Sides		
21	20	22	4	1 $\frac{1}{2}$
22	16	12	4	1 $\frac{1}{2}$
23	19	17 $\frac{1}{4}$	4	1 $\frac{1}{2}$
24	16	12	4	1 $\frac{1}{2}$
25	17 $\frac{1}{2}$	15 $\frac{3}{4}$	4	1 $\frac{1}{2}$
26	16	12	4	1 $\frac{1}{2}$

List No.	Size and Length	Weight Per Arm Fir	List Price Per 100 Arms
21	6 ft. 4 pin	19.8 lbs.	\$ 78.75
22	6 ft. 6 pin	19.8 "	78.75
23	8 ft. 6 pin	26.4 "	105.00
24	8 ft. 8 pin	26.4 "	105.00
25	10 ft. 8 pin	33 "	131.25
26	10 ft. 10 pin	33 "	131.25

N. E. L. A. ARMS— $3\frac{1}{2}" \times 4\frac{1}{2}"$

List No.	Pin Holes		Centre Bolt Hole	Brace
	Centre	Sides		
41	30	—	4	1 $\frac{1}{2}$
42	30	14 $\frac{1}{2}$	4	1 $\frac{1}{2}$
43	30	14 $\frac{1}{2}$	4	1 $\frac{1}{2}$
44	30	12	4	1 $\frac{1}{2}$

List No.	Size and Length	Weight Per Arm Fir	List Price Per 100 Arms
41	3 ft. 2 in. 2 pin	12 $\frac{2}{3}$ lbs.	\$ 59.37
42	5 ft. 7 in. 4 pin	22 $\frac{1}{3}$ "	89.06
43	8 ft. 6 pin	32 "	118.75
44	9 ft. 2 in. 8 pin	36 $\frac{2}{3}$ "	148.44

N. E. L. A. (Light) ARMS— $3\frac{1}{4}" \times 4\frac{1}{4}"$

List No.	Pin Holes		Centre Bolt Hole	Brace
	Centre	Sides		
51	30	—	4	1 $\frac{1}{2}$
52	30	14 $\frac{1}{2}$	4	1 $\frac{1}{2}$
53	30	14 $\frac{1}{2}$	4	1 $\frac{1}{2}$
54	30	14 $\frac{1}{2}$	4	1 $\frac{1}{2}$

List No.	Size and Length	Weight Per Arm Fir	List Price Per 100 Arms
51	3 ft. 2 in. 2 pin	11.2 lbs.	\$ 52.50
52	5 ft. 7 in. 4 pin	19.76 "	78.75
53	8 ft. 6 pin	28.32 "	105.00
54	9 ft. 2 in. 8 pin	32.45 "	131.25

WOOD CROSS ARMS

SPECIAL CROSS ARMS

List No.	Size	Weight Per Lin. Foot Fir	Weight Per Lineal Foot Yellow Pine	List Price Per Lineal Foot Fraction
A.	2 $\frac{3}{4}$ x 3 $\frac{3}{4}$	2.7 lbs.	3.25 lbs.	10.00 c
B.	3 x 3 $\frac{3}{4}$	2.92 "	3.6 "	10.833c
C.	3 x 4	3.11 "	3.9 "	11.51 c
D.	3 x 4 $\frac{1}{4}$	3.3 "	4.1 "	13.125c
E.	3 $\frac{1}{4}$ x 4 $\frac{1}{4}$	3.54 "	4.4 "	13.125c
F.	3 $\frac{1}{4}$ x 4 $\frac{1}{2}$	3.74 "	4.7 "	13.854c
G.	3 $\frac{1}{2}$ x 4 $\frac{1}{2}$	4 "	5 "	14.844c
H.	3 $\frac{1}{2}$ x 4 $\frac{3}{4}$	4.2 "	5.3 "	15.625c
I.	3 $\frac{1}{2}$ x 5	4.43 "	5.57 "	16.406c
J.	3 $\frac{3}{4}$ x 4 $\frac{3}{4}$	4.66 "	5.67 "	16.667c
K.	3 $\frac{3}{4}$ x 5	4.72 "	5.95 "	17.50 c
L.	3 $\frac{3}{4}$ x 5 $\frac{3}{4}$	5.46 "	6.8 "	20.00 c
M.	4 x 5	5.2 "	6.33 "	18.594c
N.	4 $\frac{1}{4}$ x 5 $\frac{1}{4}$	6.19 "	7 "	20.625c
O.	4 $\frac{1}{2}$ x 5 $\frac{1}{2}$	6.83 "	7.63 "	22.76 c
P.	4 x 6	6.60 "	7.52 "	22.135c
Q.	4 $\frac{3}{4}$ x 5 $\frac{3}{4}$	7.50 "	8.5 "	25.00 c
R.	5 x 6	8.20 "	9.29 "	27.344c

For sizes not shown above, prices will be quoted on application.

SPECIFICATIONS

Superior Grade Cross arms

Material.—Sound, live, yellow Douglas fir; close-grained (at least eight rings per inch); straight grained (not out parallel to edge of arm more than seven degrees).

Prohibited.—Rot, dote, loose heart, loose or rotten kn shakes and splits.

Allowed.—Warp up to $\frac{1}{8}$ -inch off-set per lineal foot; so knots up to $1\frac{1}{4}$ inch diameter, but not at pin holes or clusters; pitch pockets up to 8 inches in length; season checked up to one inch in depth; sap-wood up to 25 per cent of volume of arm.

Manufacture.—Best commercial practice; planed on four sides; pin holes accurately centered, smooth and badly broken out by bits in boring; dimensions as shown with commercial variations.

Utility Grade Fir Cross arms.—Sound lumber; well chined; free from loose or unsound knots; free from knots one and one-half inch diameter; pitch pockets over two inches long, loose heart, rot or wormholes.

HOW TO DESCRIBE A CROSS ARM (In placing your order)

1. Quantity wanted.
2. Material and quality (or grade).
3. Treatment (if any).
4. Width, in inches (and fraction).
5. Height, in inches (and fraction).
6. Length, in feet and inches.
7. Number of pin holes.
8. Size of pin holes.
9. Spacing between pin holes (center-side-end).
10. Size center bolt hole.
11. Size brace bolt holes.
12. Space between brace holes.

For example, the standard Bell Telephone Cross arm described—Superior Grade Fir, unpainted, $3\frac{1}{4}" \times 4\frac{1}{4}"$ —bored for ten $1\frac{1}{2}"$ pin holes, spaced 16" center, 12" side, 4" end, one $\frac{5}{8}"$ center bolt hole, two $\frac{3}{8}"$ brace bolt holes apart.

IMPORTANT

In ordering cross arms, be very careful to specify just what is wanted, and, if other than standard boring, send sketch blueprint with order. Arms specially made are of no use general stock, and cannot be taken back if mistake is made in ordering.

Any change required from standard spacings, pin hole bolt holes as here given, must be distinctly specified on order.

Treating of Arms.—For hot dip treatment in Carboline 1 $\frac{1}{2}$ c per lineal foot extra, on arms up to $3\frac{3}{4} \times 4\frac{3}{4}$ in size. If "Board Measure" of arm is wanted, add one-half to height and width of finished arm; if length runs into in take next higher foot length; multiply height by width in inches, divide by twelve, and multiply by length in feet.

All dimensions are subject to the usual manufacturing variations; cross arms long in stock show some shrinkage from original dimensions.

WOOD PINS



Standard Pin Transposition Pin
Description of Grades

A1 Grade Pins—Telephone and Telegraph
These are a high-grade pin made from live, strong, sound yellow locust. They are the same as A.T. & T. Co. grade pin shown below, but are not individually inspected except during manufacture pins which show worm holes or other defects are thrown out. These No. A1 Grade pins are superior to what is commonly called "Commercial"

A.T. & T. Co. Grade Pins Telephone and Telegraph
These are individually inspected pins, made strictly to the specification of the A.T. & T. Co.

N.E.L.A. Grade Pins—Light and Power
This pin is first quality live, sound yellow locust, made to standard dimensions and is recommended for all electric and power companies. It is made to N.E.L.A. specification.

Minimum Carload, 36,000 lbs.

PLAIN LOCUST PINS—WITH STANDARD 1" THREAD

	Grade	Approx. Wt. Per 1000	List Price Per 1000
8"	A1	310 lbs.	....
8"	A.T. & T. Co.	310 lbs.	....
9"	A1	350 lbs.	....
9"	A.T. & T. Co.	350 lbs.	....
9"	N.E.L.A. Spec.	420 lbs.	....

Price on application.

PLAIN LOCUST TRANSPOSITION PINS WITH STANDARD 1" THREAD

	Grade	Approx. Wt. Per 1000	List Price Per 1000
9"	A1	350 lbs.	....
9"	A.T. & T. Co.	350 lbs.	....

Price on application.

PLAIN LOCUST PINS WITH 1 3/8" THREAD

Unless otherwise specified pins with 1" standard thread will be furnished)

	Grade	Approx. Wt. Per 1000	List Price Per 1000
9"	N.E.L.A. Spec.	420 lbs.	....
10"	N.E.L.A. Spec.	485 lbs.	....

Price on application.

Note:—Locust is the ideal wood for top pins. It is so grained that it cannot be treated—even under pressure.

OAK BRACKET



Oak Bracket

Plain Oak Brackets—Strictly First Quality

	Grade	Approx. Wt. Per 1000	List Price Per 1000
2" x 12"	Best Quality	545 lbs.	....
2" x 12"	Best Quality	650 lbs.	....
2" x 12"	Best Quality	775 lbs.	....
2 1/2" x 12"	Best Quality	1100 lbs.	....

Price on application.

PLAIN OAK POLE STEPS—STRICTLY FIRST QUALITY

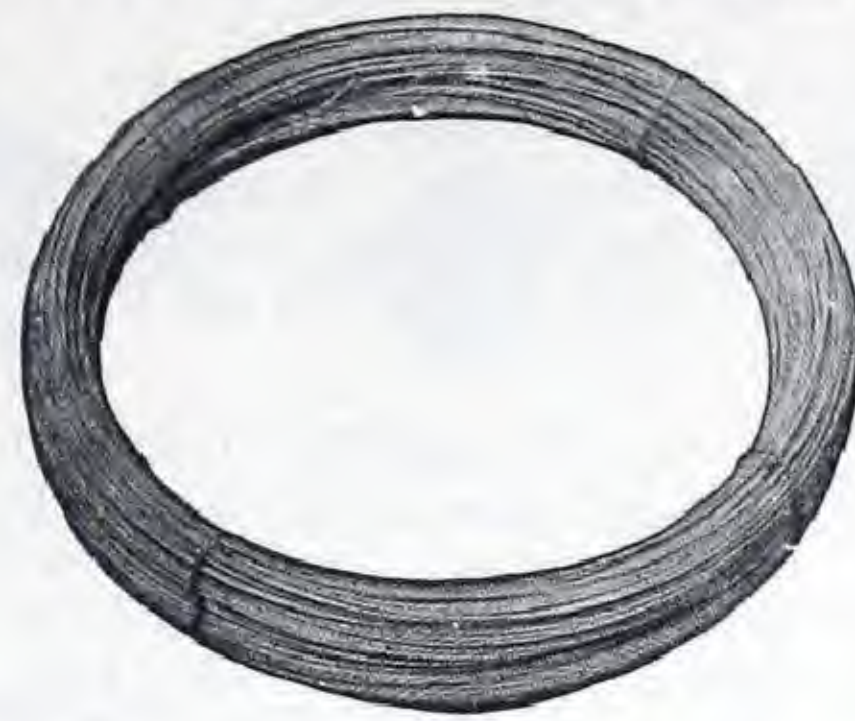


Oak Pole Step

	Grade	Approx. Wt. Per 1000	List Price Per 1000
2 5/8" x 7 1/2"	Best Quality	500 lbs.	....

Price on application.

GALVANIZED TELEGRAPH AND TELEPHONE WIRE



The Canadian Electrical Standards Association specification for manufacture of galvanized telephone and telegraph wire was adopted by Manufacturers and large users in 1921. It is still the recognized standard. Under this specification it is required that the wire wrap around a mandril having a diameter 12 times the diameter of the wire under test.

Improvements in the art of galvanizing in the past few years have been such that wire is now produced which meets all the specification requirements and in addition, will wrap around a mandril of smaller diameter without the zinc flaking off. All Galvanized Telephone and Telegraph Wire which we sell is known as Frost Zinc Bonded or Stelco Tight Galvanized.

We carry in stock as standard, wire having a constant of "5600" commonly referred to as "5600 constant" wire. The term constant meaning equivalent of weight per mile times resistance per mile. On special orders, 5000 constant wire can be supplied.

C.E.S.A. (5600 mile-ohm) galv. Tel and Tel Wire

Birmingham Wire Gauge B.W.G.	Nominal Diameter in Mils.	Breaking Load Lbs.	Approx. Weight Per Mile, Lbs.
12	109	460	171
9	148	850	315
8	165	1060	392
6	203	1600	593
4	238	2210	816

Prices on application.

GALVANIZED STEEL WIRE STRAND

C. E. S. A. Standard



Stand. Brit. Wire Gauge S.W.G.	Nom. Dia. of Strand inch	Approx. Wgt. per 1000 ft.	Minimum Breaking Load Lbs.		
			Soft Grade	Hard Grade	Crucible Grade
16	3/16	75 lbs.	1400	2300	4200
14	1/4	120 lbs.	2300	3400	5700
13	9/32	174 lbs.	3000	4300	8100
12	5/16	210 lbs.	3800	5300	10000
10	3/8	320 lbs.	5600	7500	14600
9	7/16	415 lbs.	7000	9200	18000
7 1/2	1/2	510 lbs.	9000	11000	21000

Prices on application.

COPPERWELD STRAND

See listing in wire section.

HEMINGRAY GLASS INSULATORS

No. 9 PONY

Height over all, $3\frac{3}{4}$ inches. Diameter over all, $2\frac{1}{4}$ inches. Groove, $\frac{3}{8}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
9.....	250	162	648	\$98.54



No. 12 DOUBLE GROOVE PONY

Height over all, $3\frac{5}{8}$ inches. Diameter over all, $2\frac{3}{8}$ inches. Top groove, $\frac{3}{8}$ inch; bottom groove, $\frac{1}{4}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
12.....	250	188	752	\$102.02



No. 14 DEEP GROOVE DOUBLE PETTICOAT PONY

Height over all, $3\frac{3}{8}$ inches. Diameter over all, $2\frac{7}{8}$ inches. Groove, $\frac{3}{8}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
14.....	200	164	820	\$126.36



No. 16 LONG DISTANCE NEW STYLE

Height over all, 4 inches, diameter over all, $2\frac{5}{8}$ inches, groove $\frac{3}{8}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
16.....	175	185	1057	\$124.18



No. 19 DEEP GROOVE DOUBLE PETTICOAT

Line Voltage, 4400

Height over all, $3\frac{7}{8}$ inches. Diameter over all, $3\frac{1}{4}$ inches. Groove, $\frac{1}{2}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
19.....	150	186	1241	\$142.12



No. 20 STREET RAILWAY OR EXTRA DEEP GROOVE DOUBLE PETTICOAT

Line Voltage, 4400

Height over all, 4 inches. Diameter over all, $3\frac{1}{4}$ inches. Groove, $\frac{3}{4}$ inch.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
20.....	150	186	1241	\$142.12



No. 42 DOUBLE PETTICOAT

Height over all $4\frac{1}{8}$ ", diameter over all $3\frac{3}{4}$ ", groove $\frac{5}{16}$ ".

Net weight each, 24 ozs.

Quantity per box, 100.

Weight per box, 169 lbs.

Leakage distance, $6\frac{1}{2}$ ".

Wet arcing distance, $1\frac{1}{4}$ ".

List Price, per 1000..... \$163.21



No. 50 TWO-PIECE TRANSPOSITION

Height over all, 5 inches, diameter over all, $3\frac{1}{4}$ inches, groove $\frac{3}{8}$ inch.

Net weight each, $23\frac{1}{2}$ ozs.

Quantity per box, 75.

Weight per box, 141 lbs.

List Price, per 1000..... \$329.25



HEMINGRAY GLASS INSULATORS

No. 53 ONE-PIECE TRANSPOSITION

Height over all, $4\frac{1}{2}$ inches, diameter over all, 4 inches, groove, $\frac{3}{8}$ inch.

Net weight each, $28\frac{1}{2}$ ozs.

Quantity per box, 50.

Weight per box, 110 lbs.

List Price, per 1000..... \$337.05



Nos. 60 AND 60A CABLE

No. 60—Height over all, 5 inches, diameter over all, $3\frac{1}{4}$ inches. Groove, $1\frac{1}{2}$ inches. No. 60A—same as No. 60 but with 2-inch groove.

Line Voltage 6600.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
60...	50	115	2300	\$272.00
60A..	50	112	2240	271.00



No. 61 CABLE

Old No. 1

Height over all, $3\frac{3}{4}$ inches. Diameter over all, $3\frac{1}{4}$ inches. Groove, 1 inch.

Line Voltage 6600.

List No.	Std. Pkg. Box	Wgt. Lbs. Box	Per 1000	List Price Per 1000
61...	150	189	1261	\$170.31



No. D-62 CABLE

Old No. 2

Dimensions over all: height, 4 inches, diameter, $3\frac{5}{8}$ inches; groove, $1\frac{1}{4}$ inches. Voltage test, dry, 49,600; wet, 29,100; 6600. Standard package, 100.

Weight per 1000, 172 lbs.

List Price, No. 62, per 1000..... \$189.00



No. D-990 SECONDARY POWER CIRCUIT INSULATOR



D-990

Dry Flash-over voltage 35,000.

Wet Flash-over voltage 10,000.

Dia. of groove $\frac{3}{4}$ ".

Weight each $\frac{1}{2}$ oz.

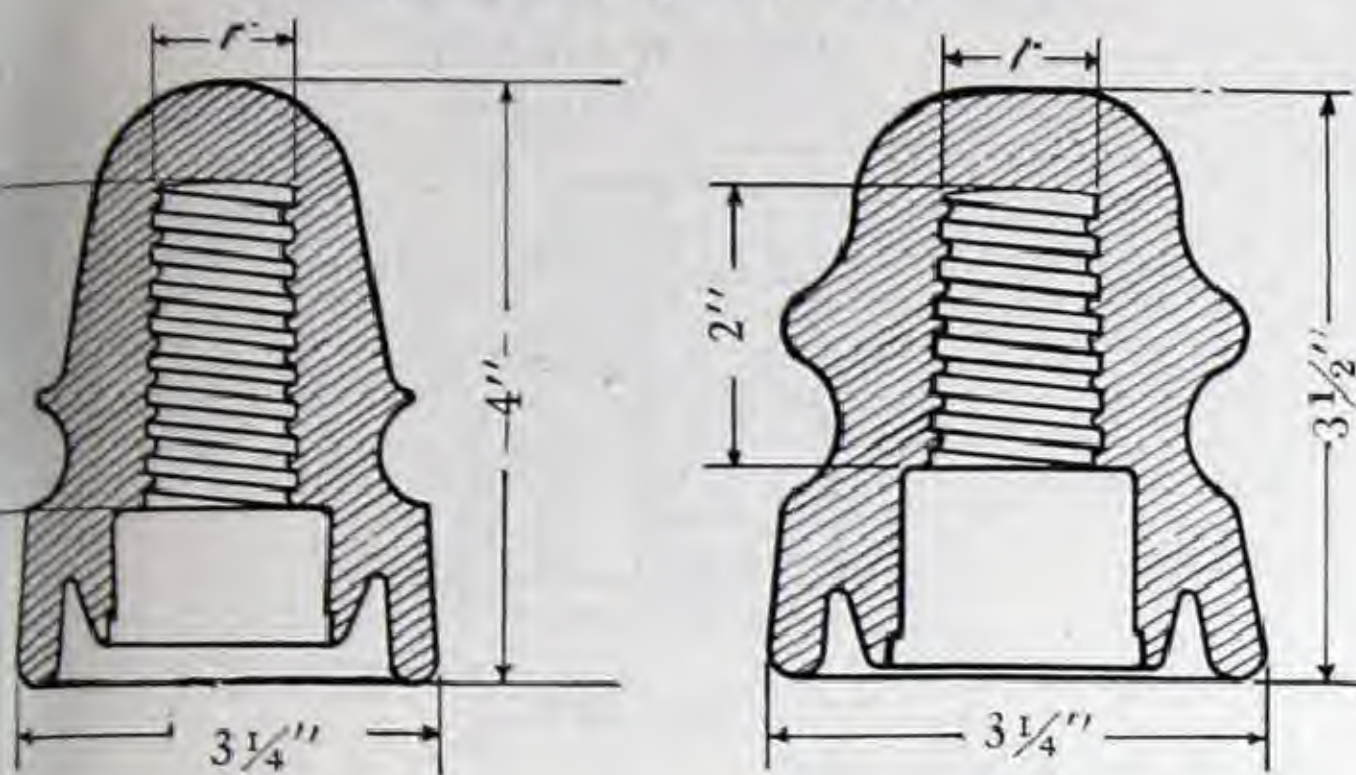
Quantity per carton 50.

Weight per carton 44 lbs.

Weight per 100, packed, 88 lbs.

List Price, \$135.28.

DOMINION GLASS INSULATORS with Drip Points

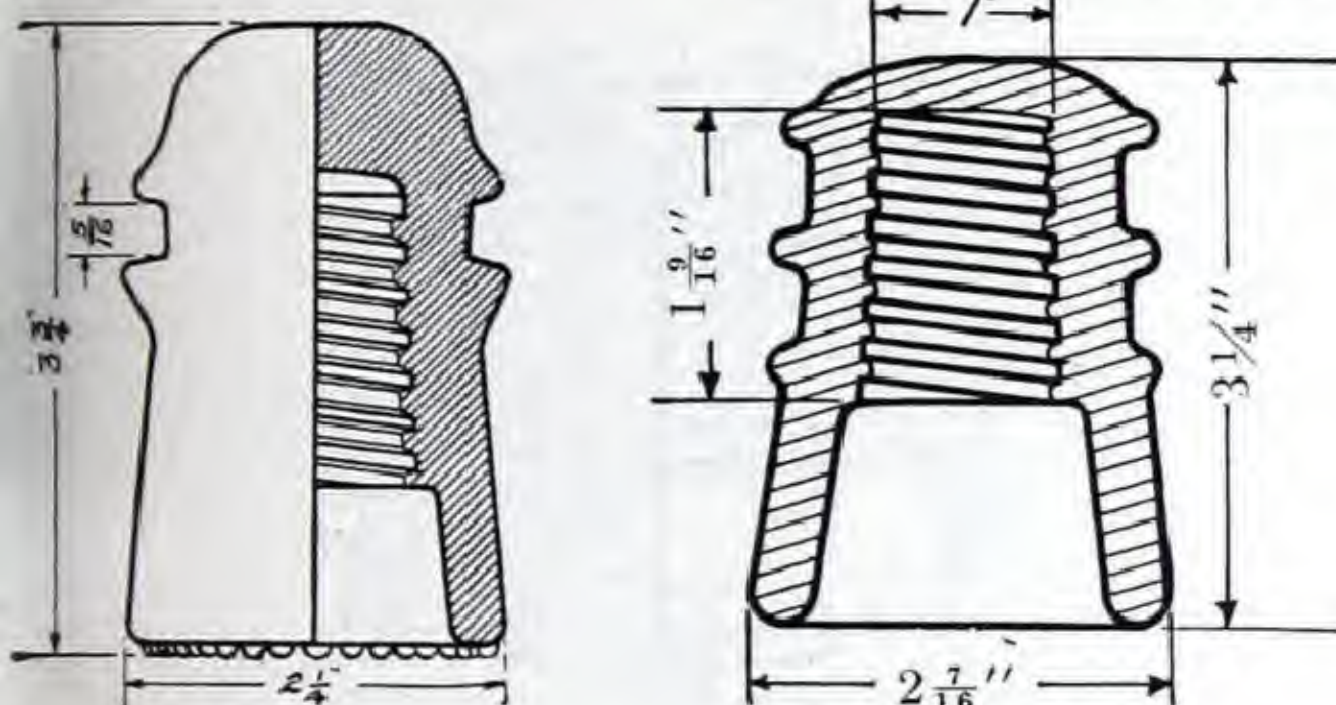


No. 1678

No. 614

No. 1678 DEEP GROOVE DOUBLE PETTICOAT
Weight..... 19 1/2 ozs.
Quantity per Box..... 100
Weight packed per Box..... 145 lbs.
Price per M..... \$77.75

No. 614 EXTRA DEEP GROOVE DOUBLE PETTICOAT
Weight..... 20 ozs.
Quantity per carton..... 50
Weight packed per Carton..... 67 lbs.
Price per M..... \$68.00

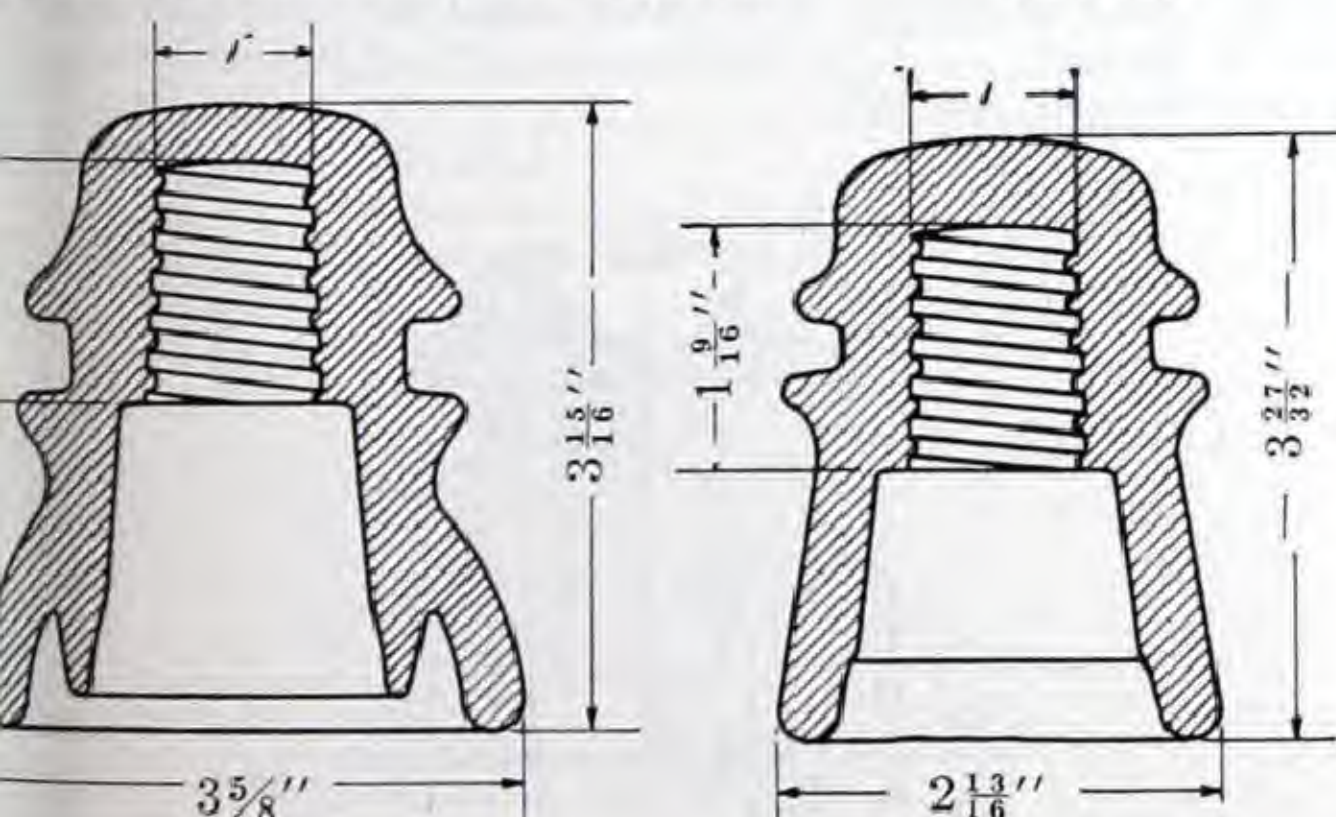


No. 9

No. 10

No. 9 PONY EXCHANGE LINE
Weight..... 10 1/2 ozs.
Quantity per Carton..... 80
Weight packed per Carton..... 55 lbs.
Price per M..... \$49.50

No. 10 EXCHANGE LINE
Weight..... 10 1/2 ozs.
Quantity..... 224
Weight..... 183 lbs.
Price..... \$49.50



No. 42

No. 16

No. 42 NEW HEAVY TELEGRAPH DOUBLE PETTICOAT (C.N.T. STYLE)
Weight..... 23 1/2 ozs.
Quantity per Carton..... 40
Weight packed per Carton..... 62 lbs.
Price per M..... \$77.50

No. 16 STANDARD TOLL LINE
Weight..... 14 1/2 ozs.
Quantity per Carton..... 72
Weight packed per Carton..... 72 lbs.
Price per M..... \$61.50

ELECTROSE SAFETY STRAIN INSULATORS



No. 1

No. 2

No. 7

Electrose Insulation has attained a wide recognition for its incomparable insulating qualities. It will not shrink, warp or change its form under ordinary conditions. It is well adapted for combination with metal parts. It is especially adapted to meet the insulating requirements for high tension currents of any voltage. It possesses uniform texture and density of body, great strength, hardness, toughness and a fine smooth polished surface and is absolutely moisture, water and oil proof, thereby assuring durability.

List No.	Diam. In.	Lgth. Body In.	Opening Eye In.	Lgth. Over. In.	Brkg. Stgth. Lbs.	Line Volt.	Wt. Lbs.	List Price per 100
1	2 3/4	2 3/8	1 1/4 x 3/4	5 1/2	10000	3500	1 1/2	\$135.00
2	2 1/4	1 3/4	1 x 5/8	4 1/2	7000	2500	7/8	80.00
7	3 1/8	2 5/8	1 x 3/4	5 1/4	10000	6600	1 3/4	140.00
7A	...	...	...	5	...	...	1 3/4	152.00
7AB	...	...	1 x 3/4	9 1/2	10000	11000	3 1/2	304.00
7ADA	...	...	1 x 3/4	13 1/4	10000	13000	5 1/4	468.00
7B	...	...	...	...	...	...	1 3/4	152.00
7C	...	...	...	...	...	...	1 3/4	164.00
7D	...	...	...	...	...	...	1 3/4	164.00
7F	...	...	...	...	...	...	2	160.00
7G	...	...	...	...	...	...	1 7/8	150.00

Sockets and stem terminals are 5/8-inch in diameter. Clevis terminals are 7/16-inch in size.

No. 7A is same as No. 7 but has eye and threaded socket.

No. 7B is same as No. 7 but has eye and threaded stud.

No. 7C is same as No. 7 but has socket with both ends threaded.

No. 7D is same as No. 7 but has stud with both ends threaded.

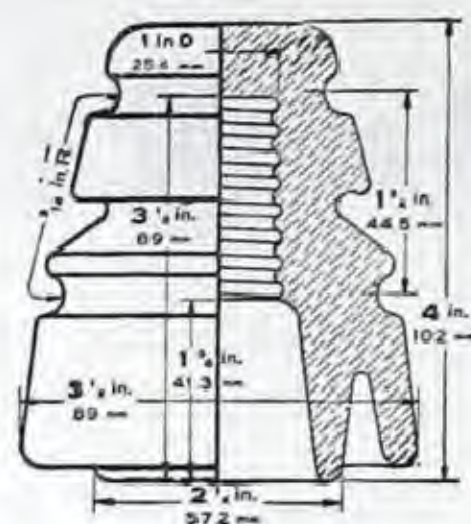
No. 7F is same as No. 7 but has both ends clevis.

No. 7 G is same as No. 7 but has eye and clevis ends.

No. 7AB and 7ADA are combinations of the above.

THOMAS PORCELAIN ONE-PART PIN TYPE INSULATORS

BROWN GLAZE

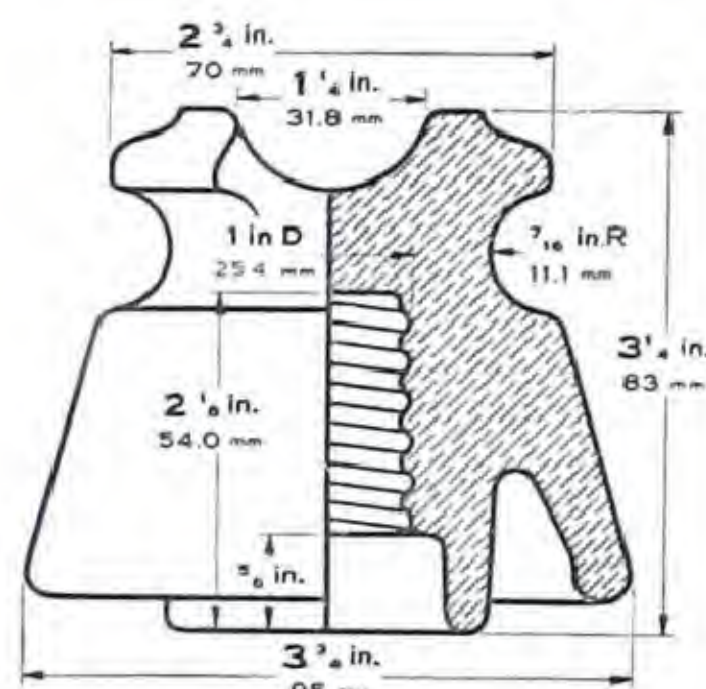


No. 1185

Transposition type insulator also commonly used for arc-light service.

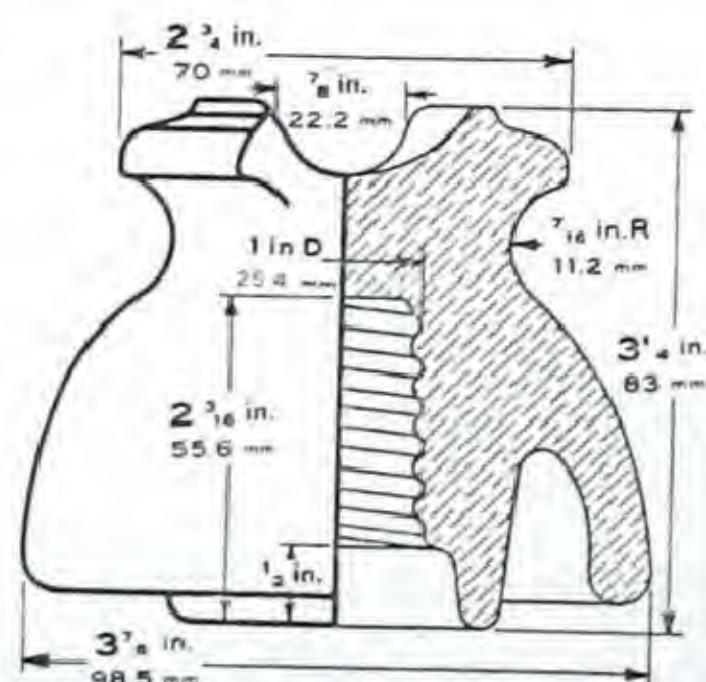
Nominal Rating, volts.....	5000
Dry Flash-Over Voltage.....	*40000
Wet Flash-Over Voltage.....	*25000
Leakage Distance, in.....	*5 1/4
Mechanical Strength, lbs.....	2500
No. in Barrel.....	100
Gross Weight per 100, lbs.....	190

*Measured between lower groove and pin. Dry flash-over between grooves is 23000 volts; wet flash-over, 13000 volts; leakage distance, 1 3/4 inches.



No. 1205

Nominal Rating, volts.....	6600
Dry Flash-Over Voltage.....	55000
Wet Flash-Over Voltage.....	25000
Leakage Distance, in.....	5 3/8
Dry Arcing Distance, in.....	3 5/8
Mechanical Strength, lbs.....	3000
Min. Pin Ht. Recommended, in.....	4
No. in Box.....	50
Gross Weight per 100, lbs.....	140



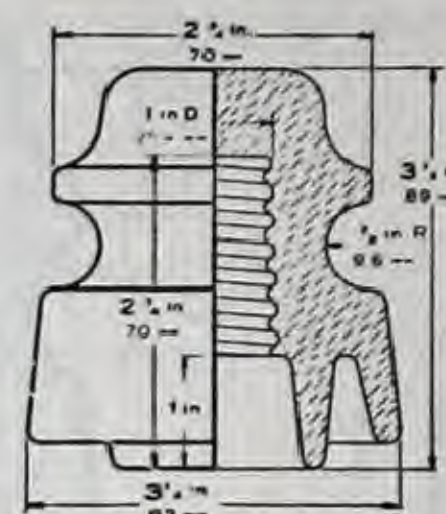
No. 1009

Nominal Rating, volts.....	8000
Dry Flash-Over Voltage.....	55000
Wet Flash-Over Voltage.....	25000
Leakage Distance, in.....	5 3/4
Dry Arcing Distance, in.....	3 3/4
Mechanical Strength, lbs.....	3000
Min. Pin Ht. Recommended, in.....	4
No. in Box.....	50
Gross Weight per 100, lbs.....	164

Electrical values given here are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

THOMAS PORCELAIN ONE-PART PIN TYPE INSULATORS

BROWN GLAZE

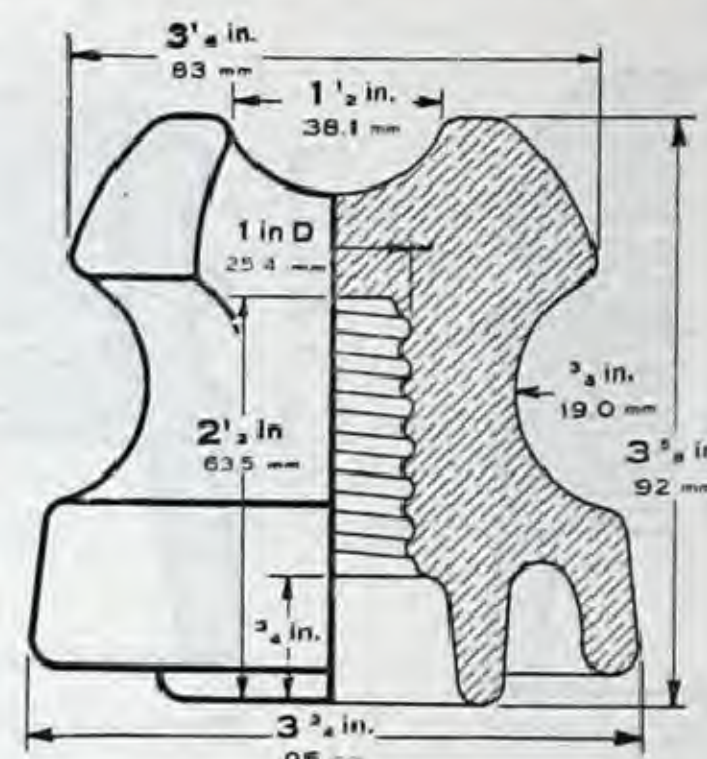


No. 1111

N. E. L. A. standard.

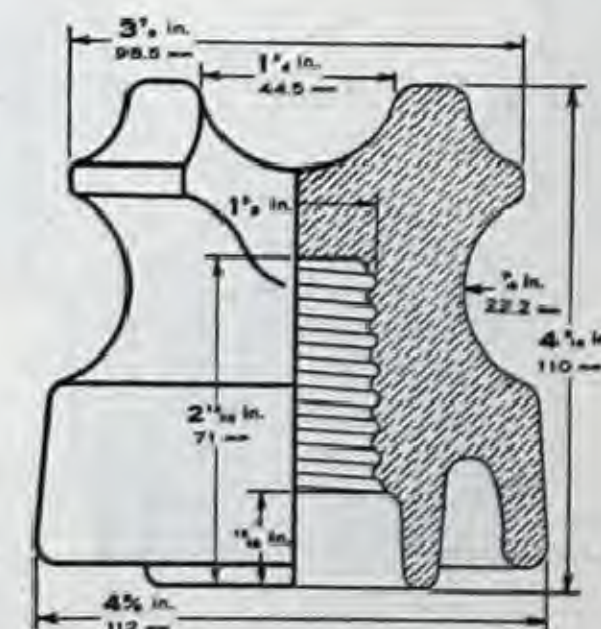
This insulator is packed in convenient wire-bound boxes.

Nominal Rating, volts.....	10000
Dry Flash-Over Voltage.....	40000
Wet Flash-Over Voltage.....	25000
Leakage Distance, in.....	5 1/2
Dry Arcing Distance, in.....	3 1/2
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4
No. in Box.....	50
Gross Weight per 100, lbs.....	190



No. 1108

Nominal Rating, volts.....	10000
Dry Flash-Over Voltage.....	40000
Wet Flash-Over Voltage.....	25000
Leakage Distance, in.....	5 1/2
Dry Arcing Distance, in.....	3 1/2
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4
No. in Barrel.....	50
Gross Weight per 100.....	190



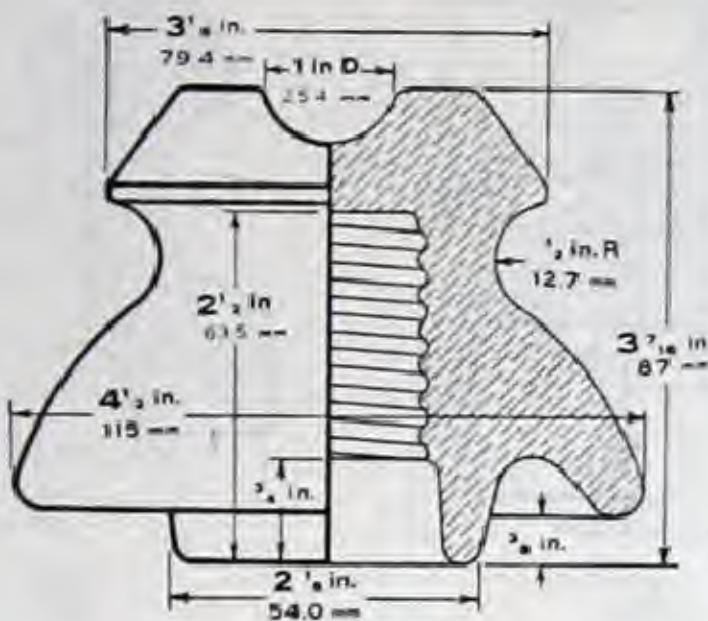
No. 1022—1 3/8-Inch Pin Hole
No. 1198—1-inch Pin Hole

Nominal Rating, volts.....	10000
Dry Flash-Over Voltage.....	40000
Wet Flash-Over Voltage.....	25000
Leakage Distance, in.....	5 1/2
Dry Arcing Distance, in.....	3 1/2
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4
No. per Barrel.....	50
Gross Weight per 100, lbs.....	190

Electrical values given here are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

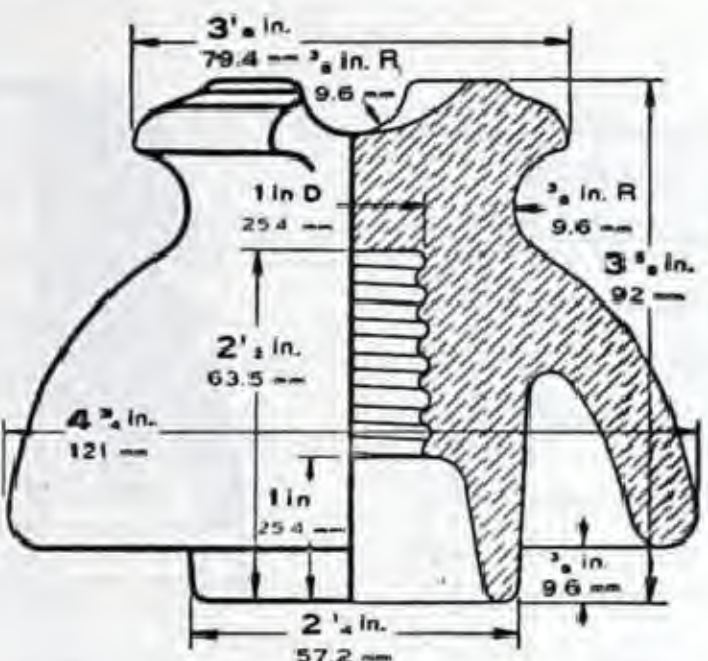
THOMAS PORCELAIN ONE-PART
PIN TYPE INSULATORS

BROWN GLAZE



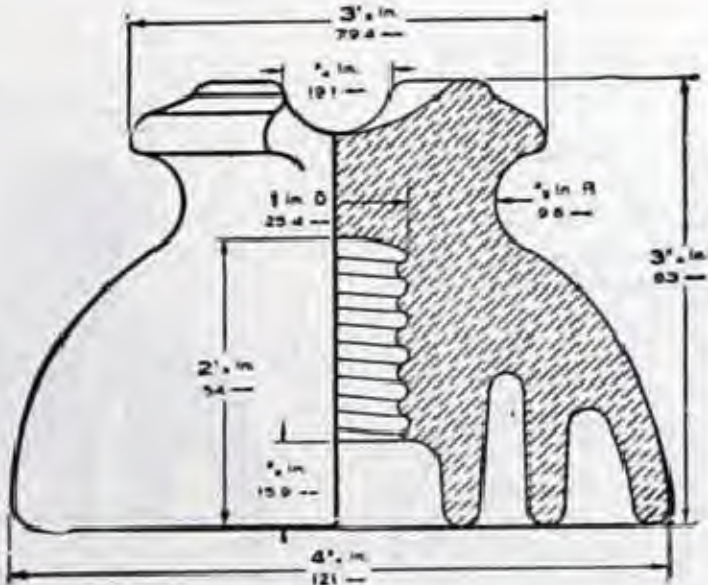
No. 1067—1 3/8-Inch Pin Hole
No. 1197—1-Inch Pin Hole

Nominal Rating, volts.....	11000
Flash-Over Voltage.....	58000
Flash-Over Voltage.....	30000
Leakage Distance, in.....	5 1/4
Arcing Distance, in.....	3 7/8
Mechanical Strength, lbs.....	4000
Minimum Pin Height Recommended, in.....	4 1/2
No. in Box.....	50
Gross Weight per 100, lbs.....	225



No. 1177—1-Inch Pin Hole
No. 1196—1 3/8-Inch Pin Hole

Nominal Rating, volts.....	13500
Flash-Over Voltage.....	70000
Flash-Over Voltage.....	42000
Leakage Distance, in.....	7 5/8
Arcing Distance, in.....	4 1/2
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4 3/4
No. in Barrel.....	100
Gross Weight per 100, lbs.....	245



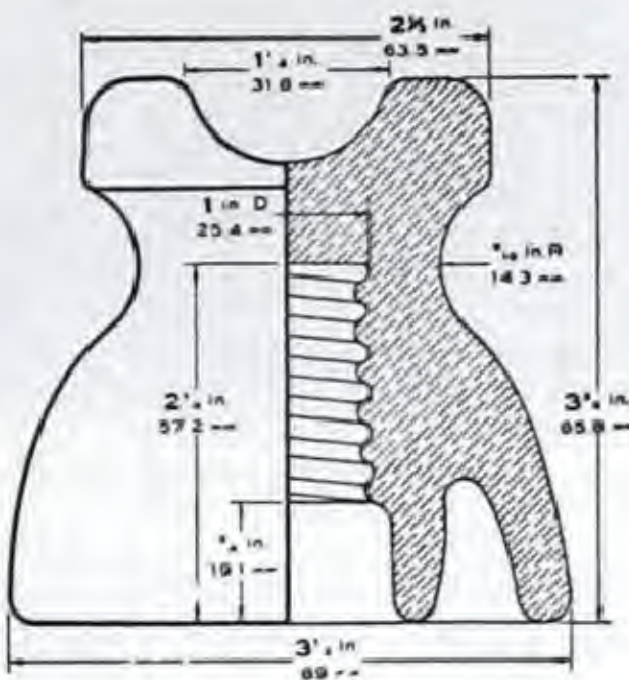
No. 1153

Nominal Rating, volts.....	13500
Flash-Over Voltage.....	68000
Flash-Over Voltage.....	40000
Leakage Distance, in.....	8 3/4
Arcing Distance, in.....	4 1/2
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4 1/2
No. in Barrel.....	100
Gross Weight per 100, lbs.....	260

Electrical values given here are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

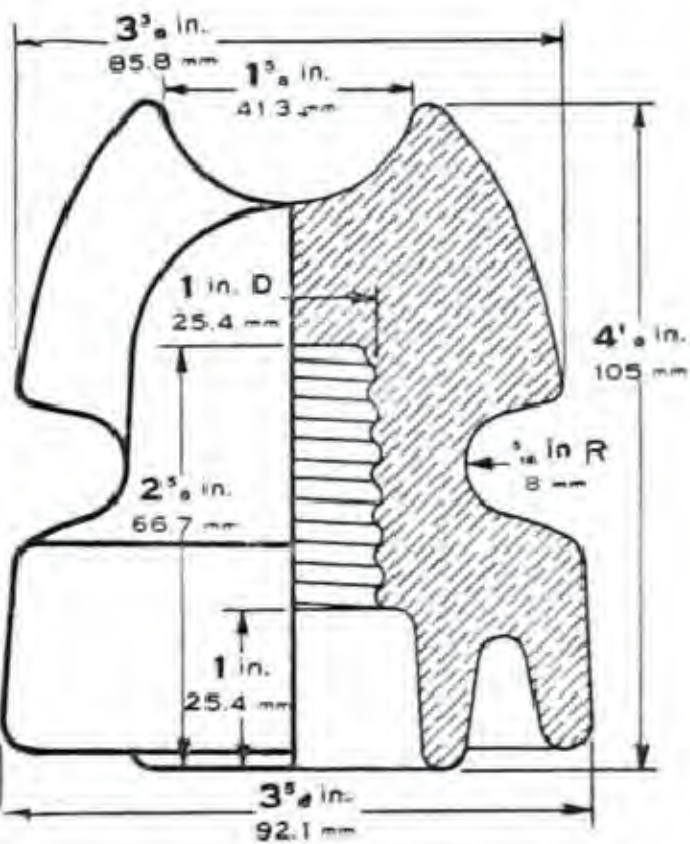
THOMAS PORCELAIN ONE-PART
PIN TYPE INSULATORS

BROWN GLAZE



No. 1049

Nominal Rating, volts.....	5000
Dry Flash-Over Voltage.....	50000
Wet Flash-Over Voltage.....	23000
Leakage Distance, in.....	5 1/4
Dry Arcing Distance, in.....	3 3/8
Mechanical Strength, lbs.....	3000
Minimum Pin Height Recommended, in.....	4
No. in Box.....	50
Gross Weight per 100, lbs.....	132



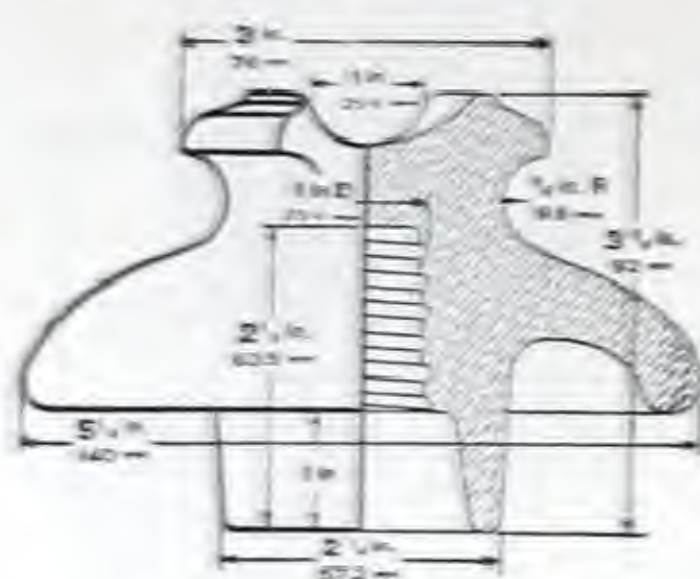
No. 1084

Nominal Rating, volts.....	7500
Dry Flash-Over Voltage.....	50000
Wet Flash-Over Voltage.....	23000
Leakage Distance, in.....	5
Dry Arcing Distance, in.....	3 1/4
Mechanical Strength, lbs.....	4000
Minimum Pin Height Recommended, in.....	4 3/8
No. in Barrel.....	125
Gross Weight per 100, lbs.....	190

Electrical values given here are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

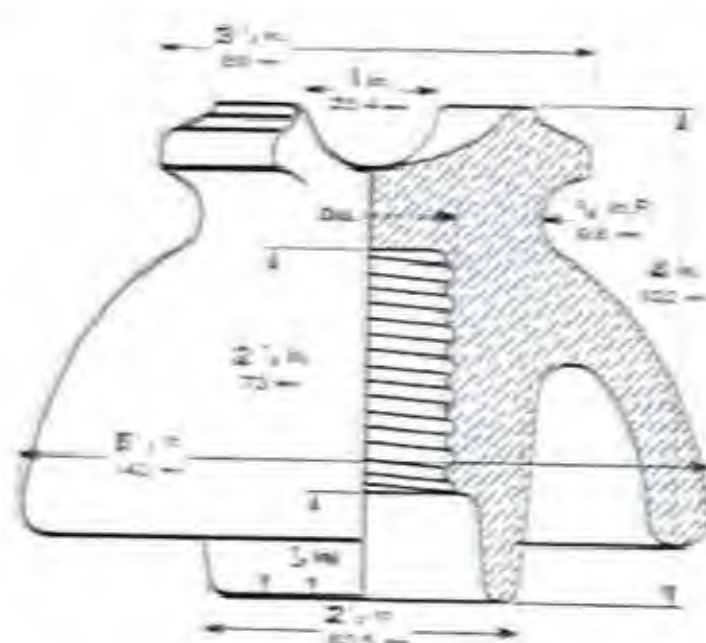
THOMAS PORCELAIN ONE-PART TYPE INSULATORS

BROWN GLAZE



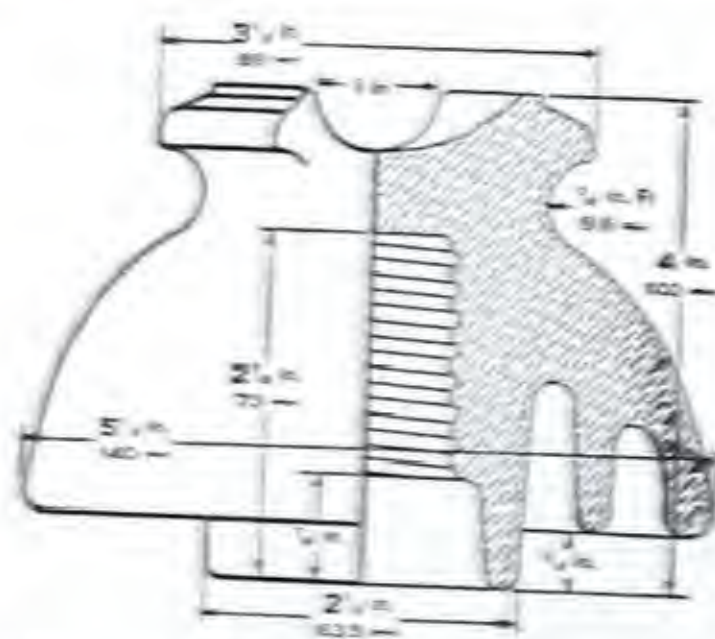
No. 1188—1-Inch Pin Hole
No. 1190—1 1/8-Inch Pin Hole

Nominal Rating, volts.....	15000
Dry Flash-Over Voltage.....	70000
Wet Flash-Over Voltage.....	45000
Leakage Distance, in.....	7
Dry Arcing Distance, in.....	4 1/8
Mechanical Strength, lbs.....	4000
Minimum Pin Height Recommended, in.....	5
No. per Barrel.....	75
Gross Weight per 100, lbs.....	220



No. 1216—1-Inch Pin Hole
No. 1217—1 1/8-Inch Pin Hole

Nominal Rating, volts.....	17500
Dry Flash-Over Voltage.....	75000
Wet Flash-Over Voltage.....	45000
Leakage Distance, in.....	8 1/4
Dry Arcing Distance, in.....	5 1/4
Mechanical Strength, lbs.....	4000
Minimum Pin Height Recommended, in.....	5
No. per Barrel.....	65
Gross Weight per 100, lbs.....	340



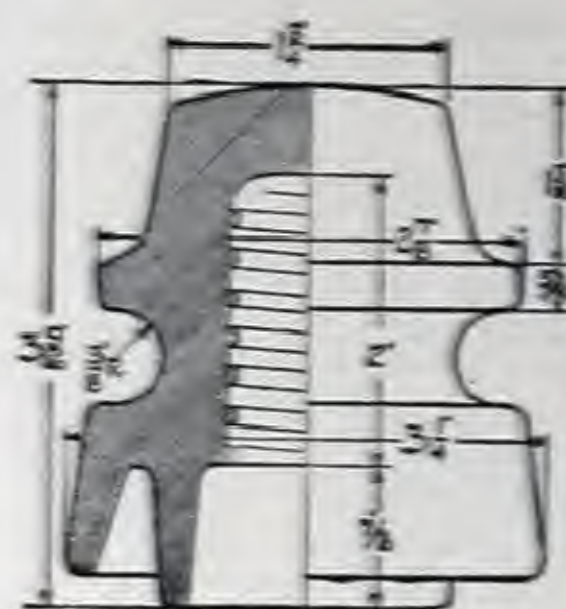
No. 1151—1 1/8-Inch Pin Hole
No. 1152—1-Inch Pin Hole

Nominal Rating, volts.....	17500
Dry Flash-Over Voltage.....	75000
Wet Flash-Over Voltage.....	45000
Leakage Distance, in.....	9 1/2
Dry Arcing Distance, in.....	5 1/4
Mechanical Strength, lbs.....	4000
Minimum Pin Height Recommended, in.....	5
No. per Barrel.....	65
Gross Weight per 100, lbs.....	400

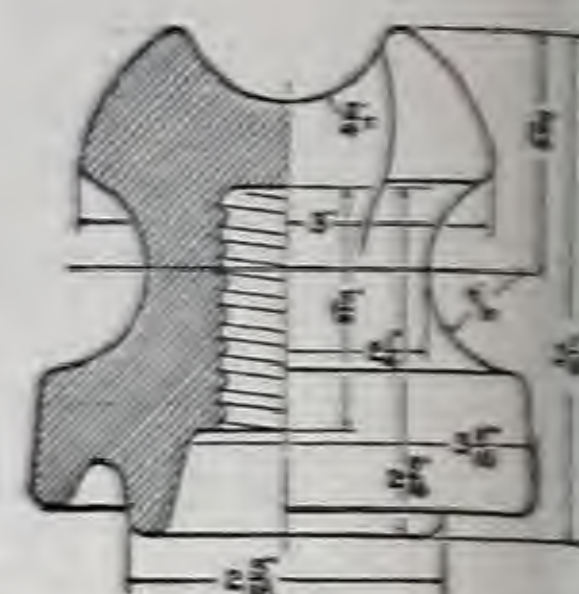
Electrical values given here are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

PORCELAIN INSULATORS

WET PROCESS



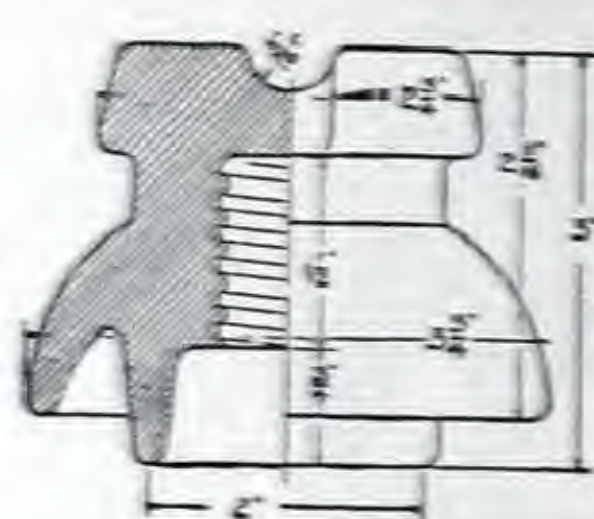
No. 660



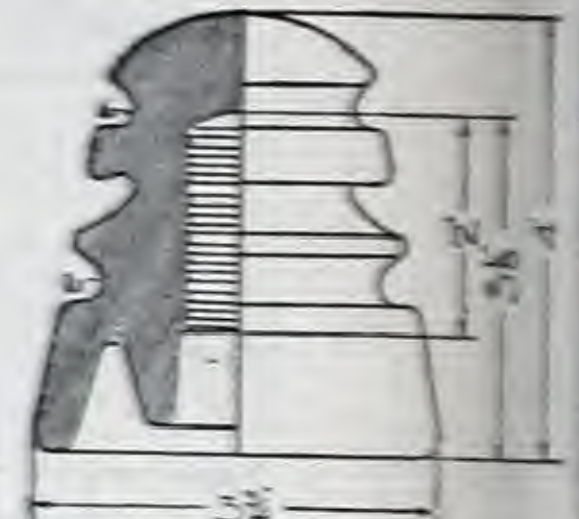
No. 807

Line Voltage.....	6,600
Test V. Needle Gap.....	45,000
Wet Arc-over V.....	25,000
Leakage Distance.....	4"
Mech. Strength lbs.....	5,300
Pin Hole (Top Dia.).....	1"
Top Groove.....	None
Net Wt. (approx.).....	1 lb.
Standard Package.....	100
Weight Packed.....	1 1/2 lbs.
Colors, Brown, Blue and White.	

Line Voltage.....	8,
Test V. Needle Gap.....	70,
Wet Arc-over V.....	32,
Leakage Distance.....	5"
Mech. Strength lbs.....	4,
Pin Hole (Top Dia.).....	1"
Top Groove.....	3/8"
Net Wt. (approx.).....	1 1/2
Standard Package.....	100
Weight Packed.....	2 lb
Color Brown.	



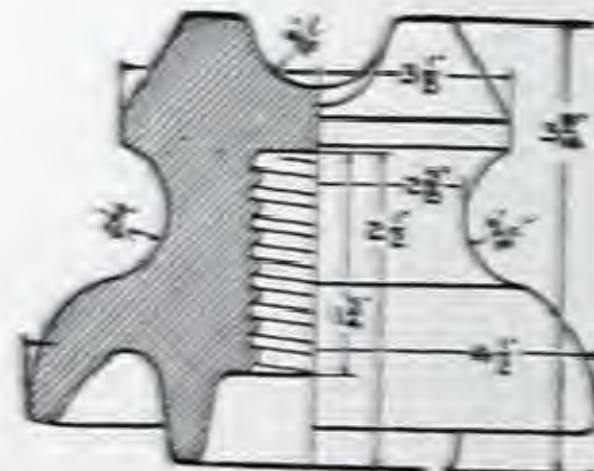
No. 800



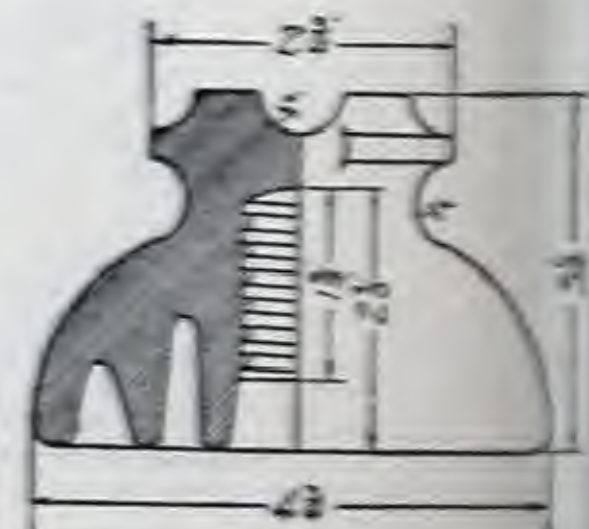
No. 802

Line Voltage.....	8,000
Test V. Needle Gap.....	55,000
Wet Arc-over V.....	34,000
Leakage Distance.....	5 5/8"
Mech. Strength lbs.....	3,850
Pin Hole (Top Dia.).....	1"
Top Groove.....	5/16" R
Net Wt. (approx.).....	1-1/5 lbs.
Standard Package.....	100
Weight Packed.....	1.7 lbs.
Color Brown or White.	

Line Voltage.....	8,
Test V. Needle Gap.....	60,
Wet Arc-over V.....	30,
Leakage Distance.....	5"
Mech. Strength lbs.....	3,
Pin Hole (Top Dia.).....	1"
Top Groove.....	No
Net Wt. (approx.).....	1 1/2
Standard Package.....	100
Weight Packed.....	2-1/5
Color Brown.	



No. 1000



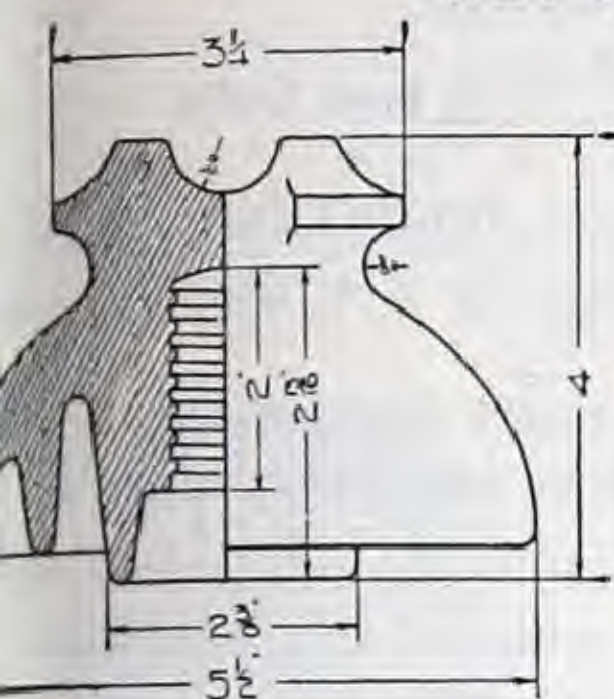
No. 1302

Line Voltage.....	10,000
Test V. Needle Gap.....	70,000
Wet Arc-over V.....	45,000
Leakage Distance.....	4 3/4"
Mech. Strength lbs.....	4,400
Pin hole (Top Dia.).....	1"
Top Groove.....	3/16" R
Net Wt. (approx.).....	2.1 lbs.
Standard Package.....	100
Weight Packed.....	2.7 lbs.
Color Brown.	

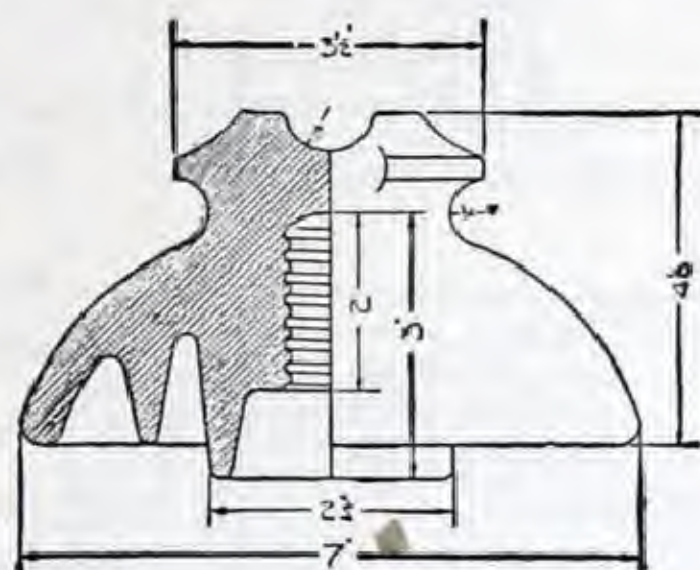
Line Voltage.....	13
Test V. Needle Gap.....	70
Wet Arc-over V.....	45
Leakage Distance.....	7 1/2
Mech. Strength lbs.....	3
Pin Hole (Top Dia.).....	1"
Top Groove.....	3/8"
Net Wt. (approx.).....	2 1/4
Standard Package.....	100
Weight Packed.....	2.9
Color Brown.	

PORCELAIN INSULATORS

WET PROCESS



No. 2004



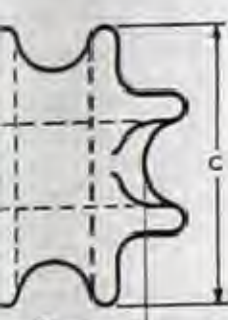
No. 2305

Line Voltage..... 20,000
Test V. Needle Gap.. 80,000
Wet Arcover V..... 55,000
Leakage Distance... 9 3/4"
Mech. strength lbs... 3,300
Pin Hole (Top Dia.) 1 3/8"
Top Groove..... 1/2" R
Net Wt. (approx.)... 3 lbs.
Standard Package... 100
Weight Packed..... 4 lbs.
Color Brown.

Line Voltage..... 23,000
Test V. Needle Gap.. 90,000
Wet Arcover V..... 65,000
Leakage Distance... 10 1/2"
Mech. strength lbs... 3,300
Pin Hole (Top Dia.) 1 3/8"
Top Groove..... 1/2" R
Net Wt. (approx.)... 4.2 lbs.
Standard Package... 100
Weight Packed..... 5.2 lbs.
Color Brown.

Same insulator with 1" Pin hole, No. 2003.

Price on application.



THOMAS PORCELAIN BREAK STRAIN INSULATORS

Wet process porcelain; brown glaze.

A guy strain insulator also used for dead-ending.

List No.	510	511	512	513	514
Height, in.....	3 1/2	5 3/8	6 3/4	10	7
Diam, in.....	2 1/2	3 1/4	3 1/2	4 3/4	3 3/4
Groove, in.....	5/8	3/4	7/8	1 1/2	1

Flash-Over Voltage... 30000 35000 40000 55000 45000
Test Flash-Over Voltage... 15000 20000 25000 30000 25000
Mechanical Strength, lbs.. 10000 15000 20000 45000 20000
in Box..... 72 30 25 25 25
Gross Wt. per 100, lbs.... 114 360 360 1085 470

PORCELAIN STRAIN INSULATORS

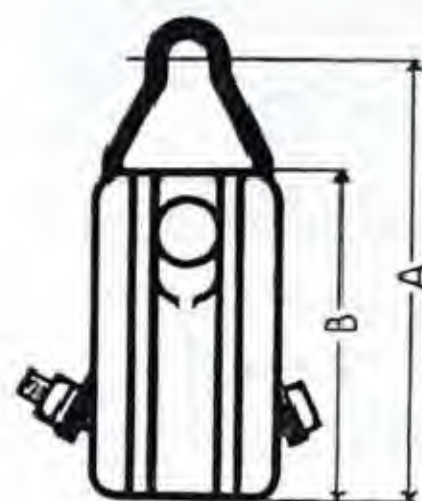


List No.	Length	Diam.	Dia. Hole
500	2 1/2"	2 1/4"	3/8"
502	3 1/2"	3 1/4"	1/2"
504	4 1/2"	3 1/2"	13/16"
506	5 1/2"	3 5/8"	3/4"

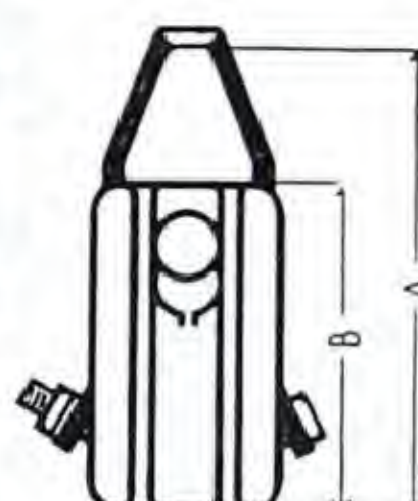
Prices on application.

YOKE CLEVISES

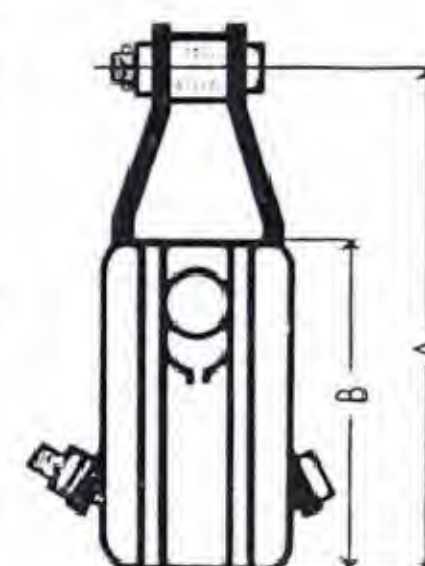
Made of half round stock



No. 10401



No. 10402



No. 10403

Mounting	List No.	Fits Insulator	Wt. lbs. Per 100
Eye Bolt.....	10401	504	36
Eye Bolt.....	10607	506	70
Mach. Bolt.....	10402	504	85
Mach. Bolt.....	10608	506	36
Steel Arm.....	10403	504	70
Steel Arm.....	10609	506	125

EVERYTHING FOR YOUR POLE LINE

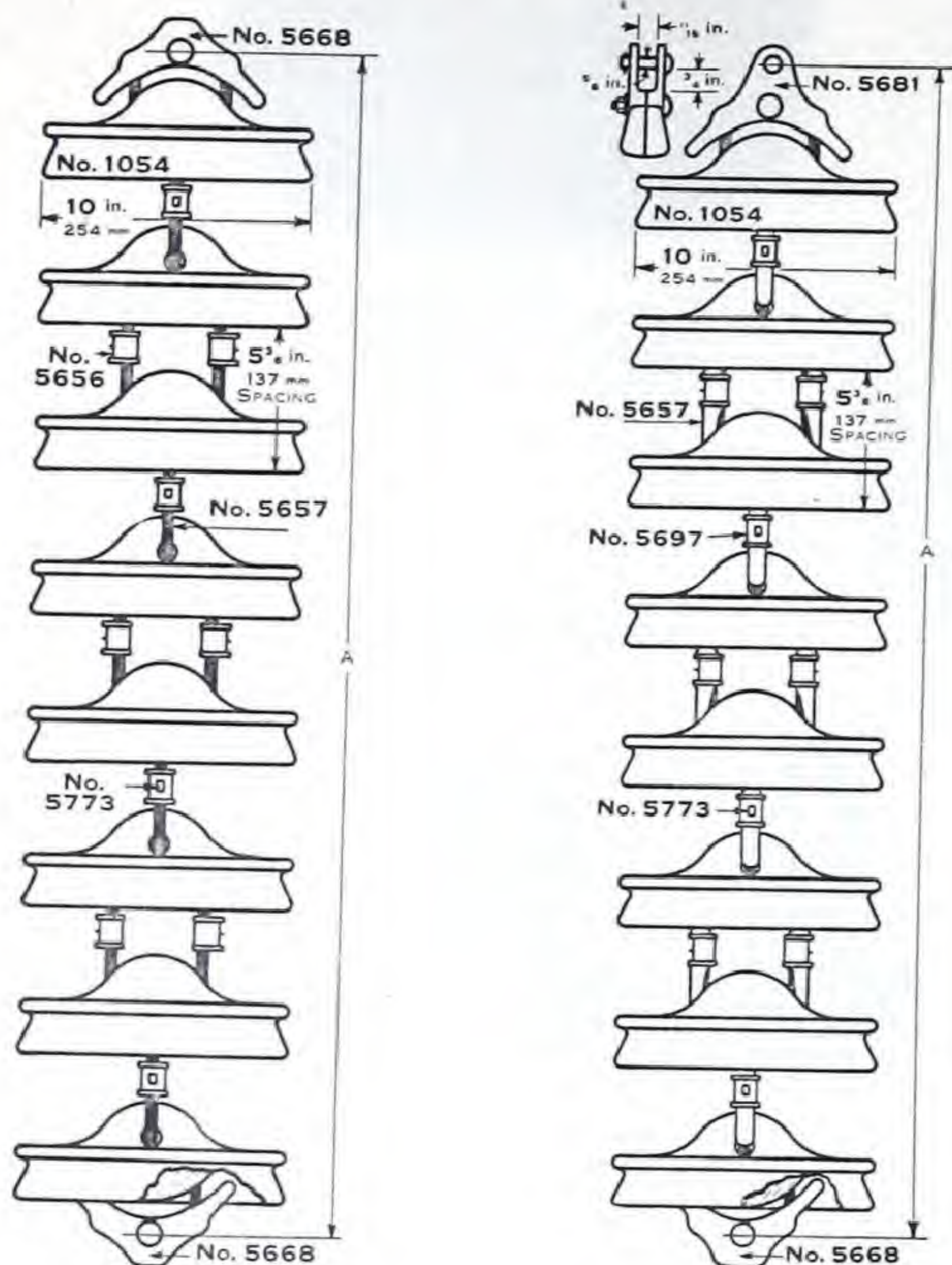
Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and

highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."

THOMAS LINK TYPE HEWLETT INSULATORS

10-INCH STANDARD UNITS

Brown Glaze—Average M & E 10000 Pounds



No. 11069-T8

No. 11072-T8

Any number of units (1054) may be assembled on a $\frac{5}{8}$ -inch spacing by means of soft drawn copper links (5657), cast bronze couplers (5656 or 5697), phosphor bronze spring clips (5773); the end terminals or adapters are of forged steel, either blind (5668) or clevis (5681) type.

No. 11069 Assembly has a blind adapter at top and bottom.

No. 11070 Assembly has a clevis adapter at the top and blind adapter at the bottom.

No. 11071 Assembly is similar to No. 11069 except has wing couplers (5697).

No. 11072 Assembly is similar to No. 11070 except has wing couplers.

No. Units	Dim. A, In.		Flash-Over, Kv.		Gross Wt., Lbs	
	11069	11070	Dry	Wet	11069	11071
Type 1	$5\frac{7}{8}$	$7\frac{1}{2}$	75	45	$19\frac{1}{2}$	$19\frac{1}{2}$
Type 2	$11\frac{1}{4}$	$12\frac{7}{8}$	145	90	$32\frac{1}{2}$	33
Type 3	$16\frac{5}{8}$	$18\frac{1}{4}$	205	135	50	51
Type 4	22	$23\frac{5}{8}$	250	170	65	$66\frac{1}{2}$
Type 5	$27\frac{3}{8}$	29	300	205	80	82
Type 6	$32\frac{3}{4}$	$34\frac{3}{8}$	350	240	95	$97\frac{1}{2}$
Type 7	$38\frac{1}{8}$	$39\frac{3}{4}$	390	275	110	113
Type 8	$43\frac{1}{2}$	$45\frac{1}{8}$	430	310	125	$128\frac{1}{2}$
Type 9	$48\frac{7}{8}$	$50\frac{1}{2}$	470	345	140	144
Type 10	$54\frac{1}{4}$	$55\frac{7}{8}$	510	375	155	$159\frac{1}{2}$
Type 11	$58\frac{5}{8}$	$61\frac{1}{4}$	550	410	170	175
Type 12	65	$66\frac{5}{8}$	590	445	190	$195\frac{1}{2}$

Electrical and mechanical values are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

Bulletins and complete information on hardware for High Voltage Insulators furnished on application.

THOMAS LINK TYPE HEWLETT INSULATORS

$7\frac{1}{2}$ -Inch Units

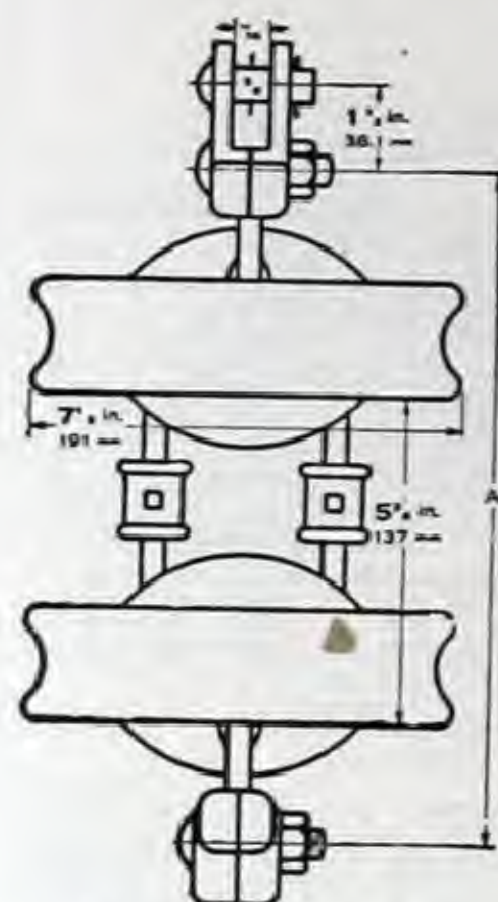
Brown Glaze

Average M & E 8000 Pounds

No. 11073 Assembly has a blind adapter at both terminal ends.

No. 11074 Assembly has a clevis at one end and a blind adapter the other terminal.

No. 11075 Assembly has a clevis adapter at both terminal ends.

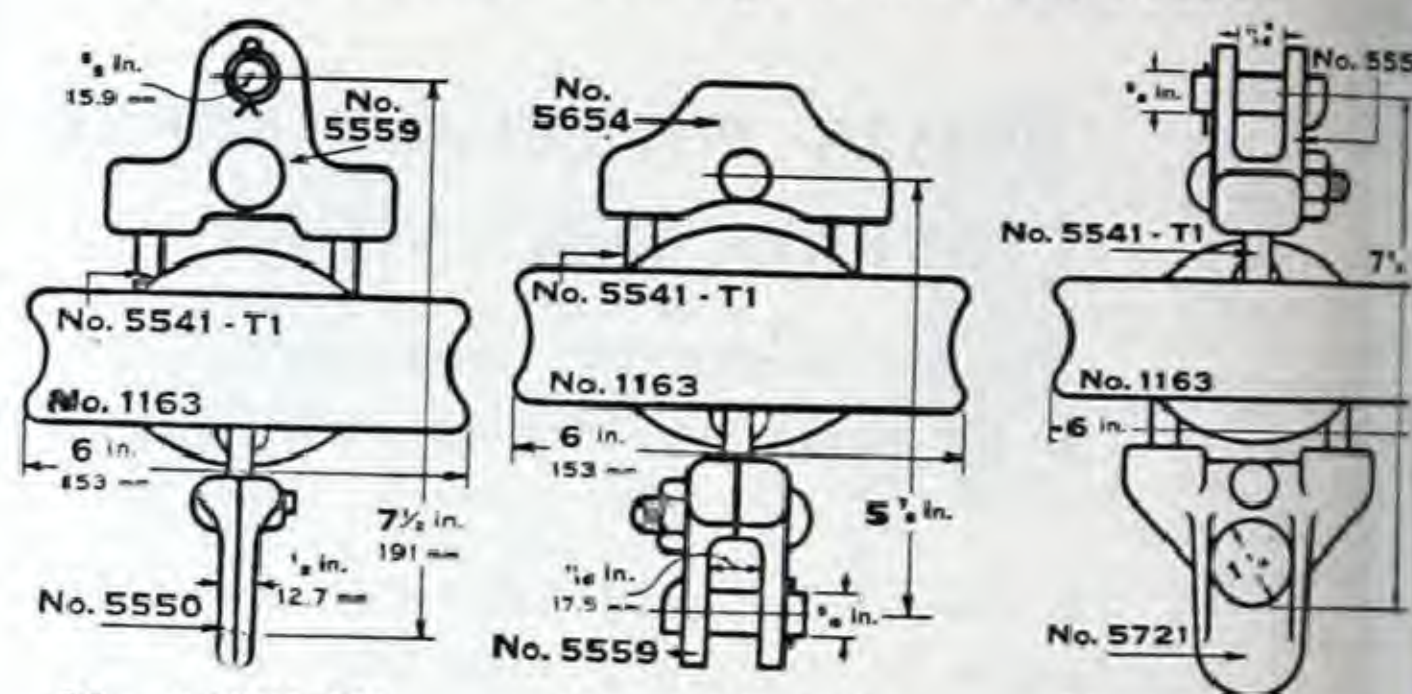


No. 11074-T2

No. Units	Dimension A, In.			Flash-Over, Kv.		Gross Wt., Lb
	11073	11074	11075	Dry	Wet	
Type 1	$5\frac{3}{4}$	$7\frac{1}{4}$	$8\frac{3}{4}$	75	45	$13\frac{1}{2}$
Type 2	$11\frac{1}{8}$	$12\frac{5}{8}$	$14\frac{1}{8}$	130	90	$26\frac{1}{2}$
Type 3	$16\frac{1}{2}$	18	$19\frac{1}{2}$	185	135	$38\frac{1}{2}$

6-Inch Units

Brown Glaze—Average M & E 6000 Pounds



No. 11031-T1

No. 11064-T1

No. 11077-T1

No. 11026 Assembly has large eye (5550) at both terminal ends.

No. 11031 Assembly has a large eye (5550) at one end and clevis (5559) at the other terminal.

No. 11032 Assembly has a clevis (5559) at both terminal ends.

No. 11062 Assembly has a blind adapter (5654) at both terminal ends.

No. 11063 Assembly has a blind adapter (5654) at one end and a large eye (5550) at the other terminal.

No. 11064 Assembly has a clevis (5559) at one end and blind adapter (5654) at the other terminal.

No. 11077 Assembly has a clevis (5559) at one end and thimble adapter (5721) at the other terminal.

No. 11078 Assembly has a large eye (5550) at one end and thimble adapter (5721) at the other terminal.

No. 11079 Assembly has a blind adapter (5654) at one end and thimble adapter (5721) at the other terminal.

No. 11080 Assembly has a thimble adapter (5721) at both terminal ends.

List No.	Spring, In.	Flash-Over, Kv.				Gross Wt., Lb	
		1-Unit		2-Units		1-Unit	2-Unit
11026	$7\frac{1}{16}$	$12\frac{3}{16}$	70	40	120	75	$7\frac{1}{2}$
11031	$7\frac{1}{2}$	$11\frac{7}{8}$	70	40	120	75	$7\frac{1}{2}$
11032	$7\frac{3}{16}$	$11\frac{9}{16}$	70	40	120	75	$7\frac{1}{2}$
11062	$4\frac{9}{16}$	$8\frac{1}{16}$	70	40	120	75	$7\frac{1}{2}$
11063	$6\frac{3}{16}$	$10\frac{9}{16}$	70	40	120	75	$7\frac{1}{2}$
11064	$5\frac{7}{8}$	$10\frac{1}{4}$	70	40	120	75	$7\frac{1}{2}$
11077	$7\frac{5}{8}$	12	70	40	120	75	$7\frac{1}{2}$
11078	$7\frac{1}{16}$	$12\frac{5}{16}$	70	40	120	75	$7\frac{1}{2}$
11079	$6\frac{1}{16}$	$10\frac{1}{16}$	70	40	120	75	$7\frac{1}{2}$
11080	$8\frac{1}{4}$	$12\frac{5}{8}$	70	40	120	75	$7\frac{1}{2}$

Electrical and mechanical values are based on tests conducted in accordance with A. I. E. E. Specifications No. 41.

SLATER SNUBBEREYE ANCHOR ROD

Galvanized

The fork is notched to engage the teeth of the roller.



The snubbing roller—note the teeth



oval shouldered bolt that holds the roller in position.

This anchor rod is provided for the engineer who favors the roller type of rod. It is efficient in keeping the original tension in line. Once the guy is made, there can be no slipping back—it is like the brakes on the guy strand.

The roller is loose and free when the guy is being made. When the guy is made the roller is snubbed and holds the guy strand from slipping and loosening the guy.

Be sure your guys are snubbed. The effective way is to use the Slater Snubbereye Anchor Rod. Made in both single and double roller eyes.

Single Roller

Double Roller

Size	Weight per 100	List No.	Size	Weight per 100
$\frac{5}{8}$ x 5	570	8555	$\frac{5}{8}$ x 5	570
$\frac{5}{8}$ x 6	680	8556	$\frac{5}{8}$ x 6	680
$\frac{5}{8}$ x 7	790	8557	$\frac{5}{8}$ x 7	790
$\frac{5}{8}$ x 8	900	8558	$\frac{5}{8}$ x 8	900
$\frac{3}{4}$ x 6	980	8566	$\frac{3}{4}$ x 6	980
$\frac{3}{4}$ x 7	1150	8567	$\frac{3}{4}$ x 7	1150
$\frac{3}{4}$ x 8	1280	8568	$\frac{3}{4}$ x 8	1280
$\frac{3}{4}$ x 9	1480	8569	$\frac{3}{4}$ x 9	1480

SLATER ANCHOR RODS

Oval Eye or Double Thimble Eye

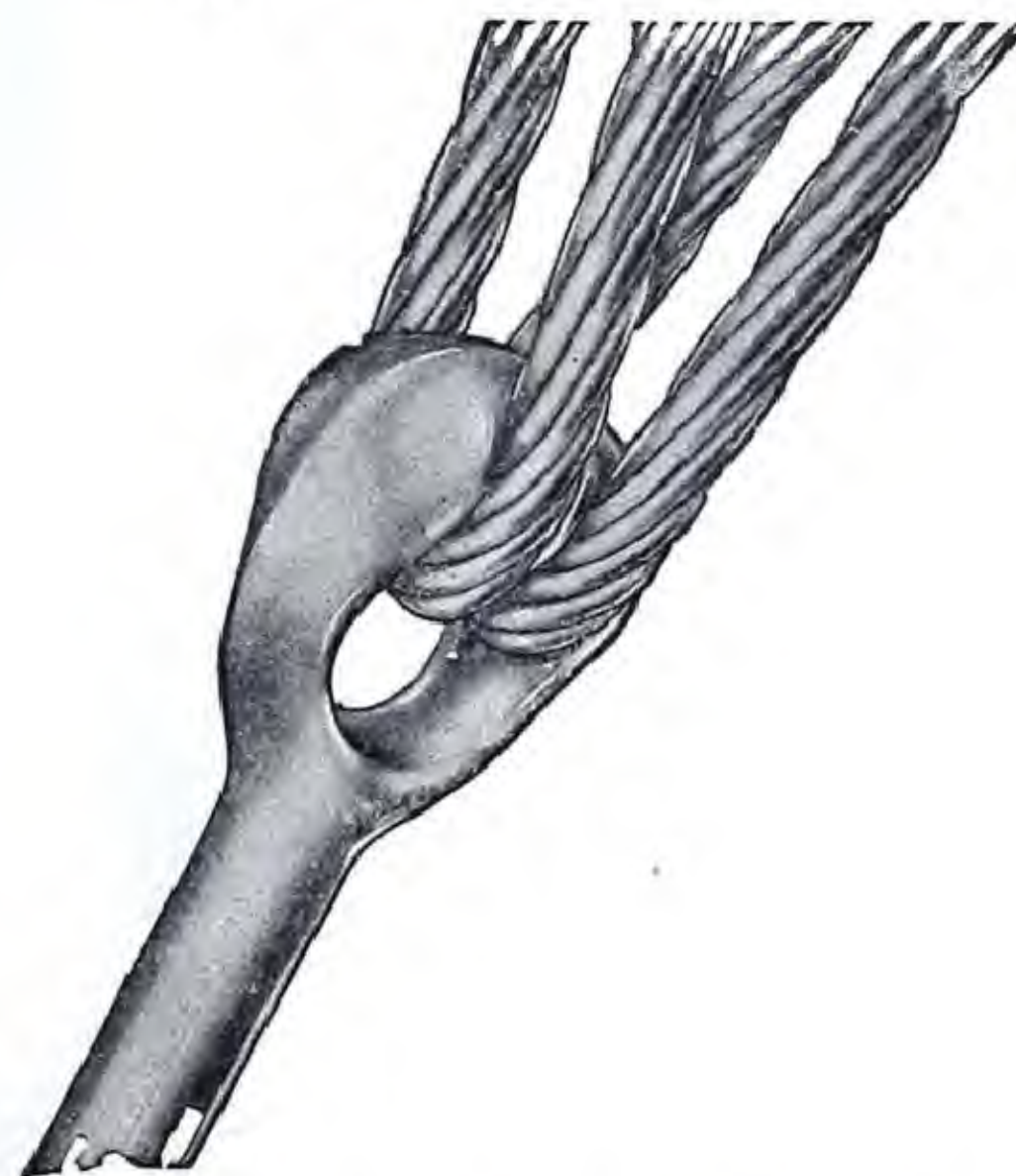
SLATER OVAL EYE ANCHOR RODS

Hot Galvanized

Square Nut—No Thimble or Washer



List No.	Size	Approx. Weight per 100
7405	$\frac{1}{2}$ " x 5'	380
7406	$\frac{1}{2}$ " x 6'	450
7407	$\frac{1}{2}$ " x 7'	510
	$\frac{5}{8}$ " x 4'	450
7415	$\frac{5}{8}$ " x 5'	580
7416	$\frac{5}{8}$ " x 6'	680
7417	$\frac{5}{8}$ " x 7'	780
7418	$\frac{5}{8}$ " x 8'	870
....	$\frac{3}{4}$ " x 4'	675
....	$\frac{3}{4}$ " x 5'	825
7426	$\frac{3}{4}$ " x 6'	940
7427	$\frac{3}{4}$ " x 7'	1149
7428	$\frac{3}{4}$ " x 8'	1280
7429	$\frac{3}{4}$ " x 9'	1480
....	1" x 6'	2320
7438	1" x 8'	2850
7439	1" x 9'	3000
7440	1" x 10'	3380



SLATER DOUBLE THIMBLE EYE ANCHOR RODS

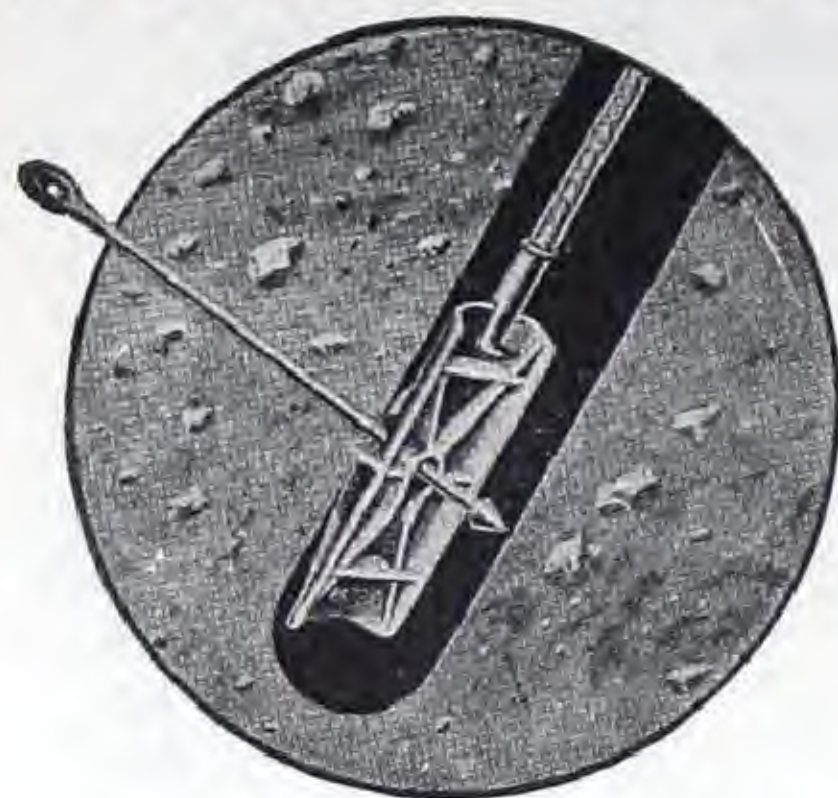
Hot Galvanized

Square Nut

List No.	Size	Weight per 100
8505	$\frac{1}{2}$ " x 5'	380
8506	$\frac{1}{2}$ " x 6'	430
8507	$\frac{1}{2}$ " x 7'	500
8515	$\frac{5}{8}$ " x 5'	570
8516	$\frac{5}{8}$ " x 6'	680
8517	$\frac{5}{8}$ " x 7'	790
8518	$\frac{5}{8}$ " x 8'	900
8526	$\frac{3}{4}$ " x 6'	980
8527	$\frac{3}{4}$ " x 7'	1140
8528	$\frac{3}{4}$ " x 8'	1280
8529	$\frac{3}{4}$ " x 9'	1440
8538	1" x 8'	2300
8539	1" x 9'	2550
8540	1" x 10'	2800
8541	1 $\frac{1}{4}$ " x 10'	4200

SLATER CHANCE NEVER CREEP ANCHOR

Hot Galvanized



The Chance Never Creep Anchor consists of a galvanized rod with a drop forge thimble eye, and a certified malleable iron plate. The thimble eye eliminates the use of thimbles.

The usual plate size used for service construction is 8" x 30".

List No.	Weight Per 100	Plate Size	Rod Size
510-25	760	5 x 10	1/2 x 5'
510-26	820	5 x 10	1/2 x 6'
615-25	1070	6 x 15	1/2 x 5'
616-26	1140	6 x 15	1/2 x 6'
615-56	1370	6 x 15	5/8 x 6'
620-56	1930	6 x 20	5/8 x 6'
620-57	2030	6 x 20	5/8 x 7'
820-56	2000	8 x 20	5/8 x 6'
820-57	2100	8 x 20	5/8 x 7'
820-36	2280	8 x 20	3/4 x 6'
820-37	2460	8 x 20	3/4 x 7'
825-36	2880	8 x 25	3/4 x 6'
825-37	3060	8 x 25	3/4 x 7'
825-38	3200	8 x 25	3/4 x 8'
830-36	3400	8 x 30	3/4 x 6'
830-37	3560	8 x 30	3/4 x 7'
830-38	3700	8 x 30	3/4 x 8'
835-36	4180	8 x 35	3/4 x 6'
835-37	4360	8 x 35	3/4 x 7'
835-38	4500	8 x 35	3/4 x 8'
835-17	4500	8 x 35	1 x 7'
835-18	4650	8 x 35	1 x 8'
1040-17	7100	10 x 40	1 x 7'
1040-18	7250	10 x 40	1 x 8'

COGHLIN ANCHORS



Driving Position
Entering ground
like a picket



Anchoring posi-
tion with guy
wire attached

Rod, plate and swiveling eyelet complete in one piece, ready to drive. The plate locks automatically for driving, and opens automatically to anchoring position when load is attached.

The plate ribbed lengthwise and crosswise will hold more than any other plate, size for size. Rod and pin are tested to a load of 50% more than the plate will hold.

This anchor will outlast the life of the pole it supports.

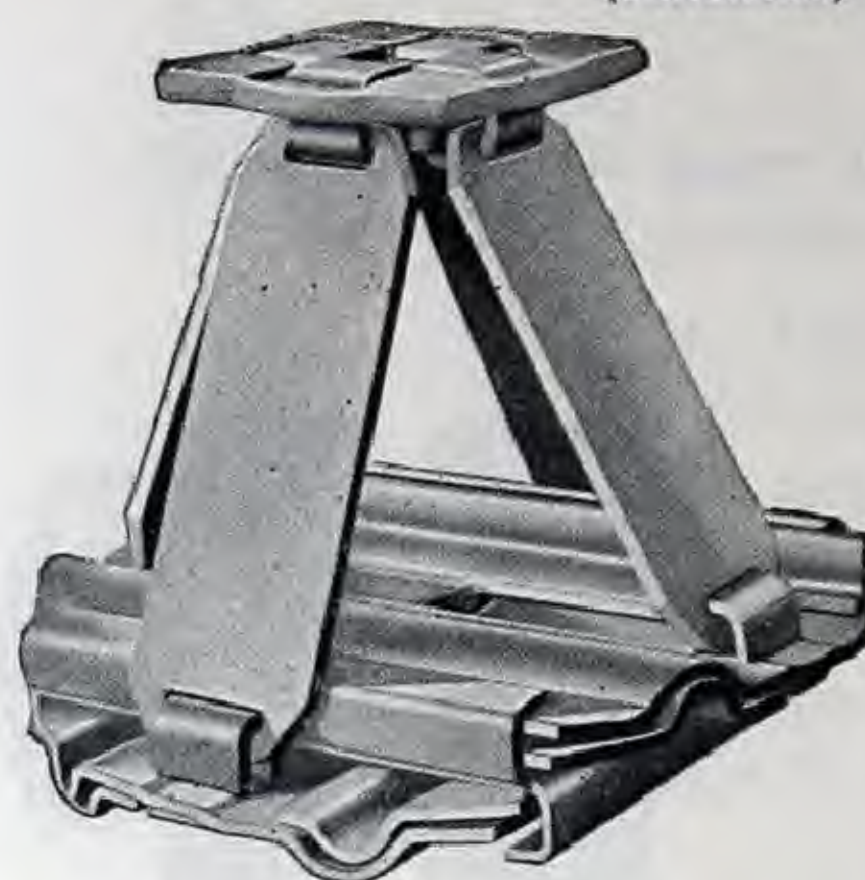
This anchor can be placed in position in one to three minutes in the hardest ground.

No hole to dig or special tool to be carried with this anchor; a hammer is all that is necessary to place it in position.

Description Weight, Lbs. List Price Each
Coghlín Anchor, 3/4" x 6' 11 \$3.00

SLATER UNBREAKABLE FOUR-WAY
EXPANSION ANCHORS

(Patented)



No. 7596

Expanding Tool

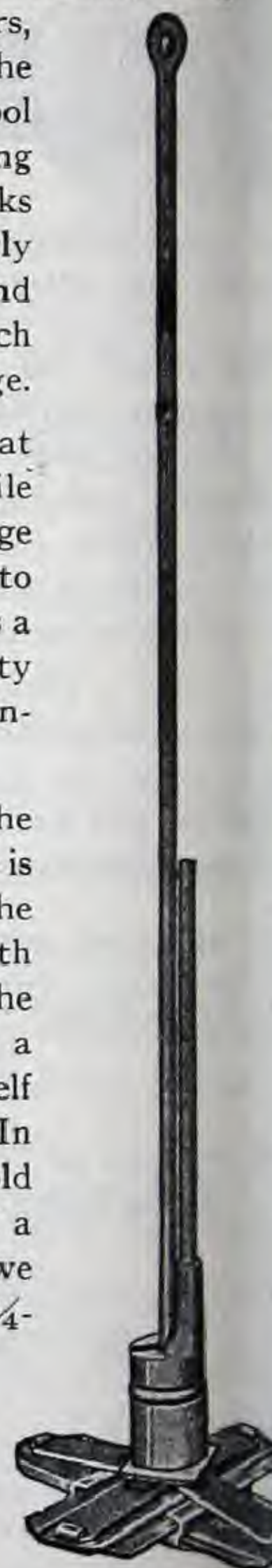
The Slater Unbreakable 4-way Expansion Anchor, is an all-steel anchor of such balanced strength and pressure area that it has shown a strength that is surprising.

has four blades, in two pairs, which are extended by the action of the Expanding Tool which is also used for tamping the filling. The extension links are made of steel strongly looped into the blades and into a square collar, which forms the expansion hinge.

Tests have shown that there is less creeping, while there has not been a breakage of the anchor even up to 20,000 pounds pull. This is a record that gives us warranty for the use of the name, "Unbreakable."

Installation is made by the auger method and the hole is sunk in the usual way. The anchor is then opened with the tamping tool and the earth is tamped home by a loop tamper which holds itself in place encircling the rod. In good soil this anchor will hold more than the strength of a 5/8-inch anchor rod, so we recommend the use of a 3/4-inch rod.

Finish—Hot Galvanized.

Anchor and
Guy Rod
AssembledGuy Anchor
expanded by
Expanding Tool

Stock No.	Way	Diameter, Inches		Approximate Shipping Weight, 100 p
		Closed	Expanded	
70622	2-way	6	9	450
70642	4-way	6	10 1/2	650
7596	4-way	8	14	1400
71042	4-way	10	18	28.00

Also supplied with Roxide Rust Resisting Paint.

SLATER STEELWING ANCHOR

Hot Galvanized

The Slater Steelwing Anchor is installed at low cost. It is mistake-proof. It provides a large bearing area upon undisturbed soil. Being installed by the method as illustrated it disturbs very little soil and retains a wide area of undisturbed earth which is one reason for its non-creeping qualities.



List No.	Diam. in Ins.		Over-All Length	Size of Eye		Wt., Lbs. Per 100
	Wing	Rod	Rod Feet	Inside Width	Inches Length	
26	6	3/4	5 1/2	1 1/2	2	1040
28	8	1	5 1/2	1 1/2	2	1860
30	10	1 1/4	5 1/2	1 3/4	2 1/4	2900
50	10	1 1/4	8	1 3/4	2 1/4	3690

SLATER SWAN ANCHOR

Hot Galvanized



The Swan Anchor is a 5' drive anchor for light loads made of a steel blade attached to the end of a Slater Anchor Rod. It is driven into position by the use of a special drive-rod, which is withdrawn after the anchor has been sunk to desired depth. The Swan Anchor is generally used where light strains are being taken care of. It is effective and sure in its principle of leverage operation, and is economical in its installation cost.

Dim. of Blade		Dia. of Eye Inside Inches	Wt. Lbs. Per 100
L.	W.		
11	4	1 1/16	540
13	4	1 1/16	540

SLATER HUB GUARDS

Hot Galvanized

Hub Guards are used on corner poles to protect them from the hubs of cross-arms. The dimensions given are for the flat plates, before bending, 14-inch Guards being bent to a 7 1/2-inch radius, and the 16-inch Guards to a 7 1/2-inch radius. All holes are 9/16-inch diameter for 1/2-inch lag screws, there being three holes on each of the 18-inch Guards and five on 30-inch sizes. The 18-inch lengths are the A. T. & T. Co. standard.



Hub Guard.

List No.	Dimensions in Inches	Approximate Shipping Weight Lbs., 100 Pcs.
0	14 x 18 x 1/8	700
1	16 x 18 x 1/8	950
2	14 x 30 x 3/16	2100
3	16 x 30 x 3/16	2600

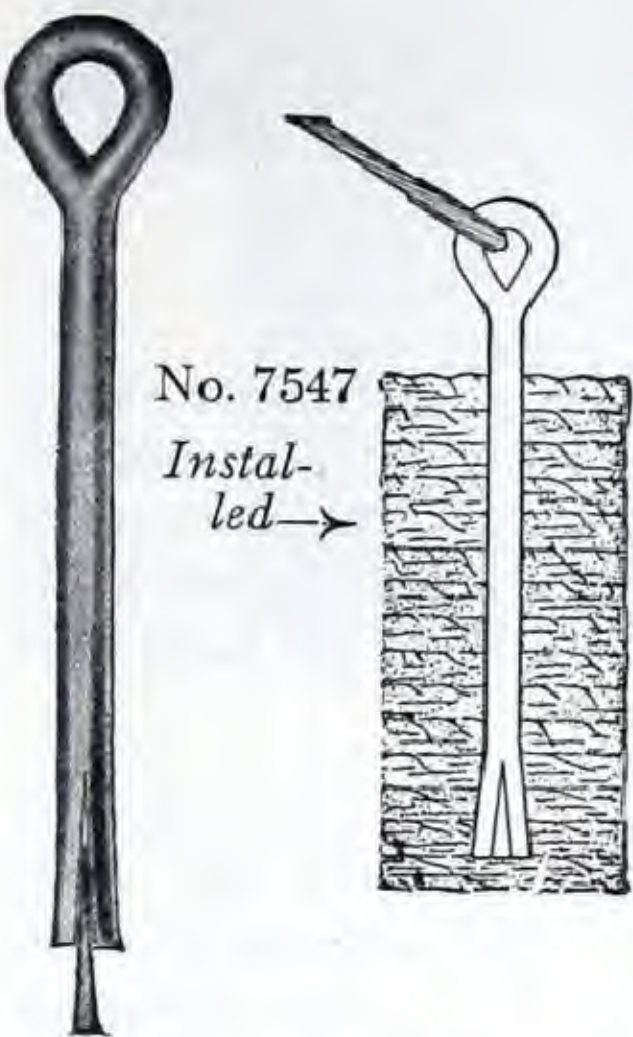
N.E.L.A. Standard.

SLATER ROCK ANCHORS

and

Rock Anchor Extensions

Hot Galvanized

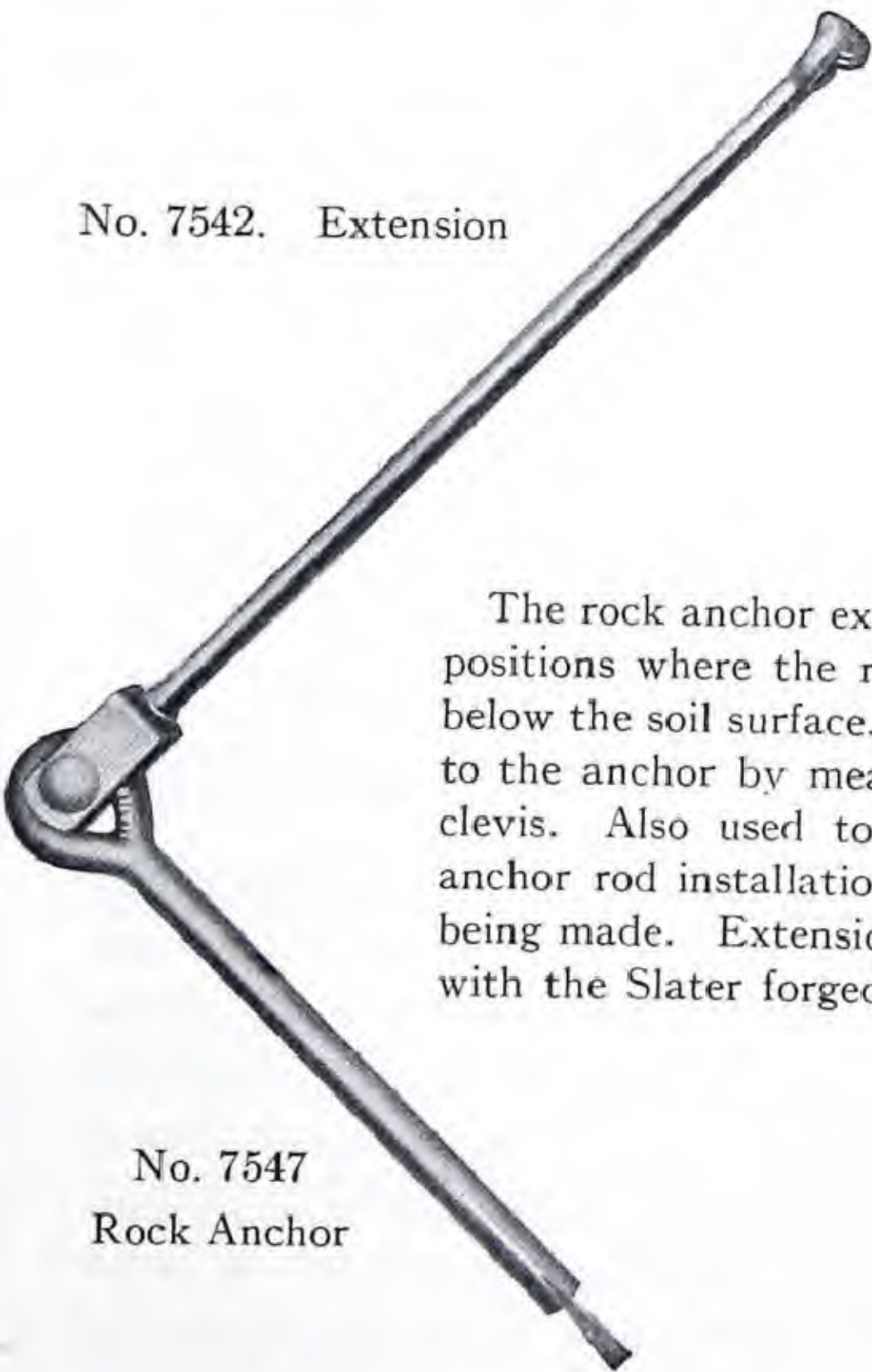


Where anchoring in rock formation is necessary the Slater Rock Anchor is the item to be ordered. This anchor is simplicity itself. It is self anchoring by the simple method of forcing the wedge into the slotted end of the anchor when driving the anchor. The wedge forces the expanded rod solidly against the sides of the drilled hole. Then the greater the tension the greater the holding power of the anchor. These anchors should always, wherever possible, be driven at an angle of 35° to the surface. However,

wherever a straight pull is unavoidable the Slater Rock Anchor will show far more holding power than the line load. It has a breaking strain of over 40,000 pounds.

List No.	Length Inches	Approximate Weight Lbs., 100 Pcs.
7546 (less wedge)	18	600
7547	18	600

No. 7542. Extension



No. 7547 Rock Anchor

The rock anchor extension is used in positions where the rock formation is below the soil surface. It is connected to the anchor by means of a suitable clevis. Also used to extend existing anchor rod installation where a fill is being made. Extension rods are made with the Slater forged Thimbleye.

The extension rod can also be used to extend the length of previously installed Anchor Rods where a fill is being made.

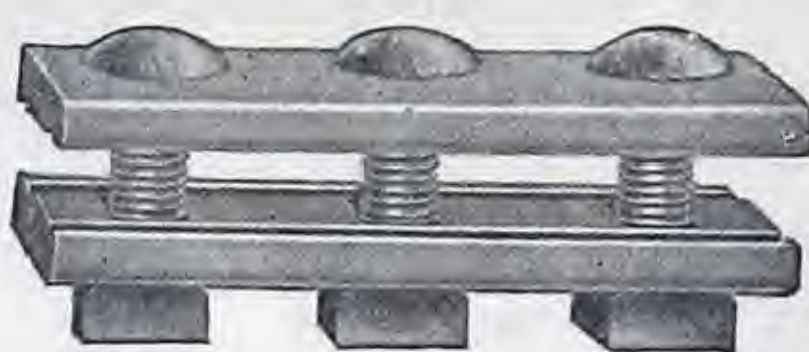
List No.	Length, Feet	Diameter, Inches	Approximate Shipping Weight, Lbs., 100 pcs.
7542	3	3/4	440
7543	4	3/4	600
7544	5	3/4	750

STELCO ROLLED STEEL GUY CLAMPS

Hot Galvanized



2-bolt Type



3-bolt Type

The clamps are made from hot rolled open hearth steel. The $\frac{1}{2}$ -inch bolts furnished are made of special steel and will stand a pull of 10,000 pounds without breaking or stripping their threads. They have an elliptical shoulder which fits into an elliptical hole in one plate and keeps the bolts from turning when the nuts are tightened.

The No. 50 clamp, the standard of the N.E.L.A. and A.T. & T., is the most popular guy clamp in use. It is equipped with $\frac{5}{8}$ -inch special heat-treated steel bolts. This clamp has greater holding power than any other clamp on the market. The heavy bolts eliminate the possibility of twisting off or straining the bolts when the nuts are tightened. This clamp has recently been adopted as the standard of the N.E.L.A. and A.T. & T. Company.

List No.	Type	Length Inches	Wt., Lbs. Per 100
20	2-bolt heavy	3	143
40	2-bolt light	3	100
30	3-bolt light	5	155
10	3-bolt heavy	6	237
50	3-bolt N.E.L.A.	6	263

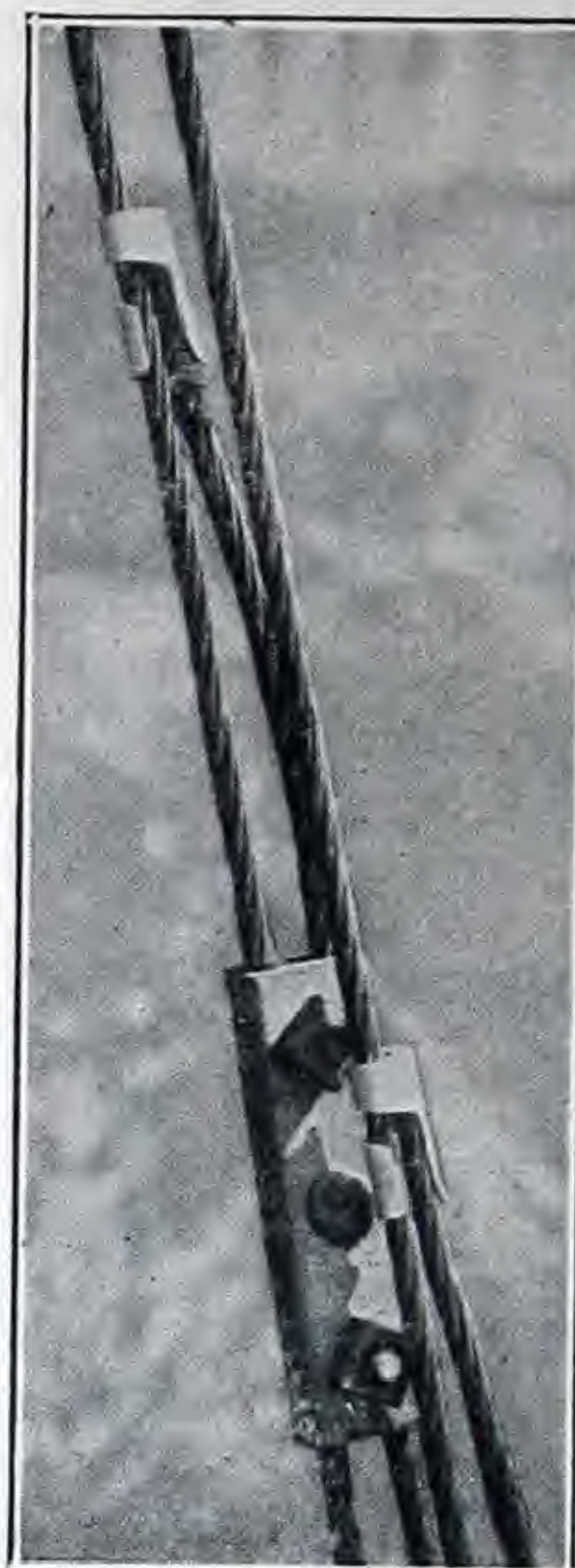
Prices on application.

EVERYTHING For Your Pole Line

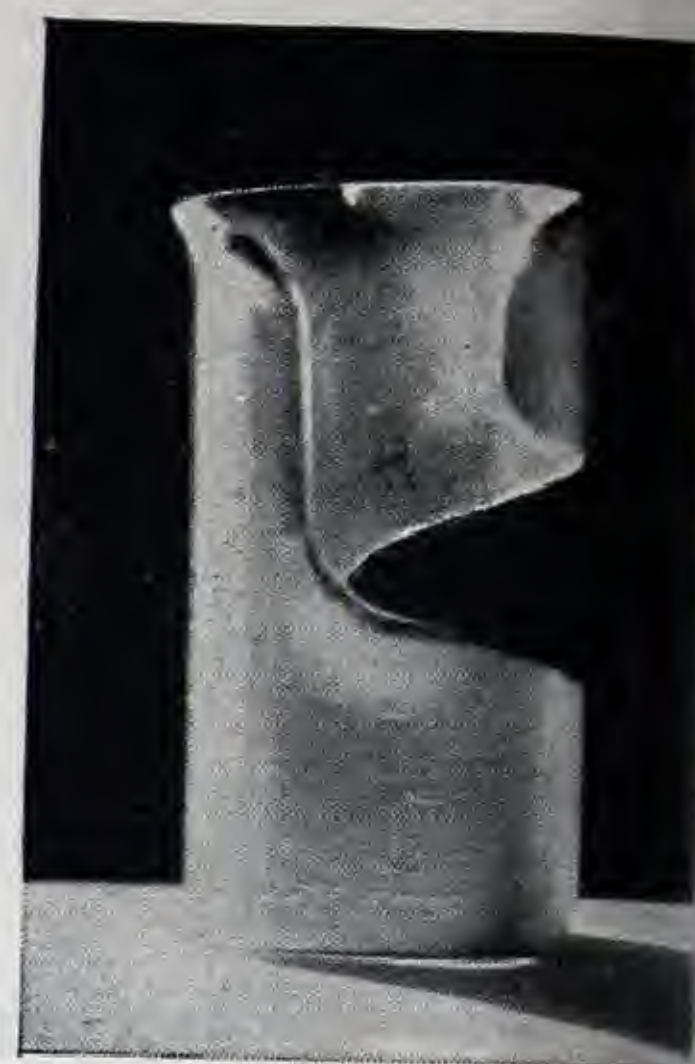
Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."

SLATER SERVISLEEVS

Hot Galvanized



This picture shows Slater Servisleeve installed.



The Servisleeve is a pre-formed galvanized steel guy clamp with a size available for every size of strand. The Servisleeve is installed by placing it on the main strand and forcing down over the free end of the strand by tapping it briskly with the pliers. Although one is usually sufficient, two more Servisleeves can often be used to advantage. Can be removed and used again—for example, after taking slack out of the guy. It is a positive time-saver. Ask a lineman who has used them for two days. Sizes $\frac{3}{16}$ " strand to $\frac{1}{2}$ " strand.

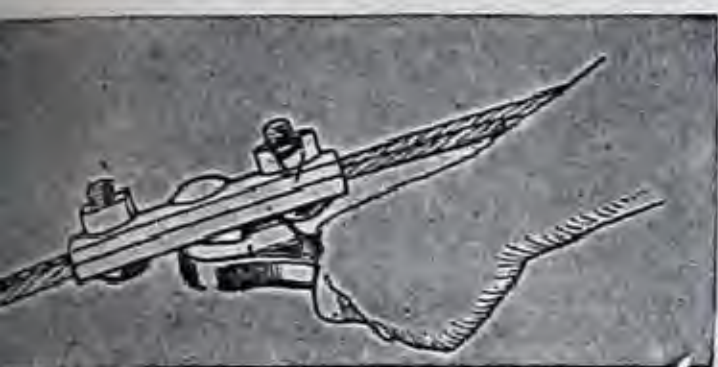
Type	For Guy Strand Diameter Inches	Packed in Boxes of	Approximate Shipping Wt. lbs. Per 10
Servisleeves	$\frac{1}{4}$ to $\frac{3}{16}$	100	3
	$\frac{5}{16}$	100	5
	$\frac{3}{8}$	100	7
	$\frac{7}{16}$ to $\frac{1}{2}$	100	8

SLATER GUY CLAMPS

Hot Galvanized



No. 7450



Showing the reversible centre bolt of the Slater three-bolt clamp

Slater Channel Guy Clamps are also made in three-bolt and two-bolt sizes as listed below:

Light Type

Dimensions—Inches

No. Bolts	Width	Length	Size Strand	Approximate Ship. Wt., Lbs., 100 pcs.
2	1 1/16	3 3/8	5/16 to 7/16	135
3	1 1/16	4	5/16 to 7/16	155
3	1 1/16	6	5/16 to 7/16	226
3	1 1/16	6	5/16 to 7/16	250

Heavy Type

3	1 21/32	6	5/16 to 1/2	274
4	1 31/32	8	5/16 to 1/2	365

Channel Back

Length—Inches

3	5	165
2	3	110

SLATER GUY THIMBLES

Hot Galvanized

Slater Guy Thimbles are made of oval steel, grooved to fit the size of guy strand, and bent to a generous curve, preventing the kinking of the strand. The ends are left open so that the thimble may be slipped over the anchor rod without chipping the galvanized coating.



Fitting Strand Size, Inches	Size Guy Rod, Inches	Approximate Wt., Lbs., 100 Pcs.
3/8	1/2 and 5/8	10
1/2	5/8 and 3/4	22
5/8	1	45

SLATER GUY THIMBLEYE

Hot Galvanized

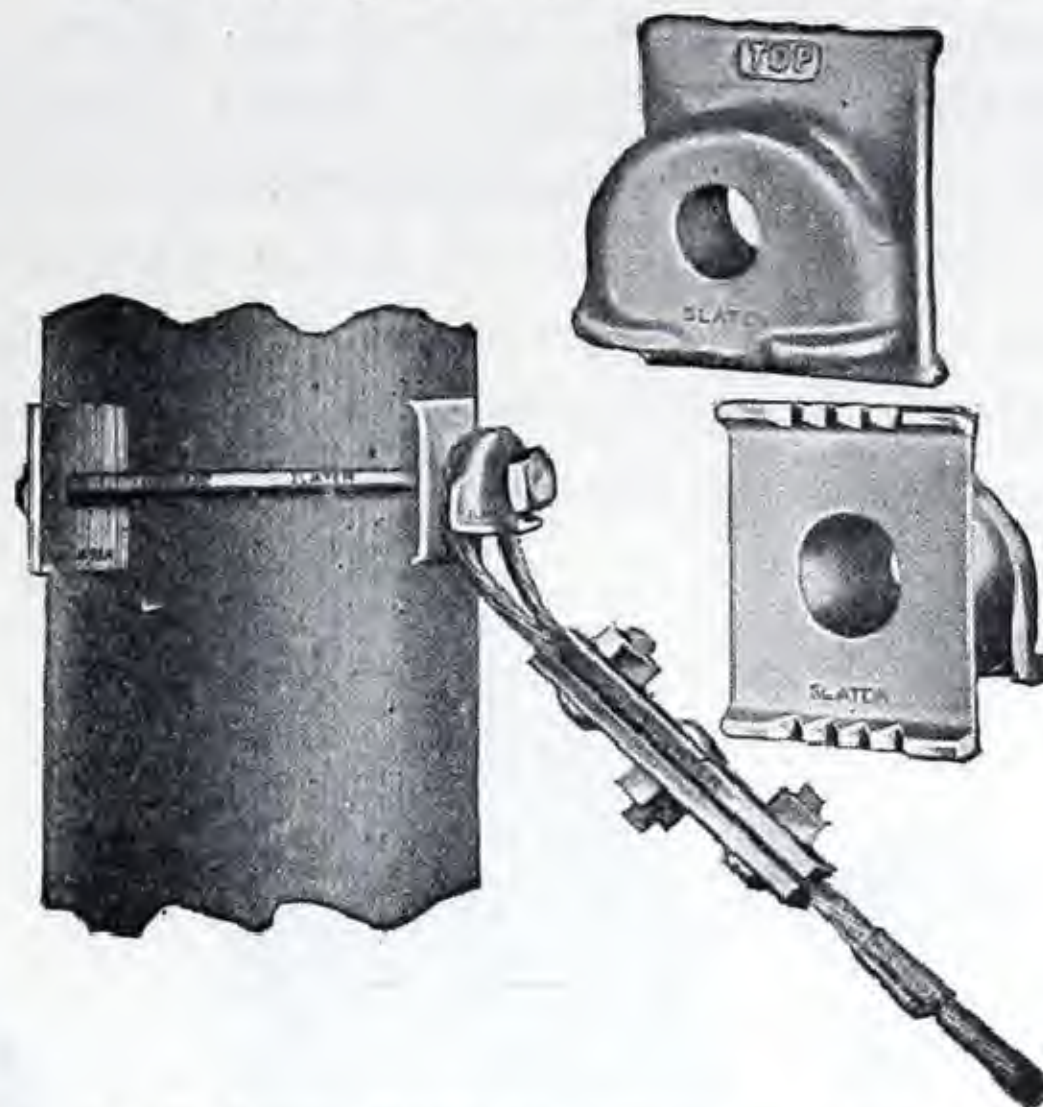


By using the Slater Guy Thimbleye there is no need of wrapping the guy strand around the pole at the upper end of the guy. All that is required is to run the strand through the Thimbleye and clamp the short end back in place. This can be done on the ground thus saving the trouble of doing the work on the pole. The Slater Guy Thimbleye is a drop-forged thimbleye made at the correct angle, and the curved plate for the through bolt fits snugly against the curve of the pole.

Dimensions Thimbleye, Inches	Through bolt hole Diam. Inches	Length Overall	Approximate Ship. Weight, Lbs., 100 pcs.
...	3/4	..	150
...	5/8	..	130

SLATER GUY FITTING

For Guying to Poles or Crossarms



Slater No. 7587 Guy Fixture saves wrapping the strand around the pole. May be used for either pole or arm guys.

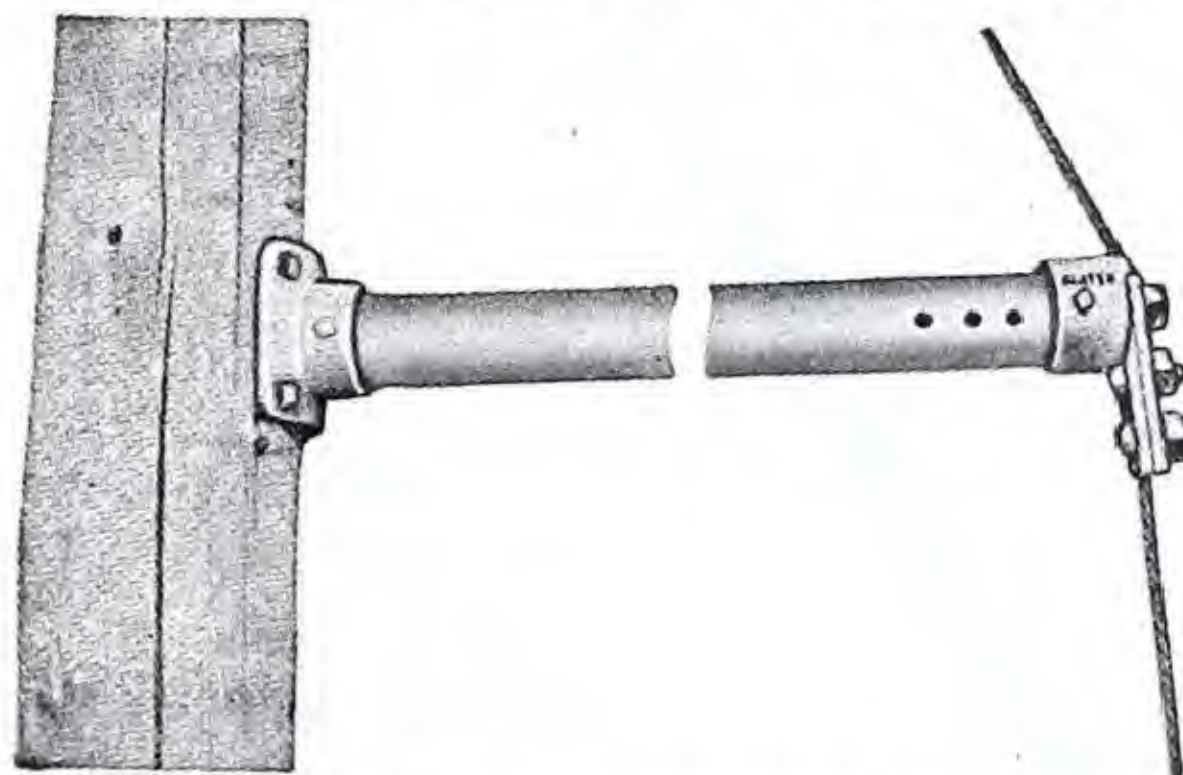
The Slater Guy Fitting can be used in guying either a pole or a crossarm, and eliminates the use of guy hooks, strain plates, lag screws and eye nuts. The fitting is installed with a through bolt and one washer. The lineman makes a liberal loop in the guy before climbing the pole. He then carries this loop up the pole and slips it over the wide radius of the guy fitting—and the pole top job is finished. The anchor installation and tightening is done in the usual manner. The saving in labour and equipment is apparent.

List

No. 7587

Item Guy Fitting

SLATER SIDEWALK GUY STRUT



Slater Sidewalk Guy Strut, showing the three parts of the complete assembly, and the holes in the pipe section for length adaptation.

This Guy Strut consists of three main parts—two malleable end fittings designed to engage pipe of either 2" or 2 1/2" diameter; and the length of pipe itself. A Slater No. 7461 guy clamp is an integral part of the fitting at the outer end. In assembling the guy, the strand is clamped firmly to the strut at this point, thus preventing any downward slippage of the guy strut under all conditions.

The double groove of the guy clamp adds greatly to the adaptability of the Slater Guy Strut. It allows the installation of guys of different types or the making of a double guy as desired. When a single guy wire is used, the open groove is filled with a short piece of guy strand.

List No.	Description	Approx. Shipping Weight, each
2055	Slater Guy Strut, complete, pole fitting, Pipe* and End Fitting (8' length) 2" pipe	42 lbs.
2056	Pole Fitting only.	5 lbs.
2057	End Fitting only.	6 3/4 lbs.

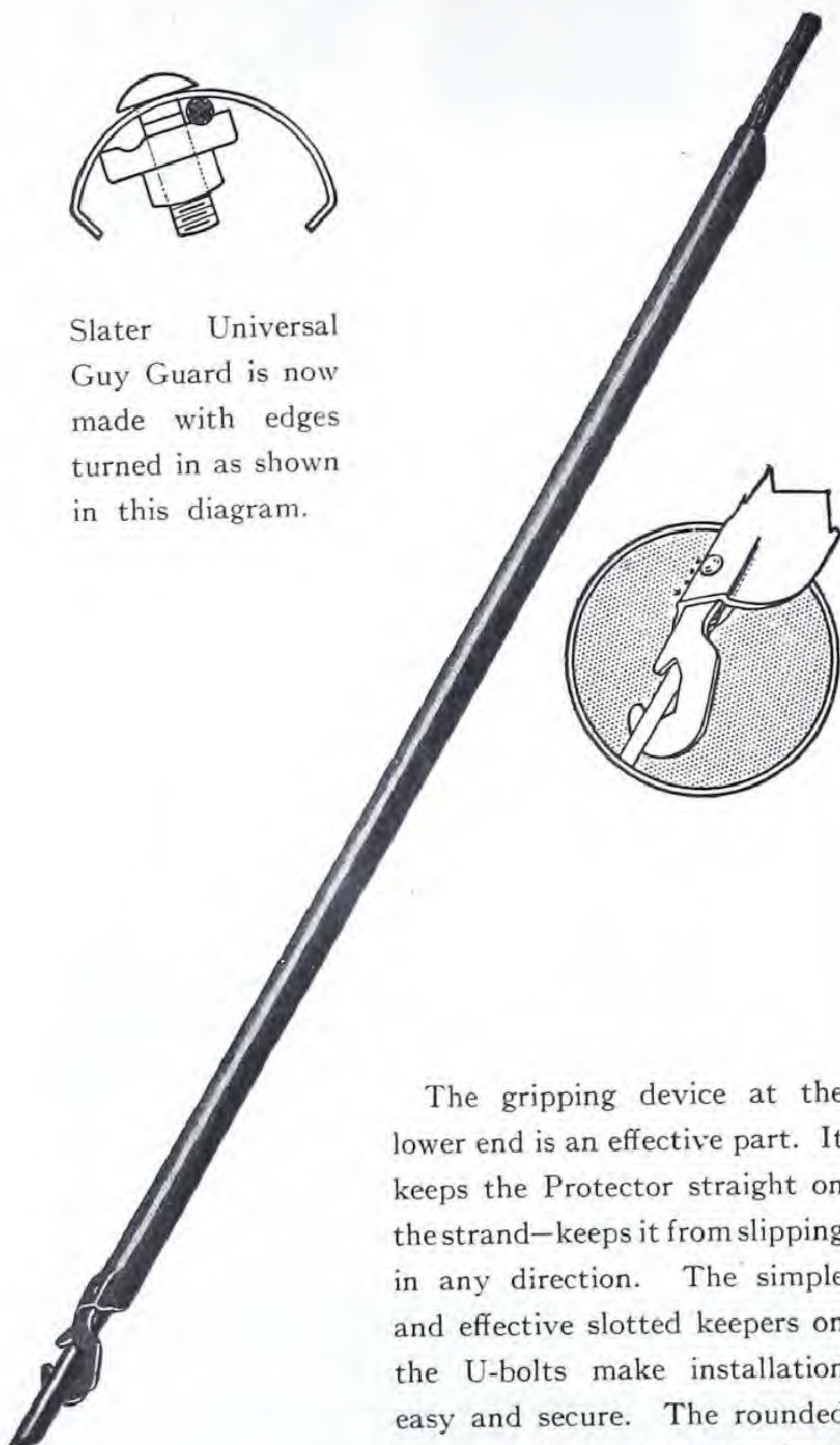
*Pipe—supplied in 6', 8' or 10' lengths, either 2" or 2 1/2" diameters. Specify pipe diameter and length required.

SLATER UNIVERSAL GUY GUARD

Improvements have been made in the Slater Universal Guy Wire Protector. They are now formed so that the edges are molded inward as shown in the illustration. The lower end of the Universal is attached to the anchor rod by the mechanical hand. The Protector is then forced down to position on the guy strand. All that is necessary is to tighten the one nut at the upper end of the Slater Universal Guy Wire Protector.



Slater Universal Guy Guard is now made with edges turned in as shown in this diagram.



The gripping device at the lower end is an effective part. It keeps the Protector straight on the strand—keeps it from slipping in any direction. The simple and effective slotted keepers on the U-bolts make installation easy and secure. The rounded corners of the protector itself makes it a thorough protection to the clothing of pedestrians.

List No.	Dimensions Length, Feet	Approx. Shipping Weight lbs., 100 pcs.
7557	7	925
7558	8	1075

SLATER ENCIRCALL GUY GUARD

Hot Galvanized



On a main thoroughfare in large city. This is one of the busiest sections at certain hours of the day. Full visibility from all angles.

The EnCirCall Guy Guard full round is made of one piece of heavy gauge steel and is held in position by one bolt. One man can install this guy guard quickly and easily. The guard is lifted above the lower guy clamp and dropped over the guy strand. It is then lowered over the anchor rod till the lower end rests on the ground. The one-bolt clamp at the upper end is then tightened on the guy strand.



Section of Slater Encircall Guy Guard

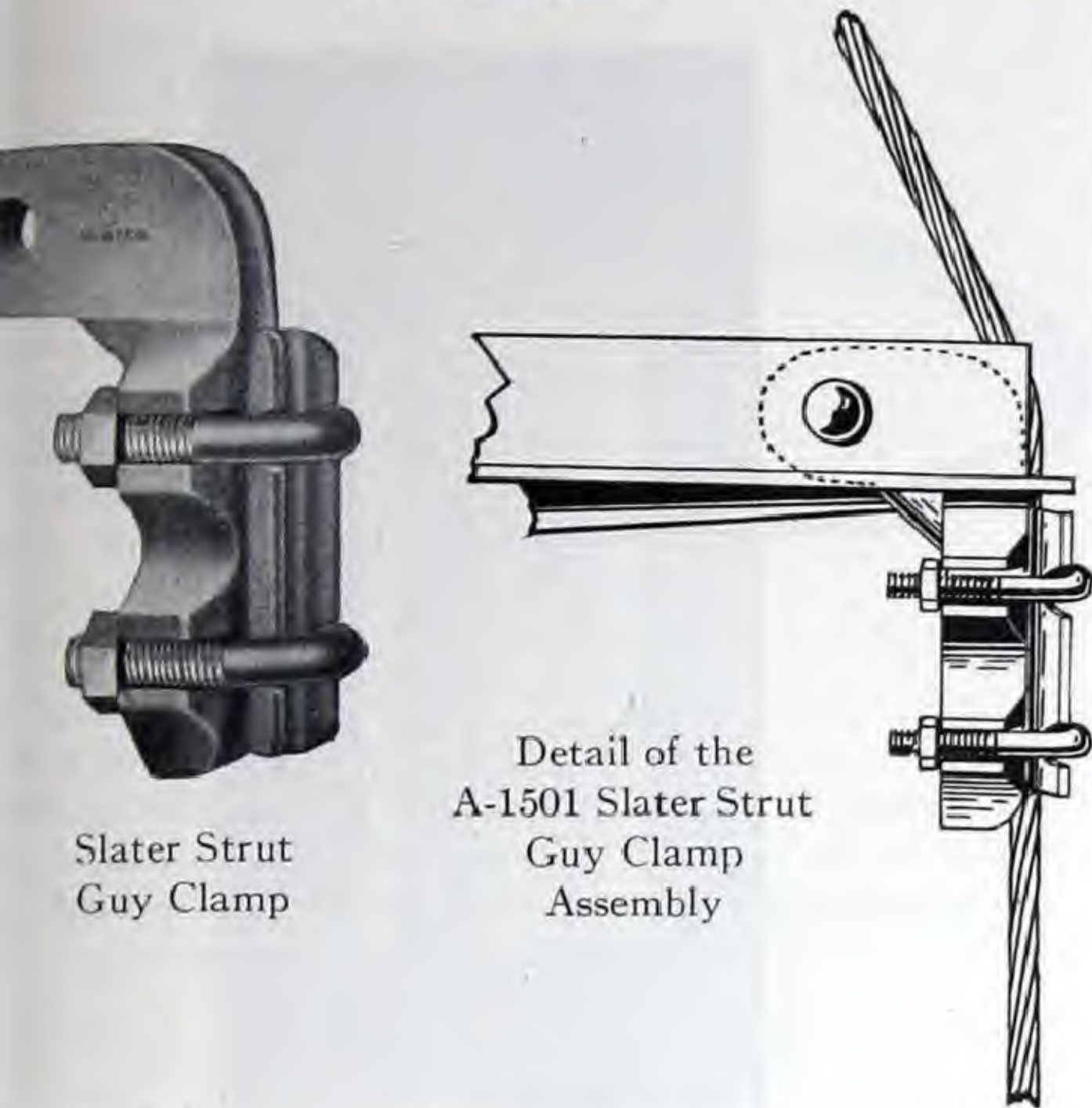
The EnCirCall Guy Guard will protect a double guy installation with equal ease. This adaptability and its full visibility from all angles make the EnCirCall Guy Guard the most suitable for such guy locations as are found near schools, playgrounds, or where traffic is very heavy.

A series of holes is pierced on both sides of the entire length of the guard. These holes eliminate any whistling or howling—caused by wind.

Ease of attachment, simplicity of mechanical construction and high visibility are the principal factors behind the demand for this guy guard. Due to its tubular shape, this Guy Guard is stronger than all other semi-circular types.

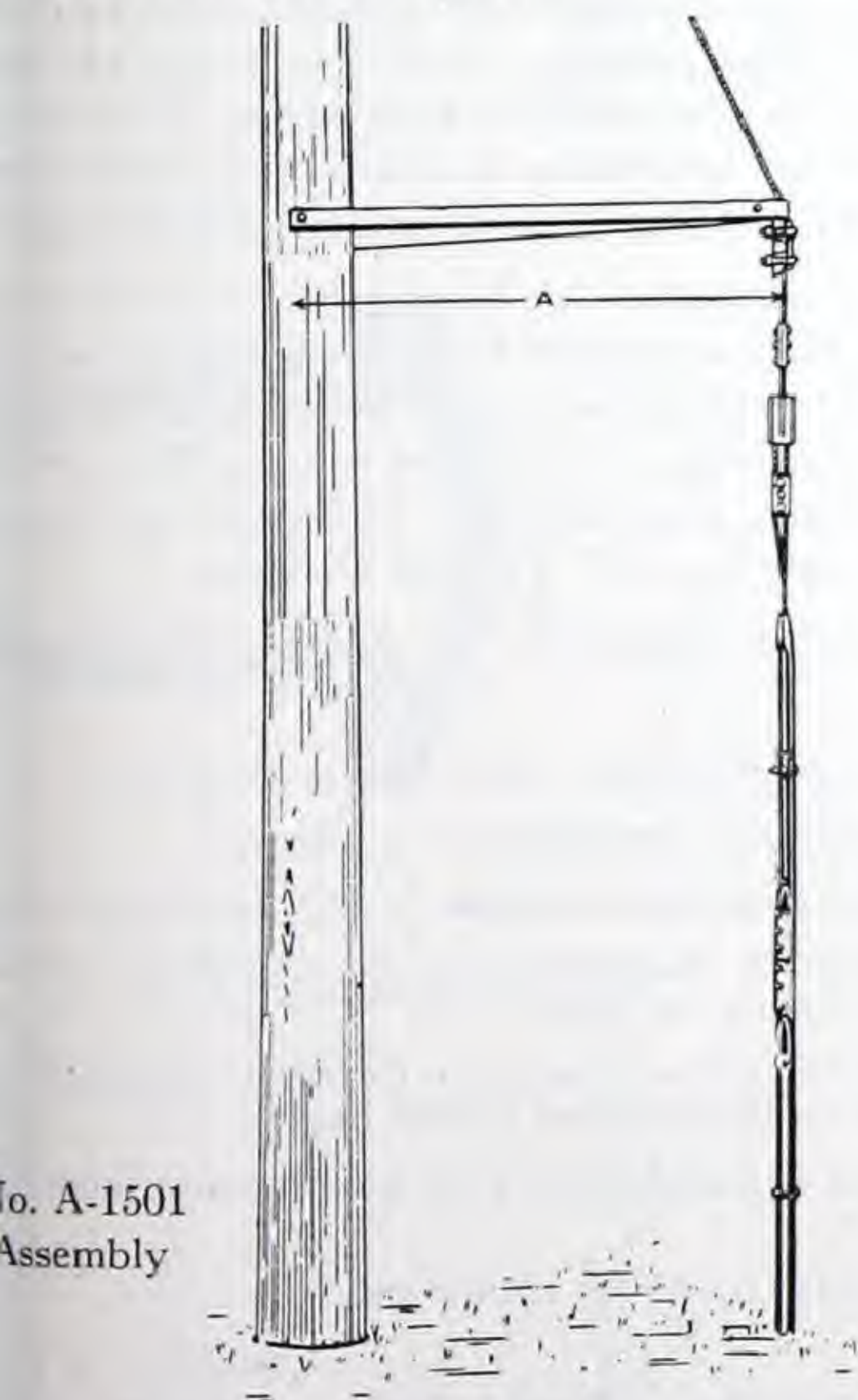
List No.	Length	Inside Diam. Inches	Standard Package	Wt. in Lbs. (Each)
7577	7 feet	3 3/8"	2	16 1/4
7578	8 feet	3 3/8"	2	18 1/2

SLATER GUY STRUTS
Hot Galvanized



This Slater Strut Guy Clamp is a complete clamp and strut combination. The clamp itself is a heavy cast block with clamp keeper with two U-bolts. This clamp is so designed that the guy strand is held without a possibility of kinking. The rounded shoulder of the clamp both holds the strand in position and gives it the right radius for its particular position. There are no extra parts to cut and fit when making this out guy. It is very neat for city locations.

This assembly is shipped as a unit—wired together for your convenience. Angle braces of other dimensions can be supplied if required, but the three lengths listed are usually standard to be all that is required.



Part No.	Overall length in feet	Angle Brace Dimensions, Inches	Approx. Shipping Wt., Lbs., Per 100 pcs.
501	6	1 3/4 x 1 3/4 x 3/16	3035
502	8	1 3/4 x 1 3/4 x 3/16	3892
503	10	1 3/4 x 1 3/4 x 3/16	4750

SLATER PUSH BRACE BAND

A practical application of the Slater stubbing band is illustrated, which shows a push-brace pole securely clamped to the main pole without drilling either the main pole or the push-brace pole.



Slater stubbing bands as applied to a push-brace, making a stronger job—without drilling either pole or push-brace.

These bands make a much stronger job than the conventional method of using a machine bolt—and can be installed much more quickly and without the hazard to the lineman who has to drill a hole for the machine bolt while standing on his spurs at the top of the pole.

The main points concerning the Slater push-brace bands are identical with the Slater Stubbing Band—namely:—

- (a) Salvage value—100 per cent.
- (b) All force applied to the bands by tightening the sleeve nuts is effective in clamping the brace pole to the main pole.
- (c) No holes are required to be bored.
- (d) No through bolt is necessary.

List No.	Pole Diameter	Length of Sleeve-Nut	Approx. Shipping Wt., Lbs., (per C Bands)
1829	8"	4 1/2"	284

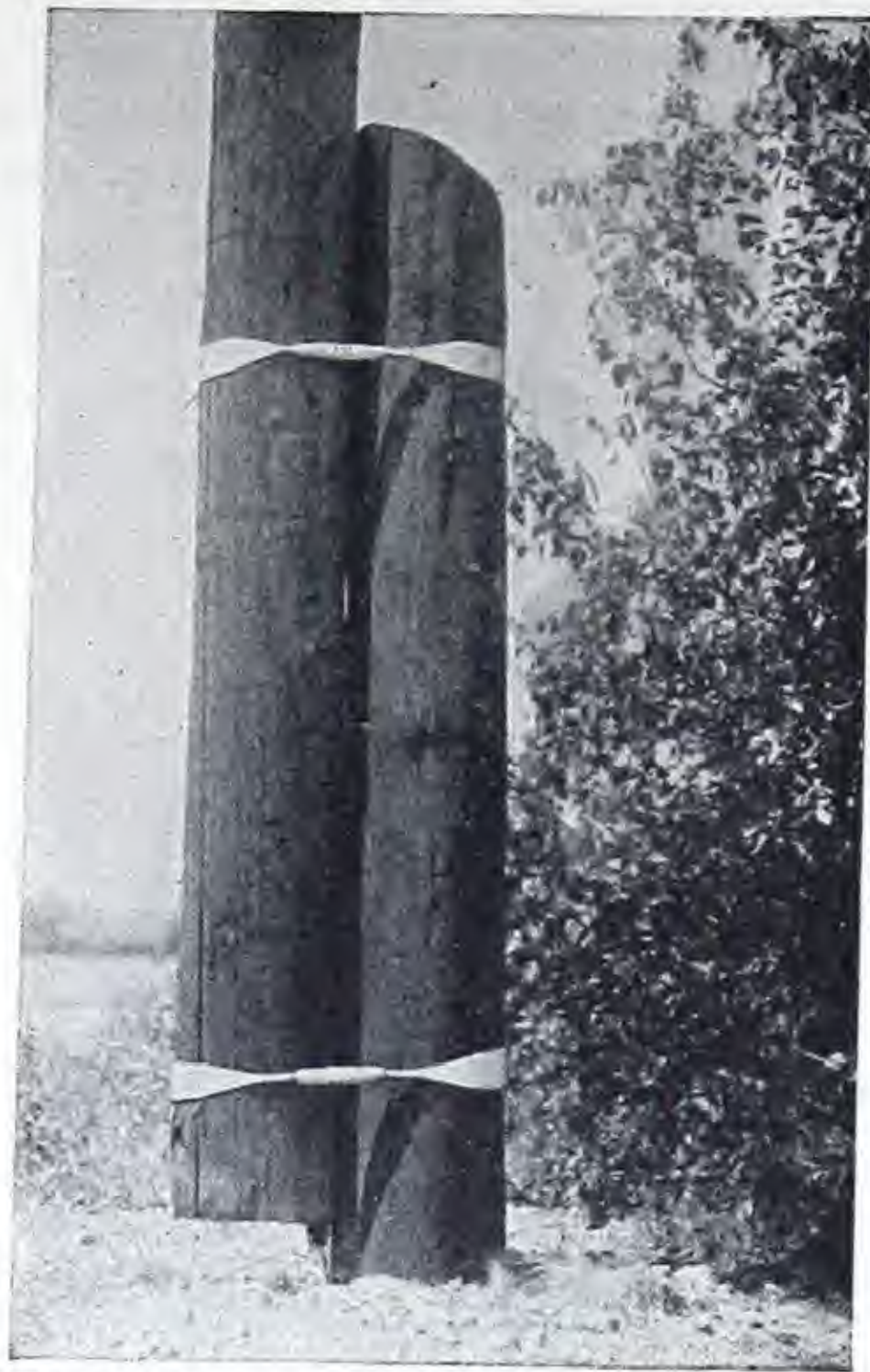
Guy hook and lag screw to be ordered separately.

SLATER STUBBING BANDS

Hot Galvanized

A 55-foot pole at a railway crossing. On account of height, the pole butt diameter is 18". The stub diameter is 14".

Note: In this case, one half an 18" band and one half a 14" band are used around the pole and stub respectively.



METHOD OF STUBBING

The following procedure to be carried out when stubbing a pole is based upon the use of Slater stubbing bands:—

In general, poles are stubbed across the line. If this is impossible, they can be stubbed on line, in which case it is advisable to use two (or four) $\frac{5}{8}$ " drift pins per pole. As a guide for the drift pins, bore $\frac{1}{2}$ " holes 6" deep, slanted and then drive the drift pins the required depth.

The stub selected should have a diameter equal to or greater than that of the pole.

Where the stub and the pole are of equal diameters, a larger half-band should be used around the stub than around the pole. Thus, for a 14" stub and a 12" pole, use one-half a 14" band and one-half a 12" band for the stub and pole respectively.

For guidance in ordering, storage and construction, each band is marked with the list number and the nominal pole diameter in large stencilled letters. The maximum and minimum pole diameters for each band are also marked, in smaller letters, on each side of the nominal pole diameter. For instance a 14" band will be marked thus:—

No. 1823 — 13-14-15

This indicates that a 14" band can be used with a 15" pole and stub, with $\frac{1}{2}$ " engagement at each end of the sleeve nut, and that same band will also pull down nicely on a 13" pole and stub, or any combination of these diameters.

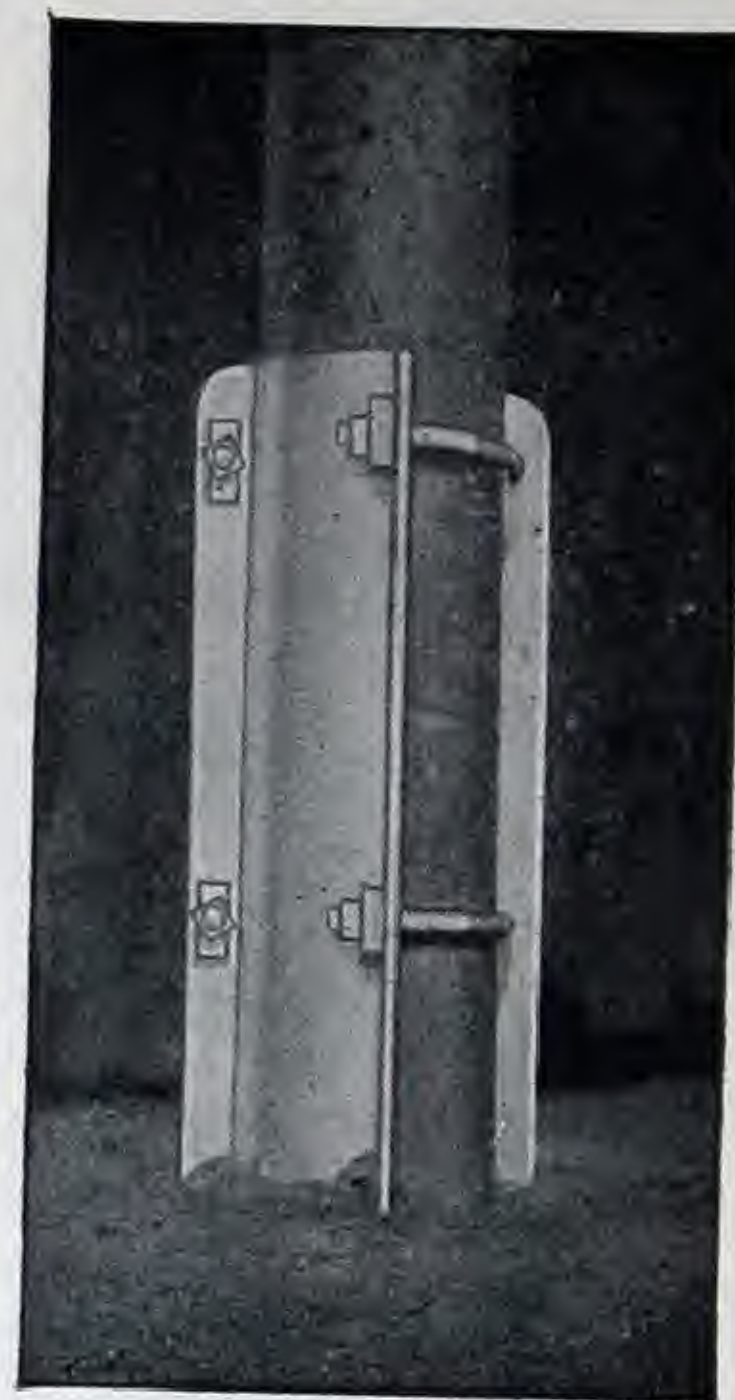
The following tabulation shows the figures which are stencilled on each half band:—

List No.	Nominal Diameters	Length of Sleeve Nut (inches)	Wt. lbs. Per C.	Std. Pkg.
1817	8 (4½" Sleeve Nut)	4½	367	10
1821A	9-10-11 (6" Sleeve Nut)	6	550	10
1822	11-12-13 (6" Sleeve Nut)	6	625	10
1823	13-14-15 (6" Sleeve Nut)	6	700	10
1824	15-16-17 (6" Sleeve Nut)	6	780	10
1825	17-18-20 (8" Sleeve Nut)	8	950	10
1826	19-20-22 (8" Sleeve Nut)	8	1020	10
1827	21-22-24 (8" Sleeve Nut)	8	1100	10

These stock numbers indicate one band only—namely two half-bands of the same diameter and two sleeve nuts.

SLATER POLE REINFORCEMENTS

Hot Galvanized



Slater Pole Reinforcement on 14" pole, adjacent to curb (visible section is exactly one-half of the total equipment).

The Slater Pole Reinforcement consists of two structural steel channels (length 6 feet) formed to fit the pole. The channels are bolted around the pole with six $\frac{3}{4}$ " curved bolts on each side. The pole—decayed only for a foot or two above the ground line—is sound and of full strength above and below this point. The steel channels, bolted firmly over the weakened section of the pole, reinforce that section to its original strength. Thus the installation of a Slater pole reinforcement will renew a questionable pole to its original strength and life.

Installation of the Slater Pole Reinforcement is very simple (1) Remove earth from around the pole to a depth of 3 or 4 feet. (2) Clean away rotted wood as far as possible, and treat with preservative. (3) Assemble complete reinforcement device above the ground line, with bolts left loose. (4) Drop into position. (5) Tighten all bolts.

Outstanding advantages in the use of Slater Pole Reinforcements:—

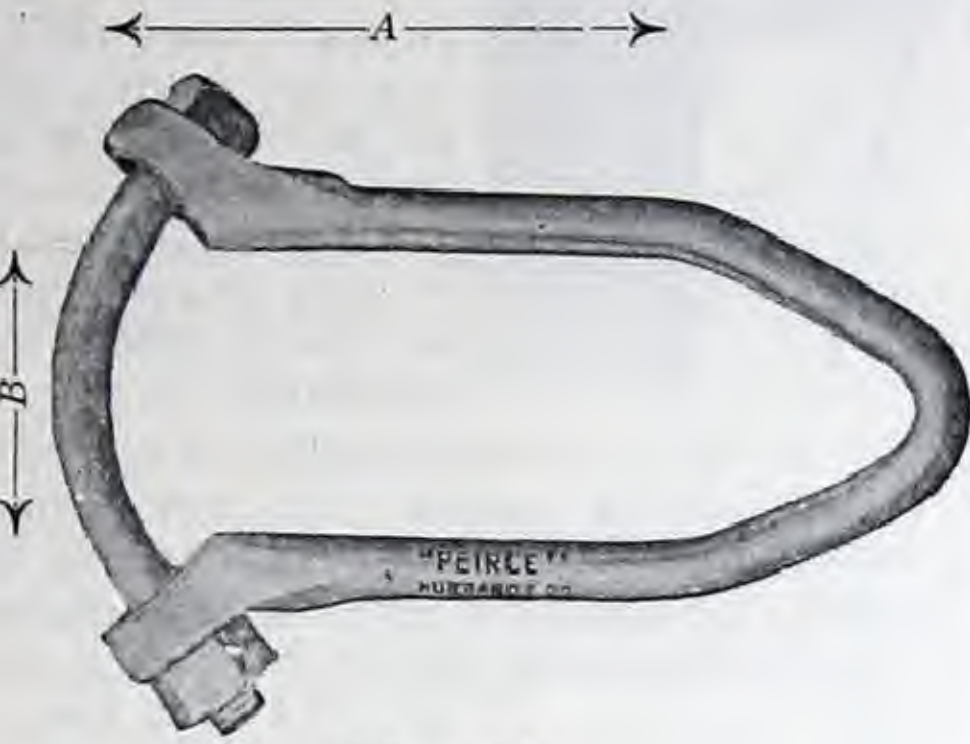
1. All steel construction, unbreakable material.
2. Hot galvanized throughout.
3. Low labour installation cost.
4. No labour or material cost for changing overhead fixtures, wiring or guys.
5. Occupies minimum side space to curbs, sidewalks, etc. No need to throw poles out of line.
6. Minimum of interference with underground pipes, conduits, etc.
7. High salvage value for future use.

List No.	Pole Diameter in Inches	Total Length in Feet	Weight in Lbs (complete with bolts, etc.)
1831	12	6	180
1832	14	6	205
1833	16	6	230
1834	18	6	240

WATER STRAIN INSULATOR CLEVISES

Hot Galvanized

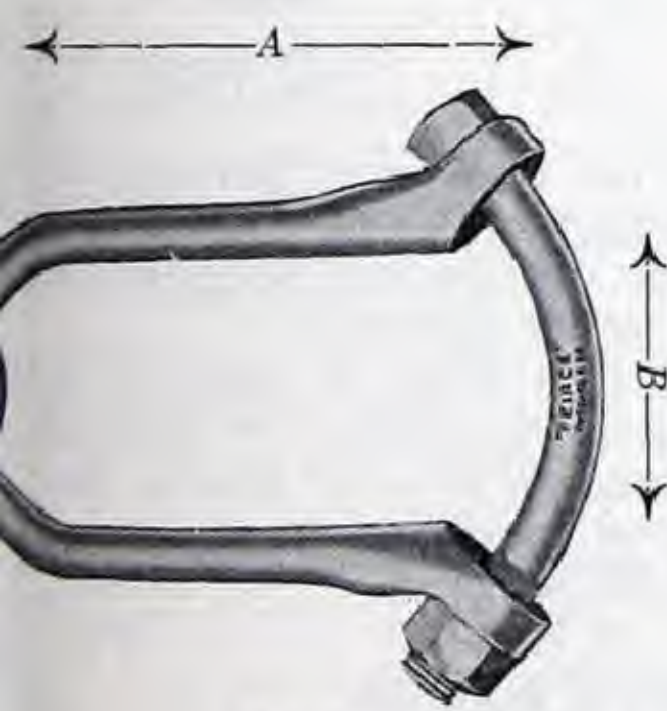
The Light Type is drop forged from $\frac{1}{16}$ -inch diameter open hearth steel. It has an ultimate strength of 10,000 pounds and is equipped with a $\frac{1}{2}$ -inch bolt. An eye 1-inch inside diameter is required to accommodate this Clevis.



No. 823

The Heavy Type is drop forged from $\frac{1}{2}$ -inch diameter open hearth steel. It has an ultimate strength of 13,000 pounds and is equipped with a $\frac{1}{2}$ -inch bolt. An eye $1\frac{1}{2}$ -inch inside diameter is required to accommodate this Clevis.

Light Type		Heavy Type	
Wt. Lbs. per 100	Dimensions in Ins. A B	List No.	Wt. Lbs. per 100
62	3 1 1/2	821	96
72	4 1 1/2	822	111
64	3 1 3/4	823	102
74	4 1 3/4	824	114
66	3 2	825	105
76	4 2	826	117
68	3 2 1/4	827	108
79	4 2 1/4	828	120
	4 1/2 2 1/4	828 1/2	126
89	5 2 1/4	829	132
71	3 2 1/2	830	111
81	4 2 1/2	831	125
	4 1/2 2 1/2	831 1/2	131
91	5 2 1/2	832	137



No. 843

Eye Type

The Eye Type Clevis is very much similar to the Heavy Type, except that it has a drop forged eye in the crotch of the clevis which is provided with an $\frac{11}{16}$ -inch hole. This hole permits the clevis to be attached to the head end of a through bolt, nut end of a through bolt, double

ing bolt, eye bolt, or double arming eye bolt.

Dimensions in inches		Wt. Lbs. Per 100
No.	A B	
41	3 1 1/2	117
42	4 1 1/2	129
43	3 1 3/4	119
44	4 1 3/4	131
45	3 2	121
46	4 2	133
47	3 2 1/4	123
48	4 2 1/4	135
48 1/2	4 1/2 2 1/4	141
49	5 2 1/4	147
50	3 2 1/2	126
51	4 2 1/2	138
51 1/2	4 1/2 2 1/2	144
52	5 2 1/2	150

SLATER FLEXIBLE BAIL CLEVISES



Slater Flexible Bail Clevis—For Strain Insulator Assembly Illustrated No. 2070



Slater Flexible Bail Clevis—For Strain Insulator Assembly Illustrated No. 2067

SLATER FLEXIBLE BAIL CLEVIS FOR STRAIN INSULATOR

These new Slater Clevises are of the Bail and Yoke type. The Bail, or that part in contact with the insulator, is made of galvanized strand which, under tension, forms to fit the strain insulator, providing maximum contact area. This feature removes the hazard of a concentrated stress on a small area, which often causes a porcelain to fail far below its rated strength.

The Yoke is made of $\frac{1}{8}$ " galvanized steel with a $\frac{1}{2}$ " cotter bolt. The spacing of the holes for the bail are on $2\frac{3}{4}$ " centres.

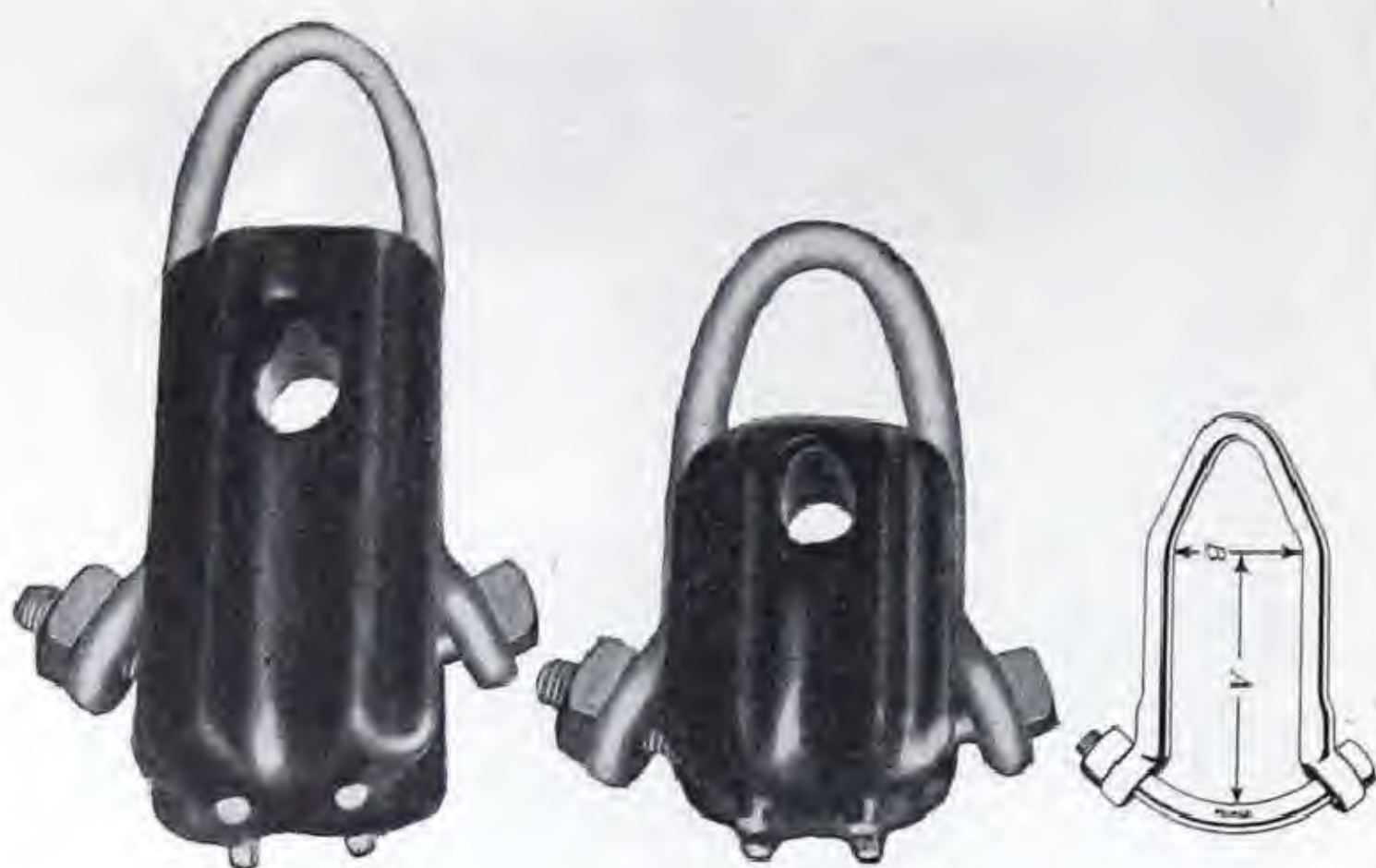
The Bail is made of $\frac{3}{16}$ " four-immersion galvanized strand, with $\frac{1}{2}$ " diameter studs on the ends, which are made of Everdur. The studs are made with a nut-lead to prevent cross-threading. The nuts on the bail are trapped in the yoke against turning. No lock washers are required.

These Slater Clevises will actually raise the average strength of porcelain strain insulators in construction, because they eliminate concentrated stresses. They will prove of great value where old strain insulators are being salvaged—due to the wide range of sizes that they will accommodate.

List No. 2064 Insulator, (Strain)
Dry Flashover—35 Kv.
Wet Flashover—18 Kv.
Ultimate Strength—12000 lbs.

List No.	Item	Shipping Weight in lbs. per 100	Std. Pkg.
2066	1—No. 2064 Insulator with one clevis.....	250	25
2067	1—No. 2064 Insulator with two clevises.....	350	25
2068	2—No. 2064 Insulators with connecting harness only.....	500	20
2069	2—No. 2064 Insulators with connecting harness and one clevis..	600	20
2070	2—No. 2064 Insulators with connecting harness and two clevises.	700	20
2064	Strain Insulator only. (Wet Process Porcelain).....	151	50

SLATER STRAIN CLEVISES

No. 606 with No.
506-W InsulatorNo. 604 with No.
504-W InsulatorNos. 602, 604
and 606

The above illustrations show our standard Strain Insulators and Clevises. The insulators are Slater wet process porcelain with a uniform brown glaze and are of the usual Slater high quality.

Being wet process porcelain, the insulators are non-absorbent and will maintain their insulating properties.

The Clevises are specially designed for these insulators so that a proper fit is thereby assured. They are made of $\frac{1}{2}$ -inch steel with drop-forged eyes. A heel which extends to the bolt is provided to distribute any side strain on the insulator, throughout the full length of the groove.

After forging and bending the whole is then galvanized by the Hot-Dip method; the bolt also is hot-dipped, ensuring thereby thorough prevention of deteriorating by rust or corrosion and assuring a long life of the Clevis.

List No.	A	B	Slater Insulator No.	Approx. Weight Per 100
602	2 $\frac{1}{2}$ "	1 $\frac{3}{4}$ "	502W	95 lbs.
606	4 $\frac{1}{2}$ "	1 $\frac{7}{8}$ "	506W	125 lbs.

Prices on application.

SNUBBER EYE TREE BOLT



List No.	Item	Shank Dimensions	Weight Per 100 pcs.
2053	Snubber Eye Tree Bolt	$\frac{5}{8}$ "x8"	140
2076	Snubber Eye Tree Bolt	$\frac{3}{4}$ "x8"	180

SLATER POLE STRUTS



Cases will arise in overhead line construction, especially in cities, in which is impossible to secure guying privilege. In such cases poles at corners in the line can be made self-supporting or "hogged" by means of the Slater Struts, shown at left.

Slack spans should be used on both sides of such trussed pole. The pole should be set in concrete one foot deeper than standard.

The Slater Strut is made of heavy steel channels, with a broad bearing against the pole, from which it extends 11 inches, and requires only the driving of three $\frac{1}{2}$ -inch lags to attach it rigidly to a pole of any diameter.

List No.	Extension from Pole Inches	Wt., Lb. Per 10
1500	11	8 $\frac{1}{2}$

Price on application.

GUY SHIMS

Hot Galvanized
No. 7570

The purpose of Guy Shims is to keep the guy strand from cutting into the pole, which not only injures the pole but also retains moisture about the strand and accelerates corrosion. Six or more guy shims are required per pole, depending on its diameter. The nail holes are $\frac{1}{4}$ -inch diameter.

List No.	Dimension in Inches	Wt., Lb. per 10
7570	1 $\frac{7}{8}$ x $\frac{7}{8}$ x8	57

Prices on application.

SLATER STRAIN PLATES

Hot Galvanized



No. 7575



No. 7576

The Strain Plate is used for the same purpose as Guy Shims but gives better protection to the pole, costs less, and is cheaper to install than shims. From two to four plates are required per pole depending on its diameter.

The No. 7576 Moulding Strain Plate is used to prevent the guy strand from cutting or crushing the ground wire moulding. This plate is formed to fit over the N. E. L. standard one inch ground wire moulding.

List No.	Type	Dimensions in Inches	Wt., Lb. Per 100
*7575	Standard	4 x 8 x 14 Ga.	75
7576	Moulding	4 x 8 x 14 Ga.	75

GUY HOOKS

Hot Galvanized

No. 7583 $\frac{1}{2}$

The 1 $\frac{3}{4}$ " x $\frac{3}{8}$ " Guy Hook is the N. E. L. A. and A. T. & T. Company's standard and is in general use. For light work the 1 $\frac{1}{4}$ " x $\frac{1}{4}$ " and the 1 $\frac{1}{2}$ " x $\frac{3}{8}$ " gives very satisfactory results.

List No.	Size Steel Inches	Lgth. Holes	Diam. In.	Wgt., Lbs. per 100
7583 $\frac{1}{2}$	1 $\frac{1}{4}$ x $\frac{1}{4}$	3 $\frac{1}{2}$	$\frac{9}{16}$	39
*7584	1 $\frac{3}{4}$ x $\frac{3}{8}$	4	$\frac{11}{16}$	87
7585	1 $\frac{1}{2}$ x $\frac{3}{8}$	3 $\frac{1}{2}$	$\frac{9}{16}$	59
7586	1 $\frac{1}{2}$ x $\frac{3}{8}$	6	$\frac{9}{16}$	88

Prices on application.

*N. E. L. A. Standard.



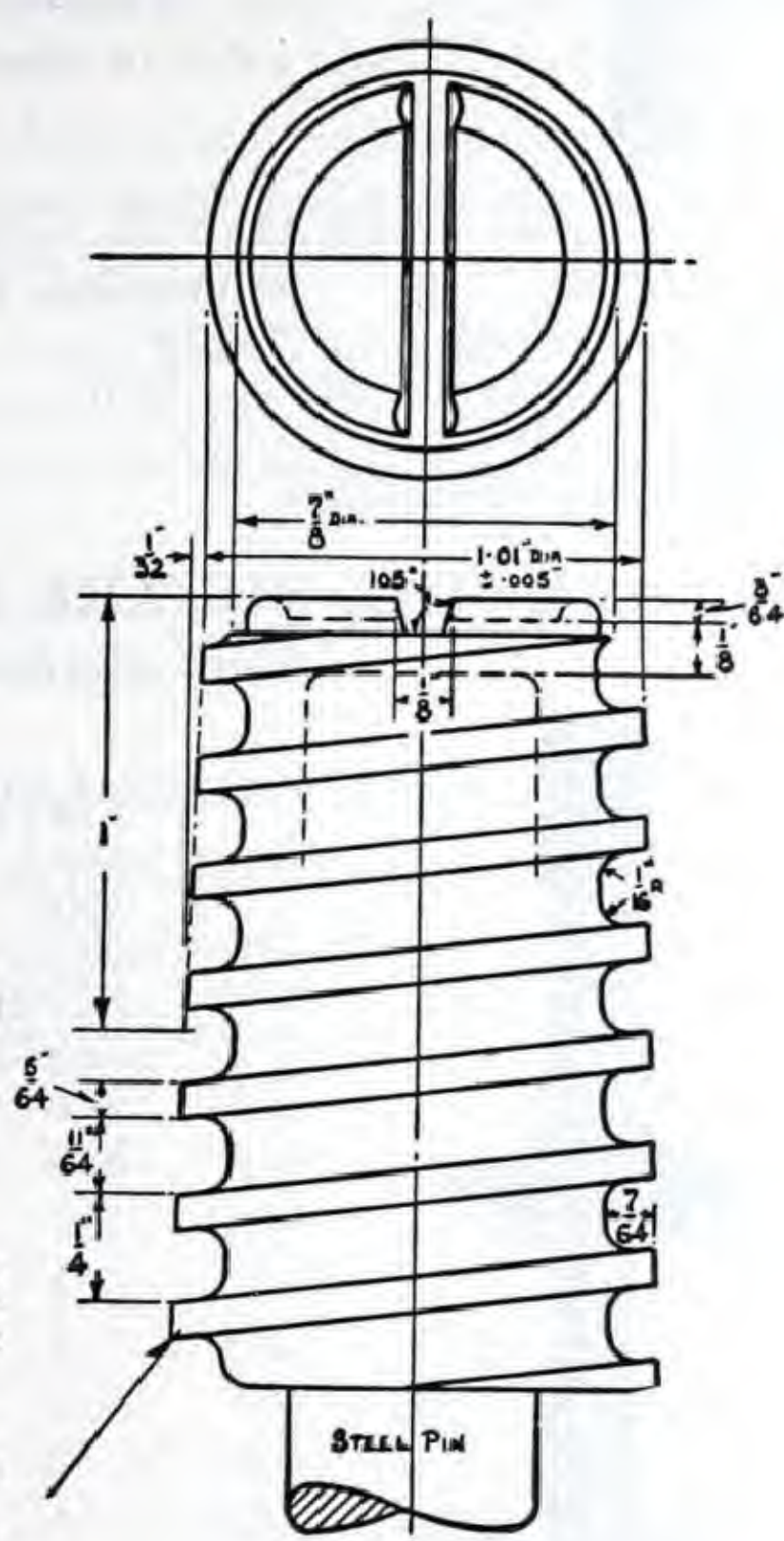
No. 7586

LEAD THREAD STANDARDS

It is the common experience of many inter-dependent industries to suffer from lack of standardization of manufacturing practice.

As the outcome of conferences between the various parties concerned, power corporations, insulator manufacturers and hardware manufacturers, it has been agreed to adopt the accompanying design for lead threads of 1" and 1 3/8" diameters. The design of this thread falls within the tolerance N.E.L.A. specifications for diameters.

This design of thread is known as the "Allen" thread, the particular feature of which is that it is square at the outer diameter of the thread and the full corners of this thread conform readily to the thread shape in the porcelain and provides a maximum bearing surface between the pin and insulator threads.



THE ALLEN

CAST LEAD - PIN THREAD

Note:
Allowable variation
plus or minus on all
dimensions except where
otherwise shown

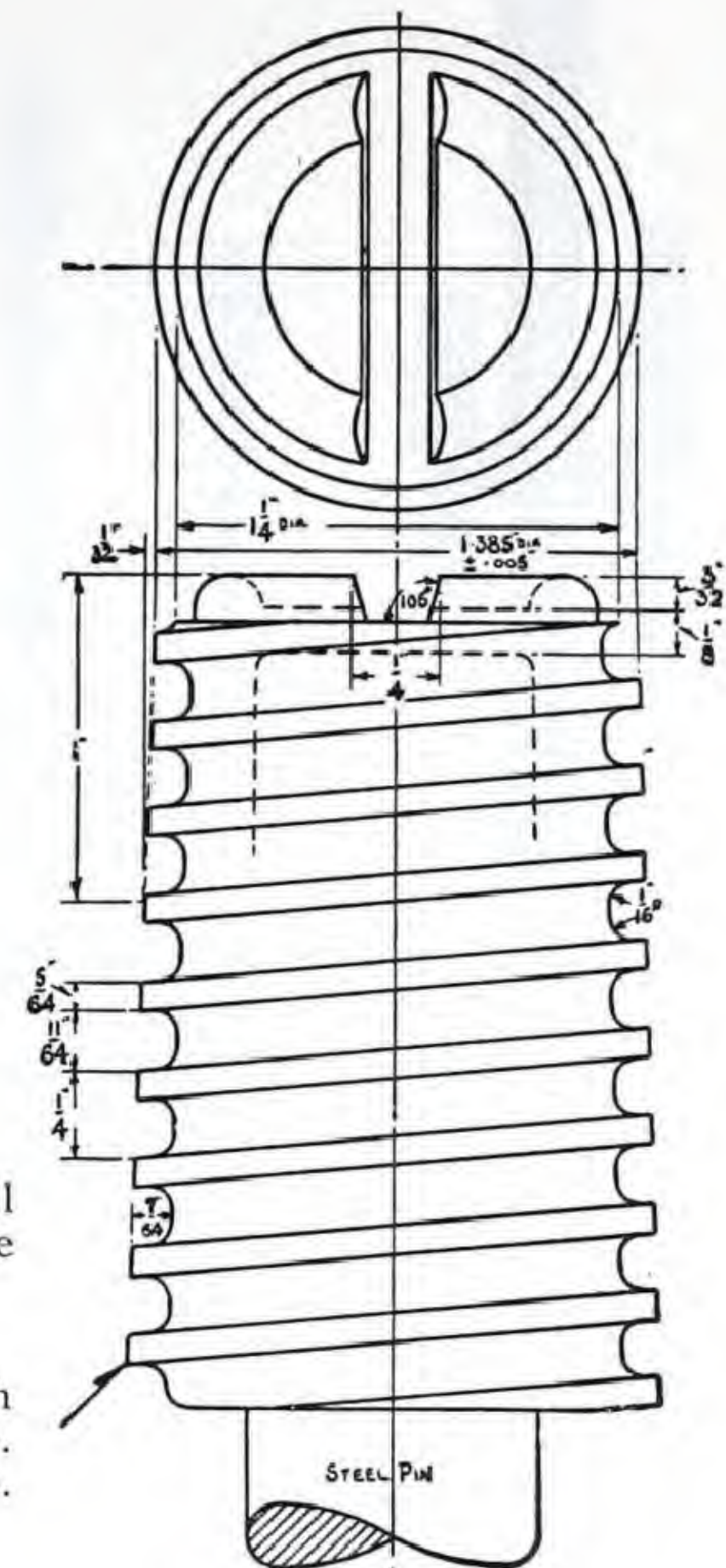
4 Threads per inch
taper - 1/16" in dia.
per inch in length.

EVERYTHING For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."

LEAD THREAD STANDARDS

(Continued)



THE ALLEN

1 3/8" CAST LEAD - PIN THREAD

Note:
Allowable variation
5% plus or minus on all
dimensions except where
otherwise shown.

4 Threads per inch
taper - 1/16" in dia.
per inch in length.

SLATER PIN THREAD ADAPTERS



List No. 5028
ADAPTER

For changing 1 inch
Diameter Pin Thread
to 1 3/8 inch diameter.

For changing 1 inch diameter Pin
Threads to 1 3/8 inch diameter.

Slater Pin Thread Adapters have been developed to meet the needs of engineers who are forced to meet the problem of stepping up voltages on their lines without changing the insulator pins.

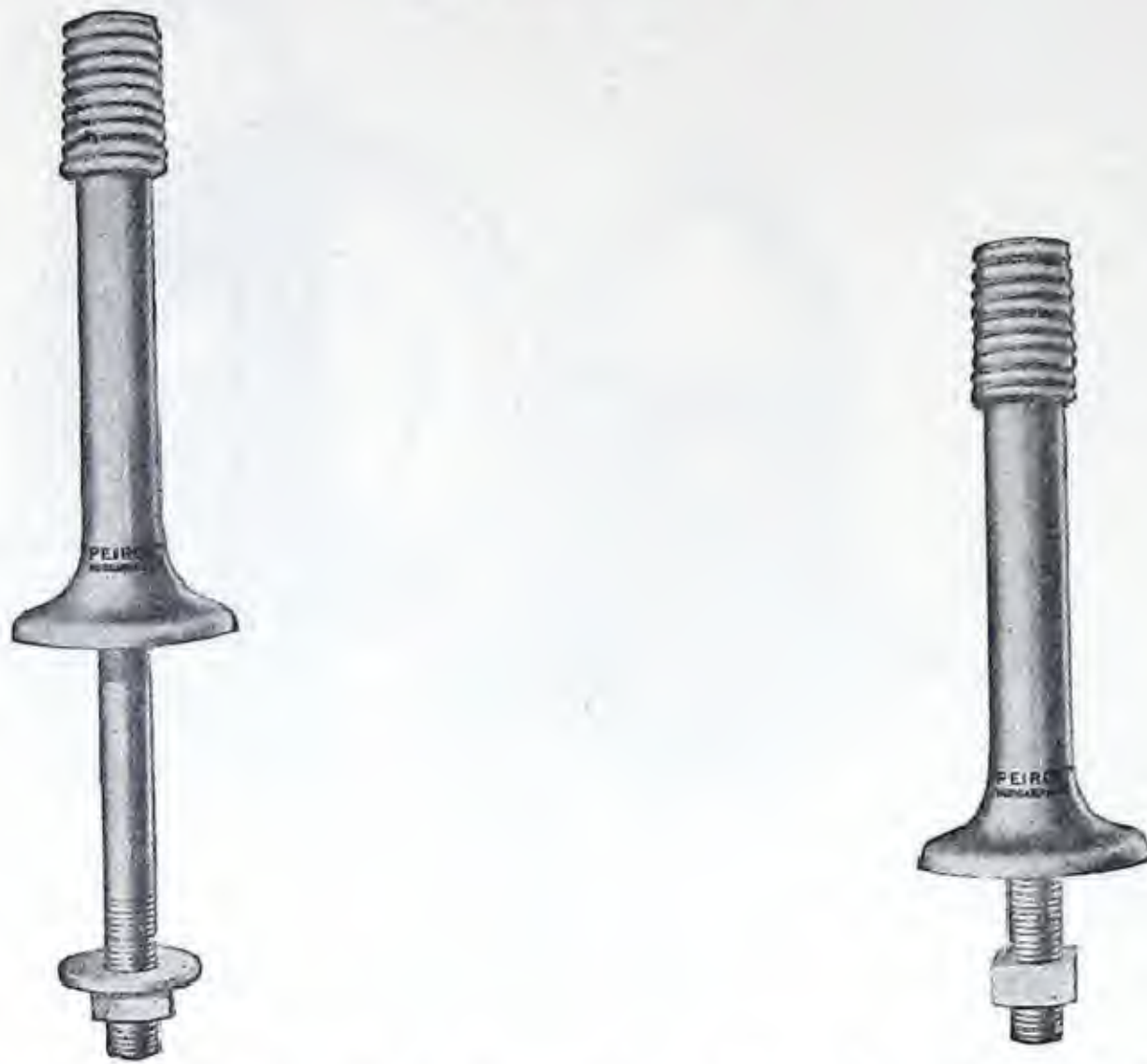
By the application of Adapter No. 5028 on existing 1-inch threads, insulators designed for higher voltages requiring 1 3/8 inch pin threads can be applied.

The Adapter consists of a tapered brass thimble with internal 1-inch pin thread. The 1 3/8 inch lead thread is applied to the brass thimble by the Slater Perfect-bond process. The thread is the adopted Allen Standard thread.

List No.	Dimensions in Inches				Shipping Weight (approx.) Pounds per 100
	Outside Diam.	Inside Diam.	Length	Thread	
5028	1 3/8"	1"	2 1/8"	Allen	50

SLATER FORGED STEEL PINS

With Lead Threads
Hot Galvanized



Slater Lead Threads possess the following characteristics:
Uniform in size and shape.

Accurate threads entirely free from fins.

There is a perfect bond between the lead and pin.

The pins are scored and notched and so prepared that when the lead thread is cast, it actually becomes a part of the pin.

The lead used is specially prepared so it will not flow under pressure of the insulator and yet not hard enough to be brittle.

Long Shank for Wood Arms

With Lead Threads for Screwing into Insulators with 1-inch Pin Hole

List No.	A	B	C	D	F	G	H	Wt., Lbs. Per 100
5704	4	5 1/2	3/4	2 1/2	1	1 5/8	1 3/4	225
5708	5	5 1/2	3/4	2 1/2	1	1 5/8	1 3/4	240
5712	6	5 1/2	3/4	2 1/2	1	1 5/8	1 3/4	267

With Lead Threads for Screwing into Insulators with 1 3/8-inch Pin Hole

5724	6	6 1/2	3/4	3	1 3/8	2 1/8	2 3/4	450
5726	7	6 1/2	3/4	3	1 3/8	2 1/8	2 3/4	485
5728	8	7	3/4	3	1 3/8	2 1/8	2 3/4	536
5730	9	7	3/4	3 1/2	1 3/8	2 1/8	2 3/4	624
5732	10	7	3/4	3 1/2	1 3/8	2 1/8	2 3/4	688
5734	11	7	3/4	3 3/4	1 3/8	2 1/8	2 3/4	759
5736	12	7	3/4	3 3/4	1 3/8	2 1/8	2 3/4	826
5738	13	7	3/4	3 3/4	1 3/8	2 1/8	2 3/4	893

Short Shank for Steel Arms

With Lead Thread for Screwing into Insulators with 1-inch Pin Hole

List No.	A	B	C	D	F	G	Wt., Lbs. Per 100
5703	4	1 3/4	3/4	2 1/2	1	1 5/8	167
5707	5	1 3/4	3/4	2 1/2	1	1 5/8	181
5711	6	1 3/4	3/4	2 1/2	1	1 5/8	207

With Lead Threads for Screwing into Insulators with 1 3/8-inch Pin Hole

5723	6	1 3/4	3/4	3	1 3/8	2 1/8	365
5725	7	1 3/4	3/4	3	1 3/8	2 1/8	400
5727	8	1 3/4	3/4	3	1 3/8	2 1/8	450
5729	9	1 3/4	3/4	3 1/2	1 3/8	2 1/8	550
5731	10	1 3/4	3/4	3 1/2	1 3/8	2 1/8	599
5733	11	1 3/4	3/4	3 3/4	1 3/8	2 1/8	673
5735	12	1 3/4	3/4	3 3/4	1 3/8	2 1/8	733
5737	13	1 3/4	3/4	3 3/4	1 3/8	2 1/8	793

Note:—Special Pins for Insulators having 1 1/2-inch Pin Hole can be furnished.

SLATER BROAD BASE FORGED STEEL PINS

Hot Galvanized

Slater Broad Base Pins are designed supporting heavy primary and secondary lines on wood cross arms.

The base is 2 1/2 inches wide and made in two styles for flat top arms and for roofed arms.

The shank, 5/8-inch in diameter, furnished in two lengths, 5 1/2 and 6 inches, and is provided with 2 1/2 inch of cut thread.

Lock Washer No. 5040, is included in the price of these pins.



LEAD THREAD FOR 1-INCH PIN HOLE

List No.	Dimensions in Inches	Wt., Lb. Per 100
Flat Base	Curved Base	
1091	1090	
	Height Above Arm	
	Length of Shank	
	4 1/2	5 1/2

Prices on application.

SLATER SQUARE BASE PINS

Hot Galvanized

Slater Forged Steel Pin No. 5705, having square base formed to fit roofed cross-arm, with 1" lead thread.



Slater Forged Steel Pin, No. 5706, having square base formed to fit roofed cross-arm with 1 3/8" lead thread.



These Slater Forged Steel Pins are made with a square base and all the features which have been incorporated in Slater pins—one piece construction, high cantilever strength, uniformity of production. The base is trimmed square formed with a radius that fits snugly on the curved surface of the cross-arm. These pins are supplied with Allen I Threads, or with separate thimbles.

All Slater lead thread thimbles are put on by the Slater Perfect Bond process—originated by Slater in 1920.

In replacing wood pins with steel pins, it will be necessary to use two centering washers to hold the steel pin upright in the centre of the hole from which the wood pin was removed. This centering washer, List 2050, is made of cast iron, galvanized, and is accessory to the pin, and should be separately ordered.

List No.	Thread Diam. Inches	Shank Diam.	Length Above Shoulder	Length Below Shoulder	Std. Pkg.	Wt. Lb.
5705	1	3/4	4 3/4	5 1/2	50	2
5706	1 3/8	3/4	6	5 3/4	50	3

SLATER FORGED STEEL PINS

With Standard 1-inch Lead Threads for Low Voltage Insulators
Hot Galvanized

From a careful study of the action of lead thread pins in actual service during the past ten years, we have found that a lead thread pin must possess the following characteristics in order to stand up properly under actual working conditions.

Threads Must be Uniform in Size and Shape

To properly fit the insulator pin hole the threads must be uniform in size and shape.

The Slater method of casting threads on pins guarantees a thread accurate in size and shape and entirely free from fins.

Lead Must Adhere to Pin

There must be a perfect bond between the lead and zinc coating on the pin to positively prevent removal of the lead.

Slater Pins in addition to being scored and notched are so prepared that when the lead thread is cast, it actually becomes a part of the pin.

Lead Must Be of Proper Hardness

The lead used must be of sufficient hardness to prevent bending under the pressure of the insulator and yet not hard enough to be brittle.

Slater lead threads are made of a special prepared lead to give the desired results.

Long Shank Type

For Wood Cross Arms

—Length, Inches—

List No.	Diam. Inches	Above Shoulder	Below Shoulder	Total	Wt. Lbs. Per 100
971	1/2	4 3/4	4 3/4	9 1/2	120
974	1/2	4 3/4	5 1/2	10 1/4	125
980	5/8	4 3/4	4 3/4	9 1/2	149
981	5/8	4 3/4	5 1/2	10 1/4	156
981A	5/8	4 3/4	6 1/2	11 1/4	163
982	5/8	6	4 3/4	10 3/4	160
984	5/8	6	5 1/2	11 1/2	166
983	5/8	6	6 1/2	12 1/2	174
990A	3/4	4 3/4	5 3/4	10 1/2	205
990	3/4	6	5 3/4	11 3/4	220
991	3/4	6	6 3/4	12 3/4	233

Short Shank Type

For Steel Cross Arms and Brackets

List No.	Diam. Inches	Above Shoulder	Below Shoulder	Total	Wt. Lbs. Per 100
972	1/2	4 3/4	1 1/4	6	108
986	5/8	4 3/4	1 1/4	6	131
987	5/8	6	1 1/4	7 1/4	132
993A	3/4	4 3/4	1 1/2	6 1/4	139
993	3/4	6	1 1/2	7 1/2	155

Lag Screw Type

For Pole and Transformer Wiring

List No.	Diam. Inches	Above Shoulder	Below Shoulder	Total	Wt. Lbs. Per 100
973	1/2	4 3/4	3	7 3/4	104
975	1/2	6	3	9	115
988	5/8	4 3/4	3	7 3/4	112
989	5/8	7 1/2	4	11 1/2	154
994	3/4	6	4	10	158

Prices on application.

SLATER WOOD TOP PINS WITH STEEL BOLTS

Bolts Hot Galvanized



No. 8078 No. 8070 No. 8000 No. 8006 No. 8010 No. 8011

Wood Top Pins are composed of oak tops, thoroughly impregnated with creosote or parafine, and stiff steel fin bolts. Complete with nut and washer as illustrated. Bolts and tops are shipped assembled.

FOR 1-INCH INSULATOR PIN HOLE

List No.	Size, Wood Top, Inches			Size of Bolt, Inches			Wt.,
	Diam. Top	Diam. Bottom	Length	Length		Below Top	Lbs. Per 100
				Diam.	Length		
8070	1	1 $\frac{7}{8}$	4 $\frac{1}{2}$	$\frac{1}{2}$	5 $\frac{1}{2}$	1	60
8071	1	2 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{1}{2}$	6 $\frac{1}{2}$	1 $\frac{1}{4}$	68
8074	1	1 $\frac{7}{8}$	4 $\frac{1}{2}$	$\frac{1}{2}$	9 $\frac{1}{2}$	5	75
8075	1	2 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{1}{2}$	10 $\frac{1}{2}$	5 $\frac{1}{4}$	85
8076	1	2 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{1}{2}$	11 $\frac{1}{2}$	6 $\frac{1}{4}$	96

FOR 3 3/8-INCH INSULATOR PIN HOLE

8072	1 $\frac{3}{8}$	2 $\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{5}{8}$	5 $\frac{1}{2}$	1	95
8073	1 $\frac{3}{8}$	2 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{5}{8}$	6 $\frac{1}{2}$	1 $\frac{1}{4}$	105
8077	1 $\frac{3}{8}$	2 $\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{5}{8}$	9 $\frac{1}{2}$	5	130
8078	1 $\frac{3}{8}$	2 $\frac{1}{4}$	4 $\frac{1}{2}$	$\frac{5}{8}$	10 $\frac{1}{2}$	6	136
8079	1 $\frac{3}{8}$	2 $\frac{1}{4}$	5 $\frac{1}{4}$	$\frac{5}{8}$	10 $\frac{1}{2}$	5 $\frac{1}{4}$	140
8080	1 $\frac{3}{8}$	2 $\frac{1}{4}$	6 $\frac{1}{2}$	$\frac{5}{8}$	12 $\frac{1}{2}$	6	170
8081	1 $\frac{3}{8}$	2 $\frac{1}{2}$	8	$\frac{5}{8}$	14	6	196
8082	1 $\frac{3}{8}$	2 $\frac{3}{4}$	9	$\frac{5}{8}$	16	7	221

Prices on application.

STANDARD WESTERN UNION PINS

Hot Galvanized

Wood Cob Pins are made in accordance with the specifications of the Western Union Telegraph Co. and the Railway Signal Association. The cobs are of the best grade of air dried oak, turned to fit a gauge and boiled in creosote parafine to exclude all moisture. The pins are made of stiff, high carbon steel with clean threads, square nuts and clipped, round washers, and are for use with standard insulators having 1-inch pin holes.

LONG SHANK PINS

For Wood Cross Arms

List No.	Diameter Inches	Length, Inches	Wt., Lbs. Per 100
8000	1/2	Above Shoulder 4 1/4, Below Shoulder 5	74
8005	5/8	Above Shoulder 4 1/4, Below Shoulder 5	106

LAG SCREW PINS

For Wood Arms and Poles

List No.	Diameter Inches	Length, Inches	Wt., Lbs. Per 100
8006	1/2	Above Shoulder 4 1/4, Below Shoulder 3	63
8007	5/8	Above Shoulder 4 1/4, Below Shoulder 3	90

SHORT SHANK PINS

For Steel Cross Arms and Transposition Brackets

List No.	Diameter Inches	Length, Inches	Wt., Lbs. Per 100
8010	1/2	Above Shoulder 4 1/4, Below Shoulder 1	53
8015	5/8	Above Shoulder 4 1/4, Below Shoulder 1	74
8015A	5/8	Above Shoulder 4 1/4, Below Shoulder 1 3/8	76

SHORT SHANK PINS

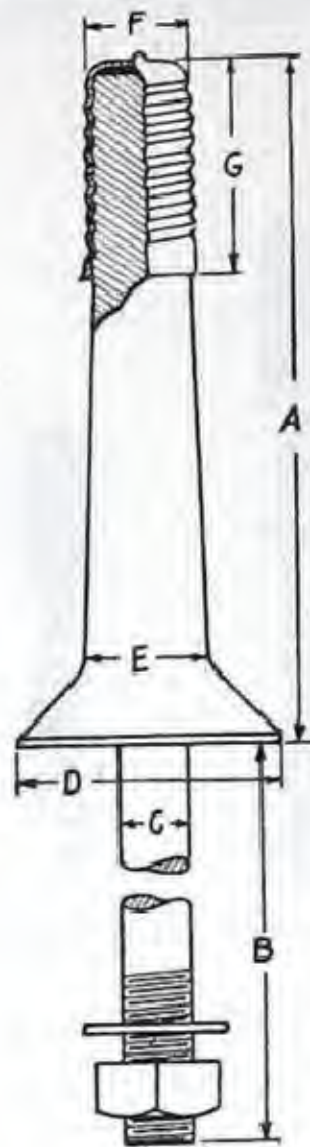
With Long Cob for Transposition Insulators

List No.	Diameter Inches	Length, Inches	Wt., Lbs. Per 100
8011	1/2	Above Shoulder 5, Below Shoulder 1	59
8016	5/8	Above Shoulder 5, Below Shoulder 1	77

Prices on application.

SLATER FORGED STEEL PINS

With Drawn Zinc Separable Thimbles
Hot Galvanized



With the Slater drawn separable type of forged Steel Pin the full strength of the Pin is brought up to the top of the insulator bore. The usual weak joint between the thimble and pin is entirely eliminated.

Another extremely important feature of this type pin is the prevention of the expansion force of the pin affecting the insulator. The expansion action is completely eliminated in the Slater Drawn Zinc Separable Thimble. It creates no strain in the insulator. If the insulator is screwed tightly on the solid steel pin, the expansion of the pin would be communicated to the thimble, but provision is made against this by the cork disc in the top of the thimble. The threads of the thimble loosely fit the threads of the pin. As the pin expands, its threads ride further up on the thimble thread and the cork disc compresses and takes up the strains.

Long Shank for Wood Arms
With Drawn Zinc Separable Thimbles
For Connecting into Insulators with 1-inch Pin Hole

List No.	A	B	C	D	F	G	H	Wt., Lbs. Per 100
5604	4	5 1/2	3/4	2 1/2	2 7/32	2	1 3/4	196
5608	5	5 1/2	3/4	2 1/2	2 7/32	2	1 3/4	209
5612	6	5 1/2	3/4	2 1/2	2 7/32	2	1 3/4	233

With Thimbles for Cementing into Insulators with 1 3/8-inch Pin Hole

List No.	A	B	C	D	E	F	G	H	Wt., Lbs. Per 100
5624	6	6 1/2	3/4	3	1 7/32	2 1/2	2 3/4		374
5626	7	6 1/2	3/4	3	1 7/32	2 1/2	2 3/4		409
5628	8	7	3/4	3	1 7/32	2 1/2	2 3/4		460
5630	9	7	3/4	3 1/2	1 7/32	2 1/2	2 3/4		552
5632	10	7	3/4	3 1/2	1 7/32	2 1/2	2 3/4		601
5634	11	7	3/4	3 3/4	1 7/32	2 1/2	2 3/4		674
5636	12	7	3/4	3 3/4	1 7/32	2 1/2	2 3/4		738
5638	13	7	3/4	3 3/4	1 7/32	2 1/2	2 3/4		792

Short Shank for Steel Arms
With Drawn Zinc Separable Thimbles
For Cementing into Insulators with 1-inch Pin Hole

List No.	A	B	C	D	E	G	Wt., Lbs. Per 100
5603	4	1 3/4	3/4	2 1/2	2 7/32	2	139
5607	5	1 3/4	3/4	2 1/2	2 7/32	2	152
5611	6	1 3/4	3/4	2 1/2	2 7/32	2	178

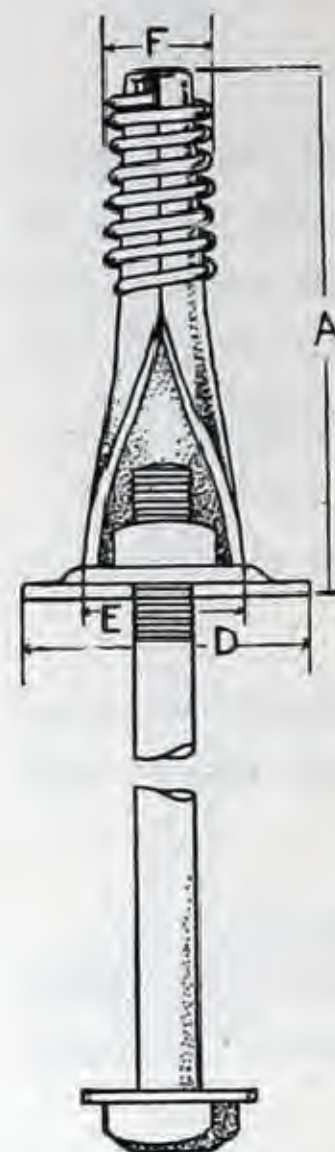
With Thimbles for Cementing into Insulators with 1 3/8-inch Pin Hole

List No.	A	B	C	D	E	F	G	H	Wt., Lbs. Per 100
5623	6	1 3/4	3/4	3	1 7/32	2 1/2			302
5625	7	1 3/4	3/4	3	1 7/32	2 1/2			339
5627	8	1 3/4	3/4	3	1 7/32	2 1/2			384
5629	9	1 3/4	3/4	3 1/2	1 7/32	2 1/2			474
5631	10	1 3/4	3/4	3 1/2	1 7/32	2 1/2			523
5633	11	1 3/4	3/4	3 3/4	1 7/32	2 1/2			596
5635	12	1 3/4	3/4	3 3/4	1 7/32	2 1/2			656
5637	13	1 3/4	3/4	3 3/4	1 7/32	2 1/2			716

Note—Special Pins for Insulators having 1 1/2-inch Pin Hole can be furnished.

SLATER
PRESTEEL PINS

Hot Galvanized
Spring Thread Only



In the interest of cutting down stocks in the warehouse and on the line wagon there has been a call for a dependable pin which would be more universal in its application than present types. The Slater Presteel Pin meets that call. The same pin can be used on either steel or wood arms—on any size wood arm—on arms bored for any size of pin.

The pin is fastened to the arm with either a 1/2-inch or 5/8-inch machine bolt. The nut fits within the body of the pin and is held from turning. A wrench is used on the head of the bolt to tighten it.



FOR FLAT TOP ARMS

List No.	A	D	E	F	Wt., Lbs. Per 100
5201	5	3	1 1/2	1	91
5202	6 1/2	3 1/4	1 3/4	1	112
5203	8	3 1/2	2	1	144

FOR ROUND TOP ARMS

List No.	A	D	E	F	Wt., Lbs. Per 100
5221	5	3	1 1/2	1	91
5222	6 1/2	3 1/4	1 3/4	1	112
5223	8	3 1/2	2	1	144

Prices on application.

Bolts are not included. Use either 1/2 or 5/8-inch machine bolts, 2 inches long for steel arms and 6 inches long for wood arms.

BOLT ASSEMBLIES FOR PRESTEEL PINS

List No.	Description	Approximate Shipping Weight, Lbs., 100 Pcs
5241	5/8 x 2 with nut and lock washer....	39
5247	5/8 x 6 with nut and lock washer....	69

SLATER PRESTEEL SCREW PIN

Hot Galvanized
Spring Thread



No. 122

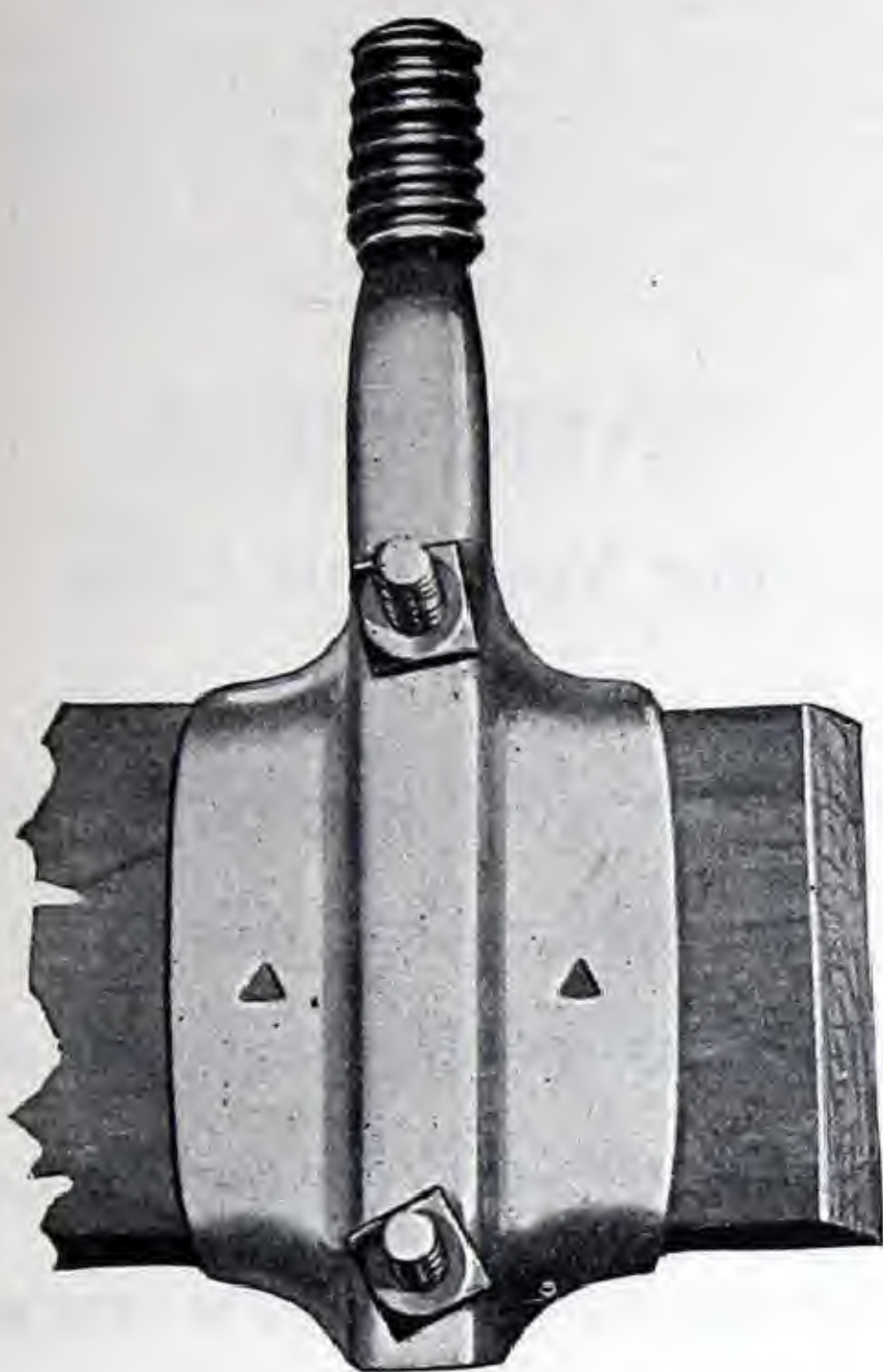
The No. 122 Screw Pin is in popular use as a transformer pin for running leads from the cross arm to the transformer arm, also, for work such as running leads from the light circuit down the pole to the lighting fixtures.

The No. 20 wood screw, which is upset first in the base, permits screwing the pin into cross arm without boring a hole and with danger of splitting the wood. Because of broad base and fulcrum it forms, the No. 122 pin will hold as great a side strain as a 1/2-inch screw shank.

List No.	Length of Screw	A	D	F	Wt., Lbs. Per 100
122	2"	4 3/4	2 1/2	1	78

Prices on application.

SLATER PRESTEEL CLAMP PIN



Slater Presteel Clamp Pin, List No. 4422, with 1" lead thread for dead-ending and corner positions. Height above crossarm 5".

The Slater Presteel Clamp pin is specially applicable to dead ending and corner positions where the shank pin is used in the straight sections of the same line. This clamp pin has a two-fold advantage.

The Clamp section wraps the crossarm, thus developing full strength, since there is no tendency to split the crossarm as in the case where a shank is used under cantilevered strain.

The channel shape of the Presteel Pin provides great strength for heavy line loads in positions for which it is recommended, namely dead end and corner positions.

This type of insulator pin has been in use for many years, but only recently has been re-designed to combine the pin and plate into one piece. This procedure decreased the number of parts in the assembly and—at the same time—increased the mechanical strength.

When ordering these clamp pins, it is always best to specify the size of the cross-arm, in order to insure a snug fit in the cross-arm strap.

The lead thread is, of course, the Allen lead thread, which is cast by the "Perfect Bond" process.

	Height Above Cross Arm	Thread	Standard Package	Shipping Weight per 100 with Crossarm Strap
22	5"	1"	50	338
27	7"	1 3/8"	50	430

SLATER CLAMP PINS

FOR HIGH VOLTAGE INSULATORS



No. 4810



No. 4860

Hot Galvanized

Slater Clamp Pins present a strong, light and inexpensive means of supporting high voltage insulators on angle steel, pipe or wood arms. They are very useful on terminal structures, built of angle steel, pipe or wood, at power houses and substations, since by their use the expense and trouble of boring pin holes is eliminated, and the pins may be spaced as desired and changed later without redrilling the arms.

One side of the pin has four sharp prongs, which bite into wooden arms and prevent the pin's deflecting if an unseasoned arm should shrink in service. When the pin is used on a steel arm, the prongs are faced away from the arm.

Slater High Tension Clamp Pins are furnished in two types: with 1 7/8-inch drawn separable thimbles for cementing into insulators having a standard 1 3/8-inch pin hole; and with the Slater 1 3/8-inch lead threads for screwing directly into a standard 1 3/8-inch insulator pin hole.

The 5/8-inch Cross Arm Straps, Angle and Pipe Clamps should be used with these pins, but are not included in the price.

1 7/8-INCH SEPARABLE THIMBLE TYPE

List No.	Inches	Pin Height Above Arm, Inches		
		Size Channel	When Mounted on Angle or Pipe	When Mounted on Wood Arm
4808	1 x 1/2	8	5 3/4	203
4809	1 x 1/2	9	6 3/4	217
8410	1 x 1/2	10	7 3/4	230

1 3/8-INCH LEAD THREAD TYPE

List No.	Inches	When Mounted on Angle or Pipe	When Mounted on Wood Arm	Weight Per 100 Lbs.
4858	1 x 1/2	8	5 3/4	268
4859	1 x 1/2	9	6 3/4	278
4860	1 x 1/2	10	7 3/4	288

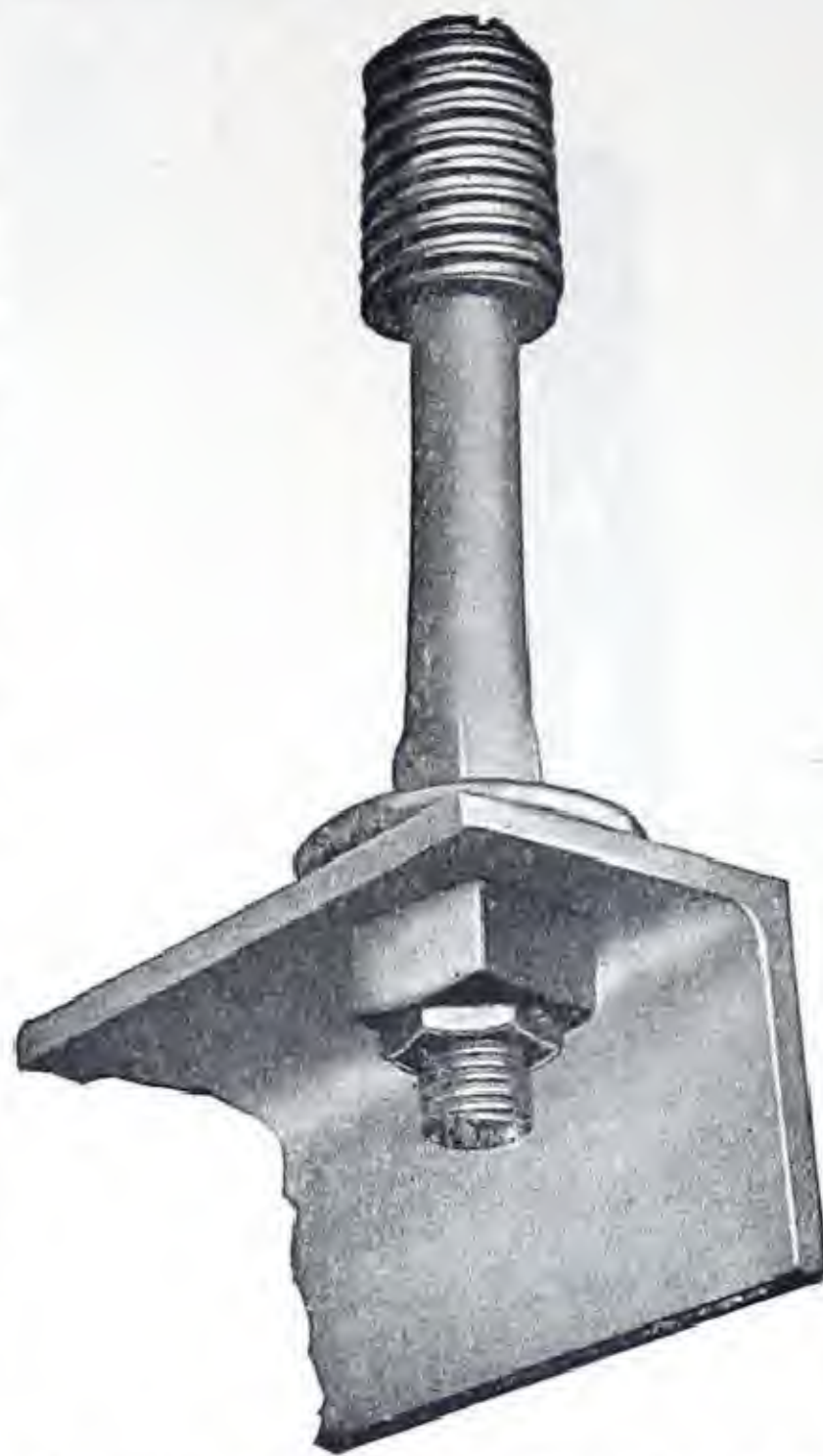
Prices on application.

SLATER PALNUTS

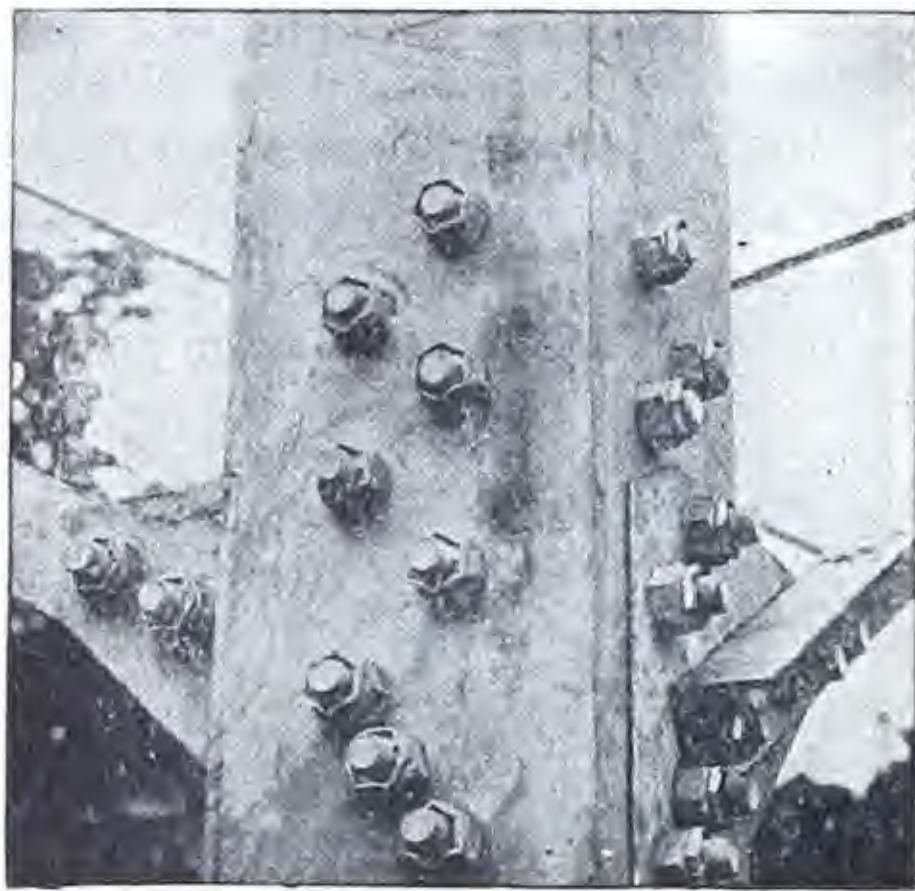
Hot Galvanized

The Palnut is a single thread lock nut. It has a perfect thread and spins onto the bolt with the fingers. It is applied to the bolt with the open face out, as shown, after the regular nut has been tightened.

The principle of the Palnut is simple. The working part is a coned disc with six jaws or prongs, which fit snugly in the root of the bolt-thread. When the Palnut is tightened, these six jaws grip the root of the bolt-thread like the jaws of a chuck. The tightening of the Palnut gives these six jaws a very powerful grip. Since the Palnut is resilient, it takes no load from the regular nut, but it does prevent the regular nut from loosening through vibration.



Showing a $\frac{3}{4}$ " U.S. Standard Palnut on a Slater drop-forged insulator pin.

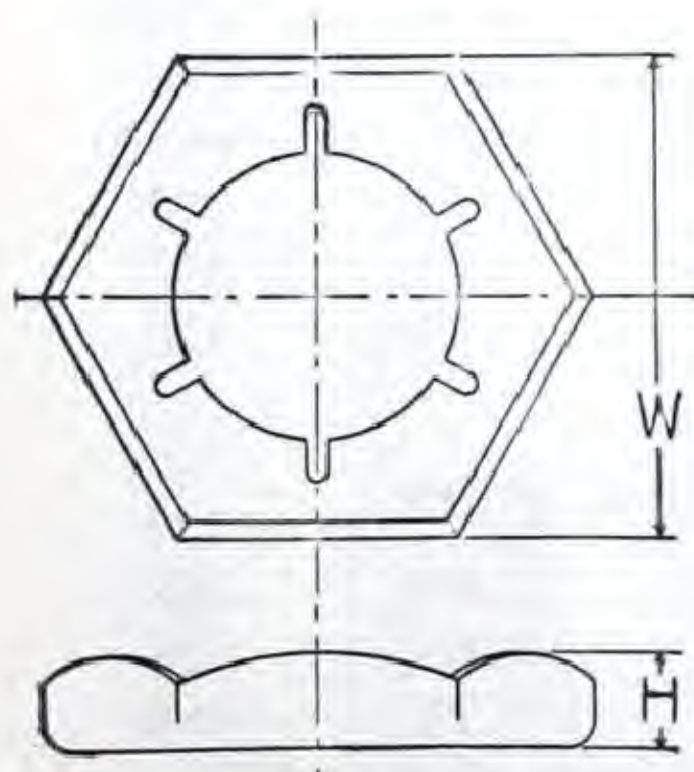


Palnuts as applied to a steel transmission tower.

The Palnut not only prevents the nut from working off the bolt, but also prevents the bolt from backing out.

Any standard linesman's wrench can be used for the installation of Palnut. When large numbers are being applied, however, the work can be speeded up by using a special box wrench, which is available in three sizes, namely, $\frac{1}{2}$ ", $\frac{5}{8}$ " and $\frac{3}{4}$ " American Standard sizes.

Very close to a million and a half Palnuts have been sold in Canada. By far the majority of these have been the $\frac{5}{8}$ " American Standard size for steel tower bolts. Ask for samples.



DIMENSIONS U.S. Standard Sizes

Bolt Size	Threads per in.	W	H	Lbs. per M
$\frac{3}{8}$ "	16	$\frac{11}{16}$ "	.155"	3.85
$\frac{7}{16}$ "	14	$\frac{25}{32}$ "	.174"	5.55
$\frac{1}{2}$ "	13	$\frac{7}{8}$ "	.192"	7.14
$\frac{5}{8}$ "	11	$1\frac{1}{16}$ "	.230"	12.5
$\frac{3}{4}$ "	10	$1\frac{1}{4}$ "	.270"	19.9
$\frac{7}{8}$ "	9	$1\frac{7}{16}$ "	.285"	26.5
1"	8	$1\frac{5}{8}$ "	.328"	37.5
$1\frac{1}{8}$ "	7	$1\frac{13}{16}$ "	.362"	52.6
$1\frac{1}{4}$ "	7	2"	.390"	63.2
$1\frac{1}{2}$ "	6	$2\frac{3}{8}$ "	.450"	105.

Finish—Steel, black rustproofing Parkerized finish. $\frac{5}{8}$ " size and over also available in Hot Dip Galvanized finish for use on galvanized bolts.



EVERYTHING For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."



SLATER PRESTEEL POLE TOP PINS

Hot Galvanized

Slater Steel Pins are pressed from sheet steel, which gives the maximum strength for a given weight, and are furnished with spring threads or lead threads, which screw into insulators with 1 and 1 $\frac{3}{8}$ -inch pin holes, and with drawn separable thimbles for cementing into insulators of these two sizes. Mounting holes are $\frac{11}{16}$ -inch.

o. 3048

Spring Thread Type

Dimensions in inches

List No.	Gauge of Steel	Length	Hole Spacing	Diameter of Thread	Wt., Lbs. Per 100
3040	9	18	8	1	240
3045	9	24	8	1	340

Lead Thread Type

3034	9	18	8	1	331
3039	9	18	8	1 $\frac{3}{8}$	404
3044	9	24	8	1	447
3049	9	24	8	1 $\frac{3}{8}$	510

Separable Thimble Type

3042	9	18	8	$\frac{7}{32}$	275
3043	9	18	8	1 $\frac{7}{32}$	286
3047	9	24	8	$\frac{7}{32}$	400
3048	9	24	8	1 $\frac{7}{32}$	406

SLATER PIPE POLE TOP PINS

Hot Galvanized

For the higher voltage lines the Pipe Pins are in general use, because of their strength and light weight, and are superseding the old types of cast and malleable pins. They are furnished with either lead thread for 1 $\frac{3}{8}$ -inch bore insulators, or Slater $\frac{1}{2}$ -inch drawn separable thimble for cementing into insulators of 1 $\frac{3}{8}$ -inch bore, which is the same as is furnished with forged steel and clamp pins. Mounting holes are $\frac{11}{16}$ -inch.

**Separable Thimble Type**

No. 3079

Dimensions in Inches

List No.	Size of Pipe	Length	Hole Spacing	Diameter of Thread	Wt., Lbs. per 100
3060	1 $\frac{1}{4}$	18	8	1 $\frac{7}{32}$	220
3061	1 $\frac{1}{2}$	18	8	1 $\frac{7}{32}$	340
3063	1 $\frac{1}{2}$	24	8	1 $\frac{7}{32}$	703
3065	1 $\frac{1}{2}$	28	8	1 $\frac{7}{32}$	823
3066	2	28	8	1 $\frac{7}{32}$	1098
3067	1 $\frac{1}{2}$	32	10	1 $\frac{7}{32}$	945
3068	2	32	10	1 $\frac{7}{32}$	1265
3069	2	36	10	1 $\frac{7}{32}$	1433

Lead Thread Type

3070	1 $\frac{1}{4}$	18	8	1 $\frac{3}{8}$	337
3071	1 $\frac{1}{2}$	18	8	1 $\frac{3}{8}$	457
3073	1 $\frac{1}{2}$	24	8	1 $\frac{3}{8}$	838
3075	1 $\frac{1}{2}$	28	8	1 $\frac{3}{8}$	946
3076	2	28	8	1 $\frac{3}{8}$	1221
3077	1 $\frac{1}{2}$	32	10	1 $\frac{3}{8}$	1078
3078	2	32	10	1 $\frac{3}{8}$	1398
3079	2	36	10	1 $\frac{3}{8}$	1566

SLATER PRESTEEL POLE TOP BRACKETS

Hot Galvanized

Some engineers like to use the same type of pin for both cross arm and pole work. The Presteel Pole Top Bracket allows them to use Slater pins for both these purposes, which, of course, simplifies stock keeping.

The Presteel Bracket is pressed out of a single plate $\frac{1}{4}$ -inch thick, with no welds or seams.

List No.	Dimensions in Inches Pin Hole	Bolt Holes	Wt., Lbs. Per 100
3035	$\frac{13}{16}$	$\frac{11}{16}$	440
3036	1 $\frac{1}{16}$	$\frac{11}{16}$	440

Prices on application.

SLATER ANGLE STEEL POLE TOP PINS

Hot Galvanized

The Angle Pin is used to support a 3-inch bore insulator at a considerable height above the pole top. Mounting holes are $\frac{11}{16}$ -inch.

No. 3031

Spring Thread Type

Dimensions in Inches

List No.	Size of Angle	Length	Hole Spacing	Diam. of Thread	Wt., Lbs. per 100
3030	2 x 2 x $\frac{3}{16}$	18	8	1	360
3031	2 x 2 x $\frac{3}{16}$	24	8	1	460
3033	2 x 2 x $\frac{3}{16}$	36	10	1	600

Lead Thread Type

3001	2 x 2 x $\frac{3}{16}$	18	8	1	469
3002	2 x 2 x $\frac{3}{16}$	24	8	1	569
3003	2 x 2 x $\frac{3}{16}$	36	10	1	709

Prices on application.

SLATER HEAVY CHANNEL POLE TOP PINS

Hot Galvanized

The No. 3024 type is composed of two heavy channels riveted back to back. Mounting holes are $\frac{11}{16}$ -inch.

Lead Thread Type

Dimensions in Inches

List No.	Size of Channel	Length	Hole Spacing	Diam. of Thread	Wt., Lbs. Per 100
3024	1 $\frac{3}{4}$ x $\frac{5}{8}$	18	8	1 $\frac{3}{8}$	587
3025	1 $\frac{3}{4}$ x $\frac{5}{8}$	25	8	1 $\frac{3}{8}$	723

Prices on application.

SLATER LIGHT CHANNEL POLE TOP PINS

Hot Galvanized



No. 3000



No. 3012

Nos. 3000, 3010 and 3012 Pole Top Pins are used for signal wires. The No. 3000 is offset so as to bring the insulator over the centre of the pole when it is necessary to fasten the pin to the side of the pole. No. 3010 is a straight pin, similar to No. 3012.

Pins No. 3013 and 3017, made of presteel, are recommended for use with 1-inch bore insulators on light 6600 and 11000 volt lines.

Spring Thread Type

Dimensions in Inches

List No.	Size of Channel	Length	Hole Spacing	Mount. Holes	Diam. of Thread	Wt., Lbs. Per 100
3000	1 x $\frac{1}{2}$	18	4	$\frac{7}{16}$	1	144
3010	1 x $\frac{1}{2}$	12	4	$\frac{7}{16}$	1	88
3012	1 x $\frac{1}{2}$	18	4	$\frac{7}{16}$	1	128
3013	1 $\frac{7}{8}$ x 1	15	4	$\frac{11}{16}$	1	150

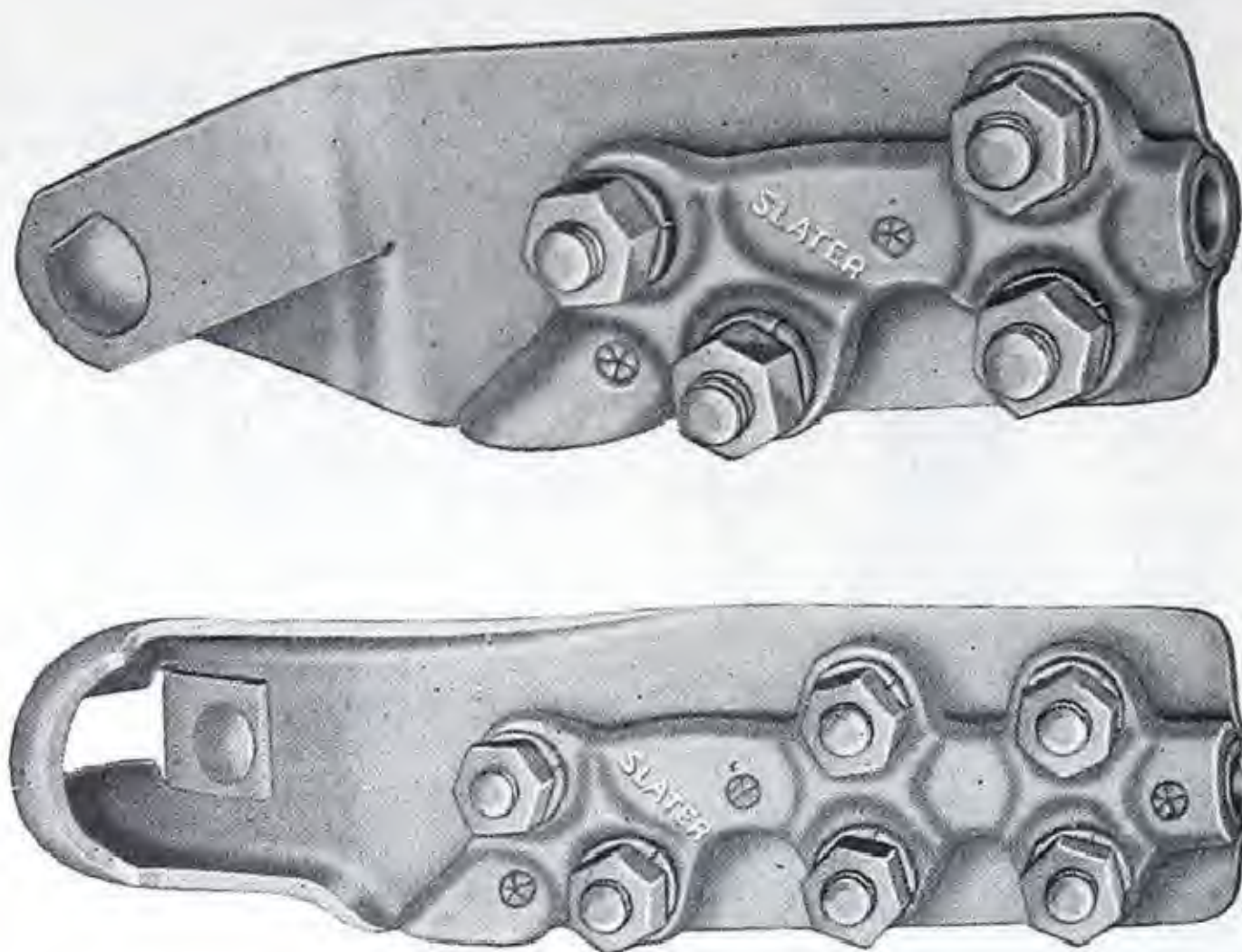
Lead Thread Type

3014	1 x $\frac{1}{2}$	18	4	$\frac{7}{16}$	1	201
3015	1 x $\frac{1}{2}$	12	4	$\frac{7}{16}$	1	145
3016	1 x $\frac{1}{2}$	18	4	$\frac{7}{16}$	1	185
3017	1 $\frac{7}{8}$ x 1	15	4	$\frac{11}{16}$	1	207

Prices on application.

SLATER LIGHT STRAIN CLAMPS

Hot Galvanized



These Slater Strain Clamps are designed to provide for conductors of small diameter the same high efficiency as in the Slater strain clamps for heavy transmission lines.

Seven features of vital importance:

1. Light in weight, lined with cast aluminum or copper shim, according to conductor.
2. Made in both ball-socket and clevis type.
3. Strong; capable of developing the ultimate strength of the conductor without slippage.
4. Equalized pressure on all strands of the conductor.
5. Line slack easily adjusted.
6. Conductor radius in clamp prevents kinking of strand.
7. Clamps with 3 U-bolts arranged for use of come-along if desired.

These Clamps are successfully used on some of the most important transmission and distribution services in Canada.

For A.C.S.R. Bare Cable

B. & S. Gauge No.	Circ. Mils.	Diam. in	Usual Standing	Average Ultimate Strength in Lbs.
3/0	167805	.501	6x.1670 1x.1670	6660
2/0	133079	.447	6x.1490 1x.1490	5300
1/0	105534	.398	6x.1327 1x.1327	4200
1	83694	.355	6x.1182 1x.1182	3390
2	66370	.316	6x.1052 1x.1052	2790
4	41740	.250	6x.0834 1x.0834	2255

B. & S. Gauge No.	Ball Socket End Clamp No.	Weight in Lbs.	Clevis End Clamp No.	Weight in Lbs.	Length Overall Dim.	No. of 1/2" U-Bolts, Per Clamp
3/0	3307S	6	3307C	5		3*
2/0	3207S	6	3207C	5		3*
1/0	2107S	4 1/4	2107C	3 1/2	9 1/2	2
1	2017S	4 1/4	2017C	3 1/2	9 1/2	2
2	2027S	4 1/4	2027C	3 1/2	9 1/2	2
4	2047S	4 1/4	2047C	3 1/2	9 1/2	2

*3-Bolt Clamps are arranged for the use of a come along.

SLATER LIGHT STRAIN CLAMPS
FOR STRANDED COPPER CONDUCTORS

B. & S. Gauge No.	Circ. Mils.	Diam. in	Usual Standing	Average Ultimate Strength in Lbs.
3/0	167805	.470	19x.0940	8400
2/0	133079	.418	19x.0837	6600
1/0	105534	.373	19x.0745	5300
1/0	105534	.368	7x.1228	5300
1	83690	.332	19x.0664	4000
1	83690	.328	7x.1305	4000
2	66370	.292	7x.0974	3150

B. & S. Gauge No.	Ball Socket End Clamp No.	Weight in Lbs.	Clevis End Clamp No.	Weight in Lbs.	Length Overall Dim.	No. of 1/2" U-Bolts, Per Clamp
3/0	3303S	6	3303C	5	15 1/4	3*
2/0	3203S	6	3203C	5	15 1/4	3*
1/0	2103S	4 1/4	2103C	3 1/2	9 1/2	2
1/0	2103S	4 1/4	2103C	3 1/2	9 1/2	2
1	2013S	4 1/4	2013C	3 1/2	9 1/2	2
1	2013S	4 1/4	2013C	3 1/2	9 1/2	2
2	2023S	4 1/4	2023C	3 1/2	9 1/2	2

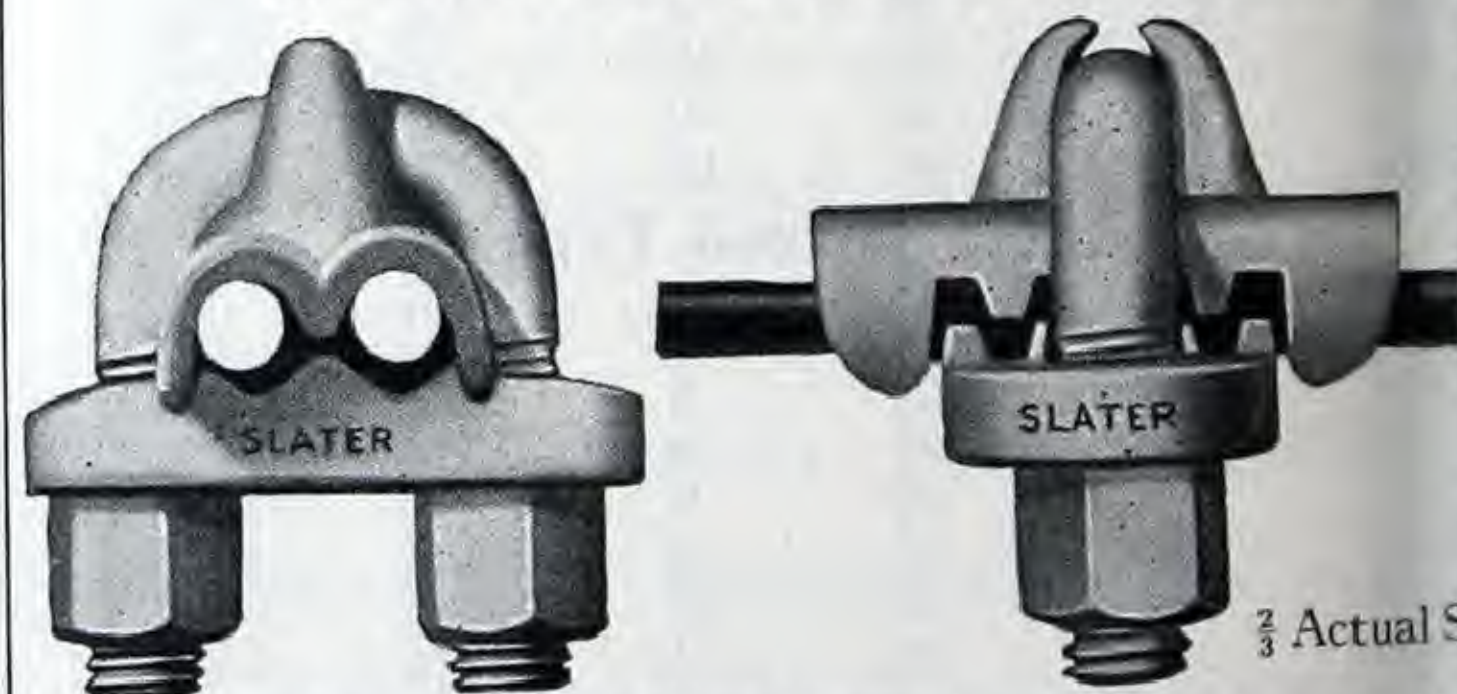
*3-Bolt Clamps are arranged for the use of a come along

FOR ALL-ALUMINUM BARE CABLE

B. & S. Gauge No.	Circ. Mils.	Diam. in	Usual Standing	Average Ultimate Strength in Lbs.
3/0	167805	.464	7x.1548	3180
2/0	133079	.414	7x.1380	2520
1/0	105534	.368	7x.1228	1990
1	83694	.378	7x.1093	1580
2	66370	.293	7x.0975	1250
4	41740	.232	7x.0772	786

B. & S. Gauge No.	Ball Socket End Clamp No.	Weight in Lbs.	Clevis End Clamp No.	Weight in Lbs.	Length Overall Dim.	No. of 1/2" U-Bolts, Per Clamp
3/0	2305S	4 1/4	2305C	3 1/2	15 1/2	2
2/0	2205S	4 1/4	2205C	3 1/2	15 1/2	2
1/0	2105S	4 1/4	2105C	3 1/2	9 1/2	2
1	2015S	4 1/4	2015C	3 1/2	9 1/2	2
2	2025S	4 1/4	2025C	3 1/2	9 1/2	2
4	2045S	4 1/4	2045C	3 1/2	9 1/2	2

SLATER DEAD-ENDING CLAMP



Slater No. 7479 Dead End Clamp for distribution circuits

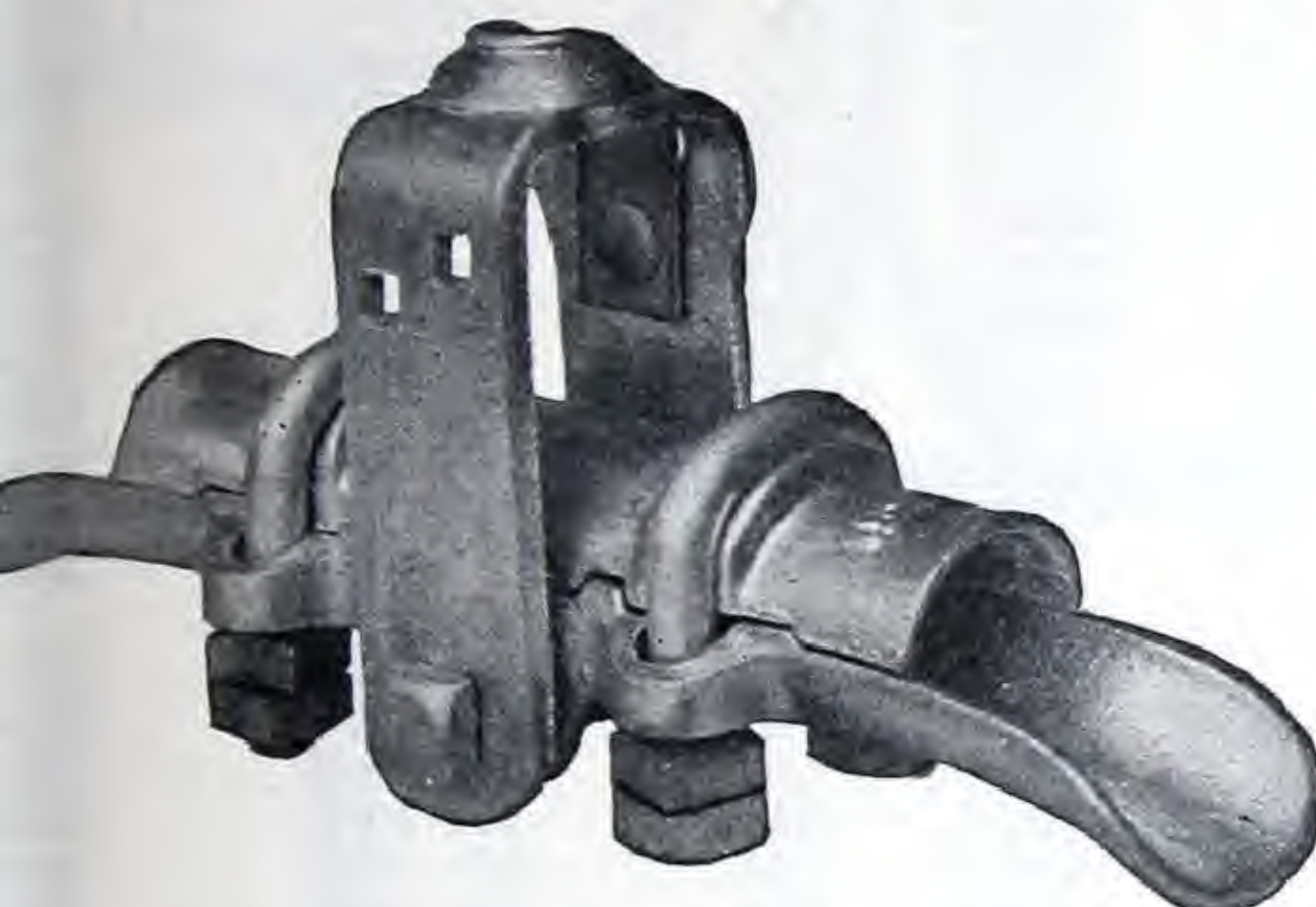
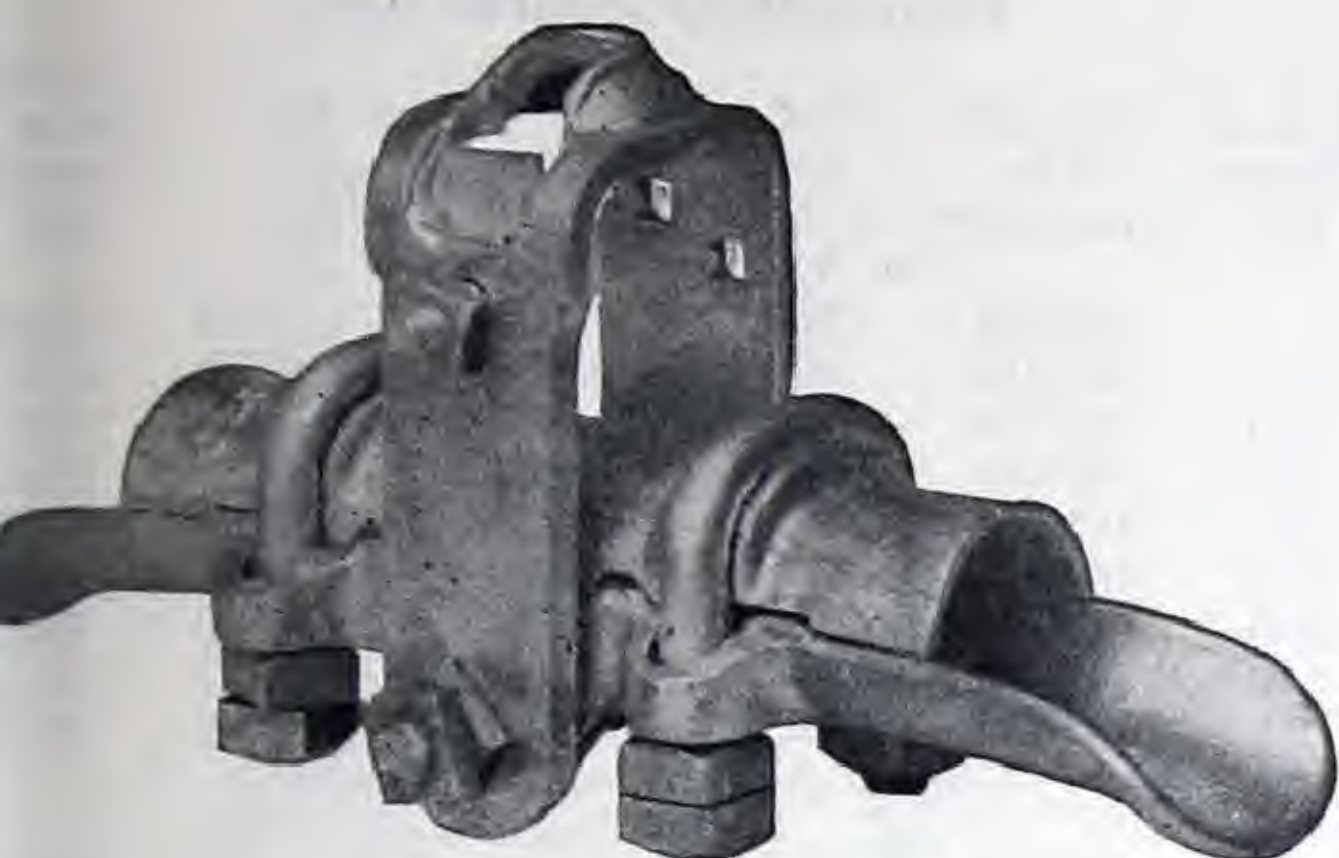
A very recent development is this Eureka type clamp dead ending the smaller conductors used in distribution lines. The parallel groove design will take a range of wire sizes from No. 6 and No. 4 solid copper to No. 2 and No. 0 stranded copper. Only one item to stock for all these wire sizes. Made with galvanized malleable iron clamping members and a high strength steel U bolt.

A handy 5/8" socket wrench (List No. 7499) with rubber covered handle is available for use with 5/8" extra deep hexagon nut.

List No.	Item	Wire Range	Weight, Lb per 100 pcs
7479	Dead End Clamp	No. 6 Solid No. 4 Solid No. 2 Stranded No. 0 Stranded	62

SLATER FLEXALL SUSPENSION CLAMPS

Hot Galvanized



Top and side views of Slater Flexall suspension clamp No. 12x for 477 M.C.M. Aluminum cable with Armour Rods.

Standard Lock Nuts or Palnuts are furnished for all bolts. The Slater Flexall Suspension Clamp embodies all the features required for suspension lines. As the name indicates, the cradle of the clamp is flexible in any direction. Not only does the cradle allow full rocking motion in line with the conductor, but what has been given equal consideration is an arrangement which permits of side-roll or conductor sway at right angles to the line. This is taken care of by slot holes in the cradle and special bolt dimension which frees the cradle to side sway without cramping the cradle in the stirrup. At the same time it is possible for the cradle of a Flexall Clamp to become locked in the stirrup, which would defeat the purpose of the flexibility of the clamp.

The stirrup is a drop-forged reinforced steel piece. The reinforcing stiffens the stirrup and increases its strength at points of vital strain.

The ease with which the Slater Flexall Suspension Clamp can be installed is another of its labor-saving characteristics. The procedure usually varies according to length of span and weight of conductor, but in practically all cases the Flexall Clamp can be attached to the insulator string and sent up with it, as in no case does the ball socket lock have to be disturbed.

Either aluminum or copper shims or liners can be supplied with these clamps as required.

SLATER FLEXALL SUSPENSION CLAMPS

Hot Galvanized—(Continued)

The following table and clamp specification will guide in the selection of the clamp to be used on a given line. If further information is desired, it may be obtained by writing to the company.

FOR STRANDED COPPER CONDUCTORS

Clamp No.	B & S Gauge No.	Circular Mils Alum.	Diam. in Inches	Usual Stranding	Average Breaking strength of Cable Lbs.	Overall Length (inches)	Wgt. of Assembled Clamp Lbs.
1025	....	500000	.814	37x.1162	25000	10½	6½
924	....	400000	.728	37x.1040	20000	9	5
924	....	300000	.630	37x.0900	15000	9	5
923	4/0	211600	.528	19x.1055	10800	9	5
822	3/0	167805	.470	19x.0904	8400	8	4¾
822	2/0	133079	.418	19x.0837	6600	8	4¾
821	1/0	105534	.373	19x.0745	5300	8	4¾

For A.C.S.R. BARE CABLE

		Aluminum		Steel			
Clamp No.							
1527	...	954000	1.196 54x.1329	7x.1329	33500	15	11
1527	...	795000	1.093 54x.1214	7x.1214	27950	15	11
1026	...	666600	1.000 54x.1111	7x.1111	23430	10½	6½
1026	...	605000	.953 54x.1059	7x.1059	21270	10½	6½
1026	...	500000	.904 30x.1291	7x.1291	24080	10½	6½
1025	...	477000	.883 30x.1261	7x.1261	23000	10½	6½
1025	6/0	336000	.741 30x.1059	7x.1059	16200	10½	6½
924	...	336000	.710 26x.1138	7x.0848	12660	9	5
924	5/0	266800	.633 6x.2108	7x.0705	9385	9	5
923	4/0	211600	.564 6x.188	1x.188	8435	9	5
923	3/0	167805	.501 6x.176	1x.167	6660	9	5
822	2/0	133079	.447 6x.1490	1x.1490	5300	8	4¾
822	1/0	105534	.394 6x.1327	1x.1327	4200	8	4¾
821	1	83694	.355 6x.1182	1x.1182	3340	8	4¾

FOR A.C.S.R. AND ARMOUR RODS

Clamp No.	Circular		Diam. in Inches	Usual Stranding	
	Mils Alu-minum	B. & S. Gauge No.		Alu-minum	Steel
15x2.4	954000	....	1.192	54x.1329	7x.1329
15x2.4	900000	....	1.162	54x.1291	7x.1291
15x2.4	874500	....	1.146	54x.1273	7x.1273
15x2.2	795000	....	1.093	54x.1214	7x.1214
15x2.1	715000	....	1.036	54x.1151	7x.1151
15x2	666600	....	1.000	54x.1111	7x.1111
15x2	636000	....	.977	54x.1085	7x.1085
†15x1.9	605000	....	.953	54x.1059	7x.1059
†15x1.9	556500	....	.953	30x.1362	7x.1362
†12x1.9	605000	....	.953	54x.1059	7x.1059
†12x1.9	556500	....	.953	30x.1362	7x.1362
12x1.8	500000	....	.904	30x.1291	7x.1291
12x1.8	477000	....	.883	30x.1261	7x.1261
12x1.6	397500	....	.806	30x.1151	7x.1151
12x1.5	366400	6/0	.741	30x.1059	7x.1059
10x1.4	266800	....	.642	26x.1018	7x.0788
10x1.4	266800	5/0	.633	6x.2108	7x.0705
10x1.4	211300	....	.663	12x.1261	7x.1261

Clamp No.	Armour Rods No. per Set	Diam.	Overall Diam.	Overall Length (inches)	Weight of Assembled Clamp, Lbs.
15x2.4	10	.508	2.212	15	12¼
15x2.4	10	.494	2.150	15	12¼
15x2.4	10	.494	2.134	15	12¼
15x2.2	10	.466	2.025	15	11¾
15x2.1	10	.441	1.918	15	11¾
15x2	10	.428	1.856	15	11¾
15x2	10	.416	1.809	15	11¾
†15x1.9	10	.405	1.763	15	11½
†15x1.9	10	.405	1.763	15	11½
†12x1.9	10	.405	1.763	12	10½
†12x1.9	10	.405	1.763	12	10½
12x1.8	10	.383	1.670	12	10½
12x1.8	10	.383	1.649	12	10½
12x1.6	10	.332	1.447	12	8¼
12x1.5	10	.314	1.369	12	8¼
10x1.4	10	.273	1.188	10	7½
10x1.4	10	.273	1.179	10	7½
10x1.4	10	.289	1.241	10	7½

SLATER SEMI-DEAD-END CLAMPS

Hot Galvanized



Double

Single

Here is a powerful clamp for semi-tension or semi-anchor construction. Where conditions would indicate extra precautions—such as at crossings, or where there is extra stress, and at angles, the Slater Semi-Dead-End Strain Clamp should be used.

The double form is composed of two clamps hinging on either ball-socket or clevis type connector as required. The single clamp is made in the same way but having but one clamp.

The clamps are made in sizes to conform to the ultimate strength of the conductor.

In ordering Slater Semi-Dead-End Strain Clamp the cable strand being used should be clearly specified. When clamps are supplied to such specification, they are capable, in case of the failure of the conductor of carrying the cable to its elastic limit after the insulator has come to a point of rest.

Aluminum shims can be furnished fastened directly to the clamping surfaces for use with aluminum conductor, or if copper cable is used, copper shims, or liners, can be supplied.

Double Semi-Dead-End Strain Clamp

Dimensions in Inches

List No.	Cable Diameter in Inches	Number of $\frac{5}{8}$ U-Bolts per Assembly	Wgt. Lbs. Each
D43043	.793 to .953	8	15 $\frac{3}{4}$
D32032	.564 to .741	6	13 $\frac{3}{4}$
D31031	.447 to .528	6	13 $\frac{3}{4}$
D21A021A	.328 to .418	4	11 $\frac{3}{4}$

Single Semi-Dead-End Strain Clamp

List No.	Cable Diameter in Inches	Number of $\frac{5}{8}$ U-Bolts per Assembly	Wgt. Lbs. Each
S530	.793 to .953	5	10 $\frac{1}{2}$
S420	.564 to .741	4	9 $\frac{1}{2}$
S310	.447 to .528	3	8 $\frac{1}{2}$
S31A	.328 to .418	3	8 $\frac{1}{2}$

SLATER STRAIN CLAMPS

Hot Galvanized



The clamping and snubbing arrangement of Slater Strain Clamps is variable to any conductor strand ordinarily in use and are made for use with hi-strength conductors, such as aluminum steel core reinforced bare cable and stranded copper cable, also all-aluminum bare cable. The seat of this clamp is long, smooth and bell-mouthed at the outer end preventing abrasion of the conductor. Gripping is obtained by clamping with $\frac{5}{8}$ U-bolts over a specially designed channel-shaped keeper. For snubbing stranded steel core of A.C.S.R. Cable these Clamps are provided with a snubbing arrangement which encases the core and confines all strands under equal tension. In ordering clamps the diameter, elastic limit and ultimate strength of the conductor should be specified. Clamps supplied to these specifications will provide a high safety factor. It will be of great assistance in judging your requirements if a maximum working tension be stated in your specification.

A permanent aluminum liner or shim for aluminum cables or copper liner for stranded copper cable can be supplied in position on all clamping surfaces, thus eliminating the cost and trouble of applying the ribbon armor in the field.

These clamps are designed to engage either ball and socket or clevis type insulator.

Prices on application.

SLATER STRAIN CLAMPS

Table Showing Corresponding Clamps for Standard Conductors

B & S Gauge No.	Circular Mils Aluminum	Dia. in Inches	Usual Stranding Aluminum	Steel	Average Ultimate Strength Lbs.
For A.C.S.R. Bare Cable					
...	605000	.953	54x.1059	7x.1059	21270
...	500000	.904	30x.1291	19x.0775	23750
6/0	336400	.741	30x.1059	7x.1059	16200
5/0	266800	.633	6x.2108	7x.0705	9385
4/0	211600	.564	6x.1880	1x.1880	8435
3/0	167805	.501	6x.1760	1x.1670	6660
2/0	133079	.447	6x.1490	1x.1490	5300
1/0	105534	.398	6x.1327	1x.1327	4200
1	83694	.355	6x.1182	1x.1182	3340

For All-Aluminum Cable Bare

Usual Stranding

...	636000	.918	37x.1312	12000
...	556500	.856	19x.1711	10500
...	500000	.810	19x.1623	9420
...	477000	.793	19x.1585	9000
...	397500	.724	19x.1447	7490
...	336400	.657	19x.1330	6350
...	300000	.621	19x.1256	5650
...	266800	.586	7x.1953	5040
4/0	211600	.522	7x.1740	3970
3/0	167805	.464	7x.1548	3180
2/0	133079	.414	7x.1380	2520
1/0	105534	.368	7x.1228	1990
1	83694	.328	7x.1093	1580

For Stranded Copper Conductors

...	500000	.814	37x.1162	25000
...	400000	.728	37x.1040	20000
...	300000	.630	37x.0900	15000
4/0	211600	.528	19x.1055	10800
3/0	167805	.470	19x.0940	8400
2/0	133079	.418	19x.0837	6600
1/0	105534	.373	19x.0745	5300

Table Showing Corresponding Clamps for Standard Conductors

Clamp No.	Length Over- all Dimen- sions	No. of $\frac{5}{8}$ U Bolts per Clamp Detail	Style No. of Clamping Keeper Detail	No. of $\frac{1}{2}$ " U Bolts per Clamp Detail	Style No. of Snubbing Keeper Detail	Weight of Assem- bled Clamp Lbs.
For A.C.S.R. Bare Cable						
5332	23"	5	No. 3	3	No. 2	14 $\frac{1}{2}$
5343	24 $\frac{1}{2}$ "	5	No. 3	4	No. 3	15 $\frac{1}{4}$
4232	20"	4	No. 2	3	No. 2	12 $\frac{3}{4}$
4232	20"	4	No. 2	3	No. 2	12 $\frac{3}{4}$
3221	16"	3	No. 2	2	No. 1	10
3131	16"	3	No. 1	2	No. 1	10
3121	16"	3	No. 1	2	No. 1	10
31A21	15 $\frac{1}{4}$ "	3	No. 1A	2	No. 1	9 $\frac{1}{2}$
21A21	13"	2	No. 1A	2	No. 1	9

For All Aluminum Cable Bare

5300	21"	5	No. 3	...	...	12 $\frac{1}{4}$
5300	21"	5	No. 3	...	...	12 $\frac{1}{4}$
5300	21"	5	No. 3	...	...	12 $\frac{1}{4}$
5300	21"	5	No. 3	...	...	12 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
3100	16"	3	No. 1	...	...	8 $\frac{1}{4}$
3100	16"	3	No. 1	...	...	8 $\frac{1}{4}$
31A00	16"	3	No. 1A	...	...	8 $\frac{1}{4}$
31A00	16"	3	No. 1A	...	...	8 $\frac{1}{4}$
31A00	16"	3	No. 1A	...	...	8 $\frac{1}{4}$

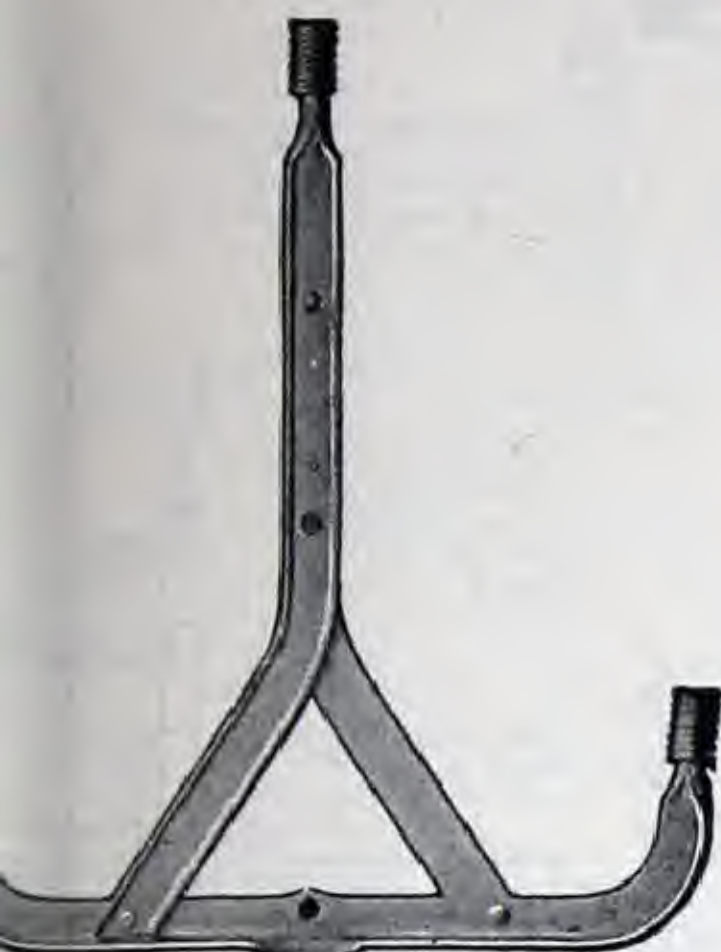
For Stranded Copper Conductors

5300	21"	5	No. 3	...	...	12 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
4200	18 $\frac{1}{2}$ "	4	No. 2	...	...	10 $\frac{1}{4}$
4100	18 $\frac{1}{2}$ "	4	No. 1	...	...	10 $\frac{1}{4}$
4100	18 $\frac{1}{2}$ "	4	No. 1	...	...	10 $\frac{1}{4}$
41A00	18 $\frac{1}{2}$ "	4	No. 1A	...	...	10 $\frac{1}{4}$
31A00	16"	3	No. 1A	10 $\frac{1}{4}$

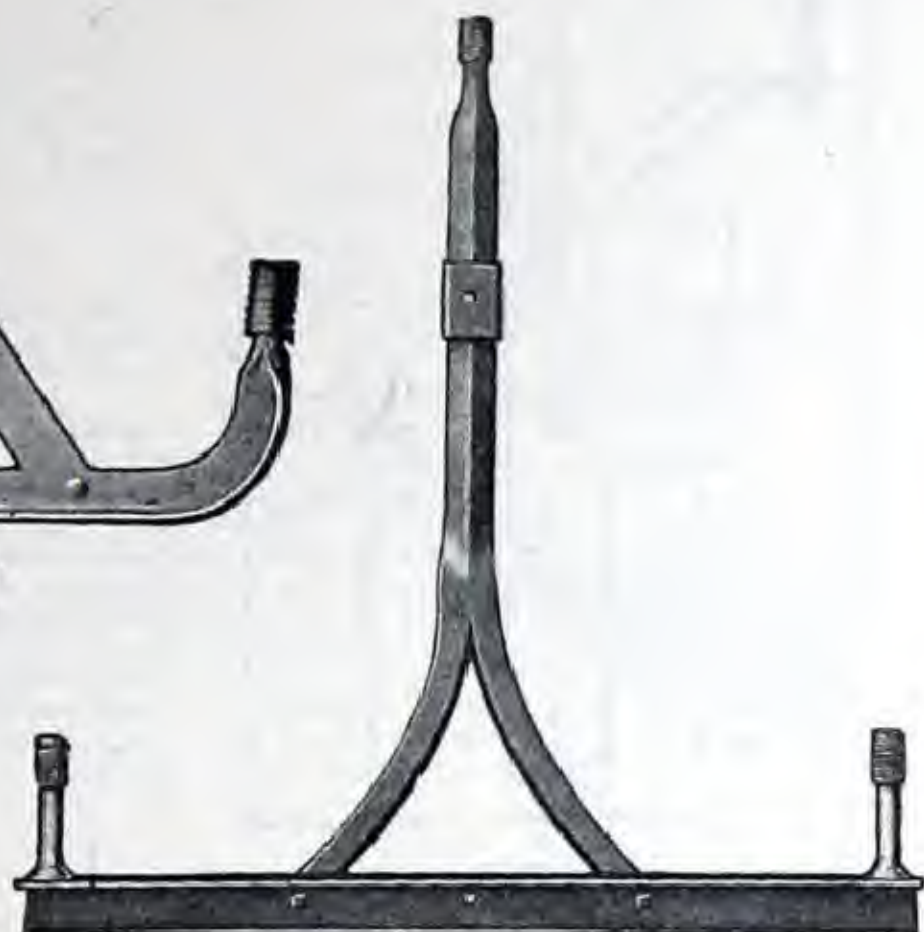
SLATER THREE-POINT POLE-TOP FIXTURES

Hot Galvanized

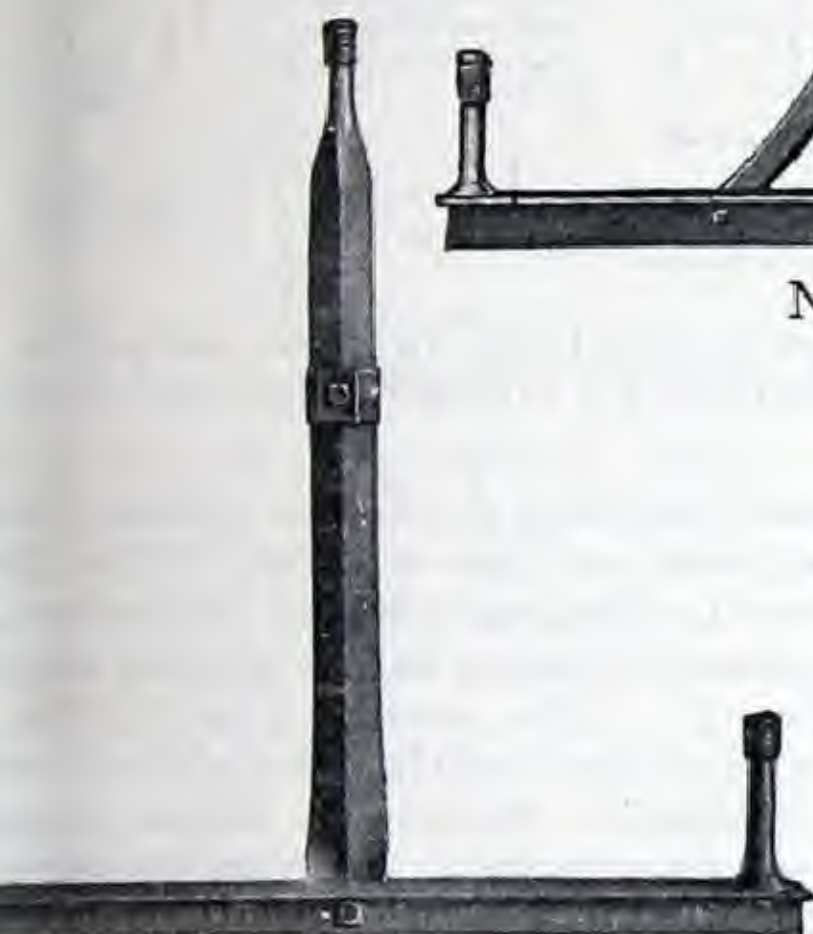
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No. 1117



No. 1118



No. 1119

Slater Three-point Pole-top Fixtures provide a logical method of evenly balancing the weight at the top of the pole, thereby furnishing the greatest resistance to storm stresses. These fixtures are very easy to install, as they consist of the fewest possible number of parts and are attached directly to the pole by through bolts, no gains being required. Sizes are made for all voltages up to 66,000. When ordering specify pin spacing. Also state thread dimension. Threads supplied are either 1-inch or 1 3/8-inch pin holes; dimensions of which are as follows, the taper commencing with dimension 1/8-inch increase in diameter per inch in length; thimble has four threads per inch.

At strain positions the Slater double-arming sets provide the greatest reliability. Adjustment for pole diameter is incorporated in the design.

These fixtures are fitted with broad-base pins, and are finished with the Slater Perfect Bond Thread. The positions of the through bolt holes are indicated at dimension D. Templates for fixing the position of the hole to be drilled can be supplied if required.

The Slater No. 1119 is the latest development in three-point pole-top fixtures. It is designed for stresses in any direction; combines strength, safety, simplicity and minimum weight.

It is compact for shipping, the cross arm being disassembled and is wired to the vertical pin in one bundle. If installation must be made upon poles already erected the advantage of having no loose parts is quite evident, as the bolts do the assembly.

SLATER THREE-POINT POLE-TOP FIXTURES

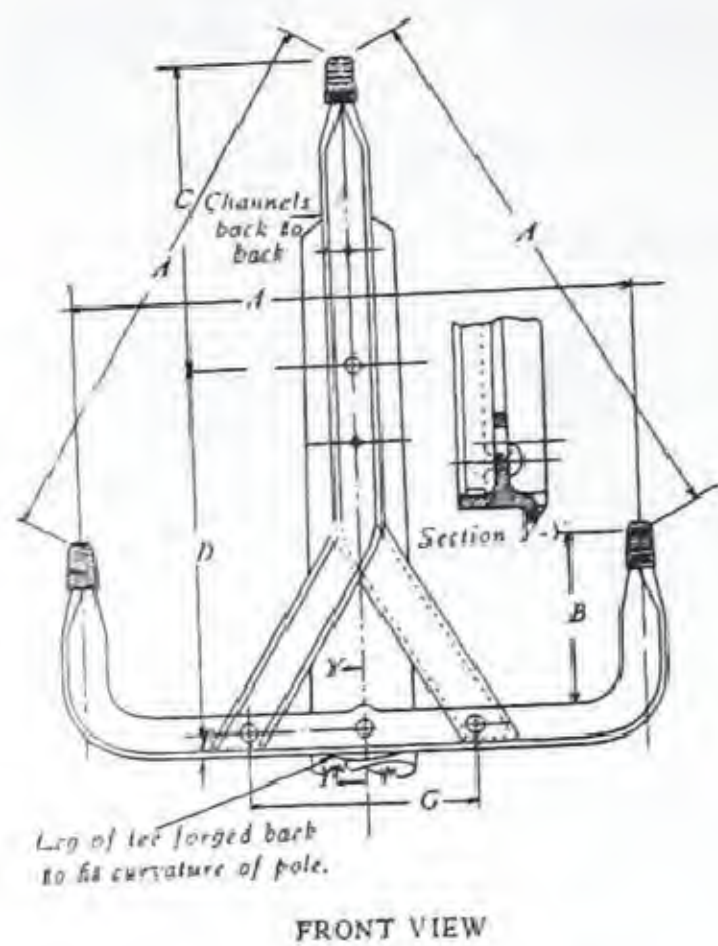
Hot Galvanized

DIMENSIONS OF STANDARD SIZES

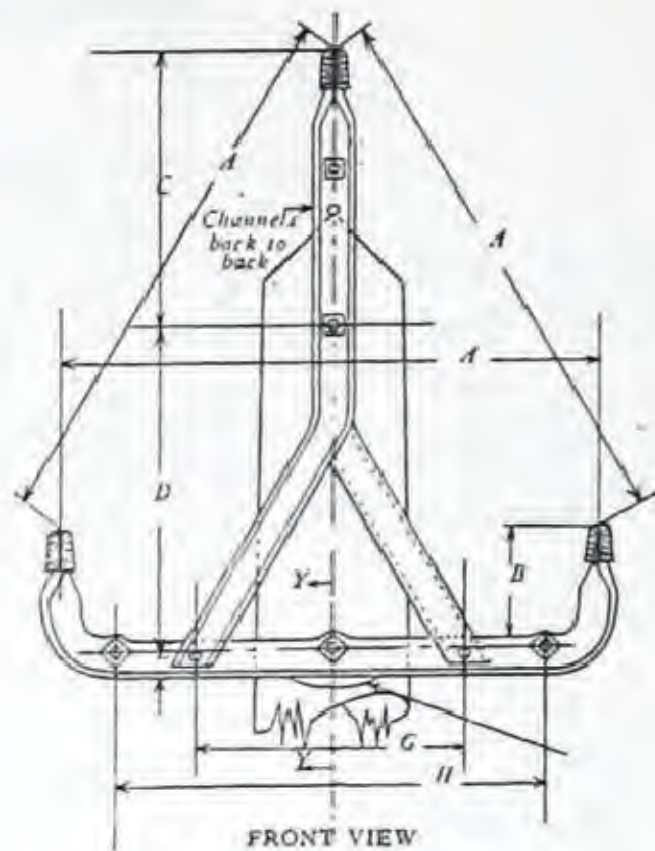
Dimensions in Inches										Wt. Lbs.
A	B	C	D	E	F	G	H	Vertical Pin	Horizontal Arm	Ea.
No. 1117 Single Arm										
20	6	11 1/2	13	1	1	8	-	1 3/4 x 1/2 x 1/8	1 1/2 x 1 1/2 x 1/8 tee	13
20	6	14 1/4	13	1	1	14	-	1 3/4 x 1/2 x 1/8	1 1/2 x 1 1/2 x 1/8 tee	14
30	6	14 1/2	18	1 1/2	1	15	-	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	24
32	6 1/2	17 1/2	18	1 1/2	1 3/8	15	-	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	27
36	6 1/2	17 1/2	21 1/2	1 1/2	1 3/8	15	-	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	30
42	8	17 1/2	28	1 1/2	1 3/8	22	-	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	37
No. 1117 Double Arm										
20	6	11 1/2	13	1	1	8	14	1 3/4 x 1/4 x 1/8	1 1/2 x 1 1/2 x 1/8 tee	28
24	6	14 1/4	13	1	1	12	18	1 3/4 x 1/2 x 1/8	1 1/2 x 1 1/2 x 1/8 tee	32
30	6	14 1/2	18	1 1/2	1	15	24	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	53
32	6 1/2	17 1/2	18	1 1/2	1 3/8	15	26	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	60
36	6 1/2	17 1/2	21 1/2	1 1/2	1 3/8	15	30	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	67
42	8	17 1/2	28	1 1/2	1 3/8	22	32	2 x 5/8 x 1/8	2 x 2 x 1/4 tee	75
No. 1118 Single Arm										
20	5	12	12	...	1	8	-	1 1/2 x 1 1/2 x 1/8	1 3/4 x 1 3/4 x 1/8	13
24	6	14	14	...	1	10	-	1 3/4 x 1 3/4 x 1/8	1 3/4 x 1 3/4 x 1/8	15
30	6	14	19 1/2	...	1	16	-	1 3/4 x 1 3/4 x 1/8	2 x 2 x 1/4	21
36	7	14	25 1/2	...	1 3/8	20	-	1 3/4 x 1 3/4 x 1/8	2 1/2 x 2 1/2 x 1/4	32
42	7	14	31	21 1/2	1 3/8	24	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	34
48	7	14	36	24	1 3/8	24	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	42
60	8	15	47	35	1 3/8	24	-	2 x 2 x 1/4	3 x 3 x 1/8	60
72	12	17	58 1/2	34 1/2	1 3/8	32	-	2 x 2 x 1/4	3 1/2 x 3 1/2 x 1/8	79
No. 1118 Double Arm										
20	5	12	12	...	1	8	-	1 1/2 x 1 1/2 x 1/8	1 3/4 x 1 3/4 x 1/8	40
24	6	14	14	...	1	10	-	1 3/4 x 1 3/4 x 1/8	1 3/4 x 1 3/4 x 1/8	44
30	6	14	19 1/2	...	1	16	-	1 3/4 x 1 3/4 x 1/8	2 x 2 x 1/4	60
36	7	14	25 1/2	...	1 3/8	20	-	1 3/4 x 1 3/4 x 1/8	2 1/2 x 2 1/2 x 1/4	78
42	7	14	31	...	1 3/8	24	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	104
48	7	14	36	...	1 3/8	24	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	117
60	8	18	47	...	1 3/8	24	-	2 x 2 x 1/4	3 x 3 x 1/8	165
72	12	21	58 1/2	...	1 3/8	30	-	2 x 2 x 1/4	3 1/2 x 3 1/2 x 1/8	214
No. 1119 Single Arm										
20	5	12	12	...	1	..	-	1 1/2 x 1 1/2 x 1/8	1 3/4 x 1 3/4 x 1/8	13
24	6	14	14	...	1	..	-	1 3/4 x 1 3/4 x 1/8	1 3/4 x 1 3/4 x 1/8	14
30	6	14	19 1/2	...	1	..	-	1 3/4 x 1 3/4 x 1/8	2 x 2 x 1/4	20
36	7	14	25 1/2	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	2 1/2 x 2 1/2 x 1/4	30
42	7	14	31	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	37
48	7	14	36	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	41
No. 1119 Double Arm										
20	5	12	12	...	1	..	-	1 1/2 x 1 1/2 x 1/8	1 3/4 x 1 3/4 x 1/8	37
24	6	14	14	...	1	..	-	1 3/4 x 1 3/4 x 1/8	1 3/4 x 1 3/4 x 1/8	45
30	6	14	19 1/2	...	1	..	-	1 3/4 x 1 3/4 x 1/8	2 x 2 x 1/4	60
36	7	14	25 1/2	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	2 1/2 x 2 1/2 x 1/4	94
42	7	14	31	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	111
48	7	14	36	...	1 3/8	..	-	1 3/4 x 1 3/4 x 1/8	3 x 3 x 1/4	115

SLATER THREE-POINT POLE-TOP FIXTURES

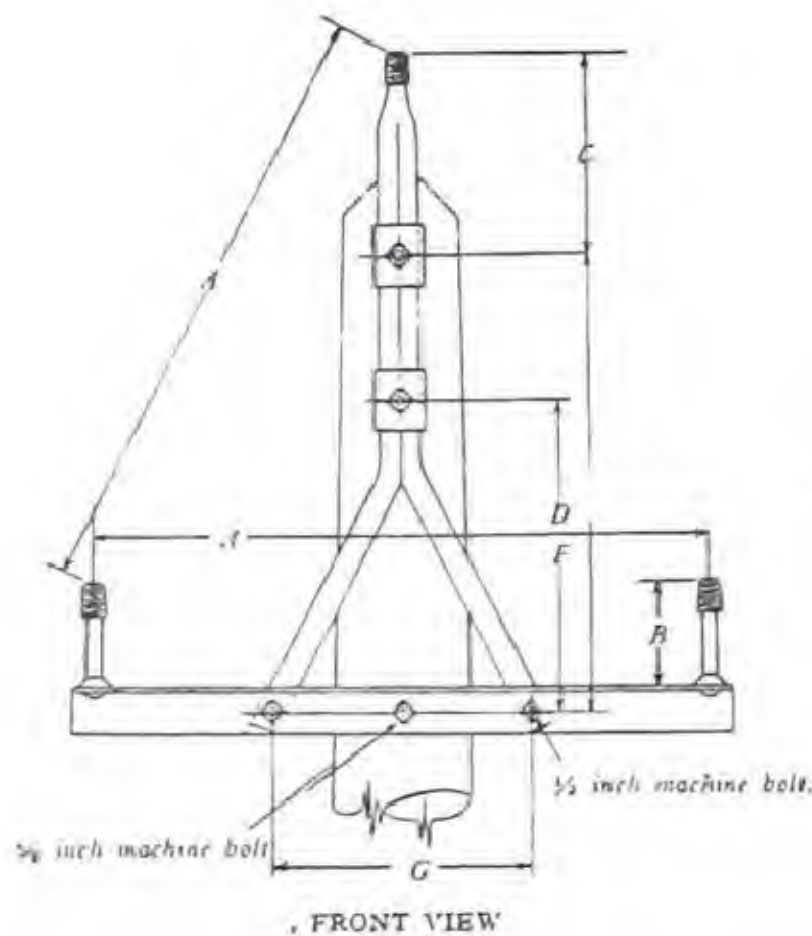
Hot Galvanized
(Continued)



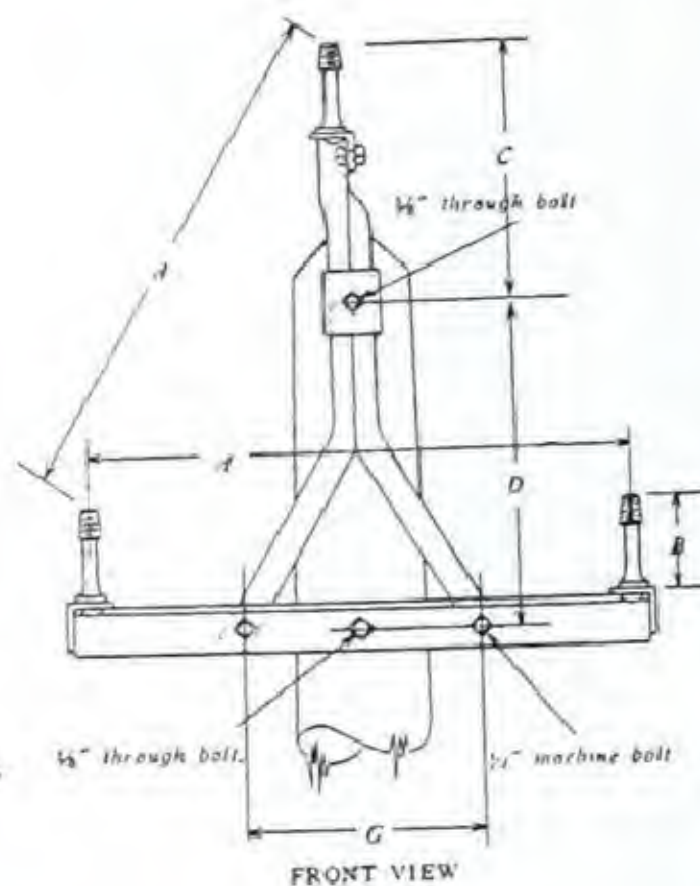
No. 1117
Single Arm Fixture



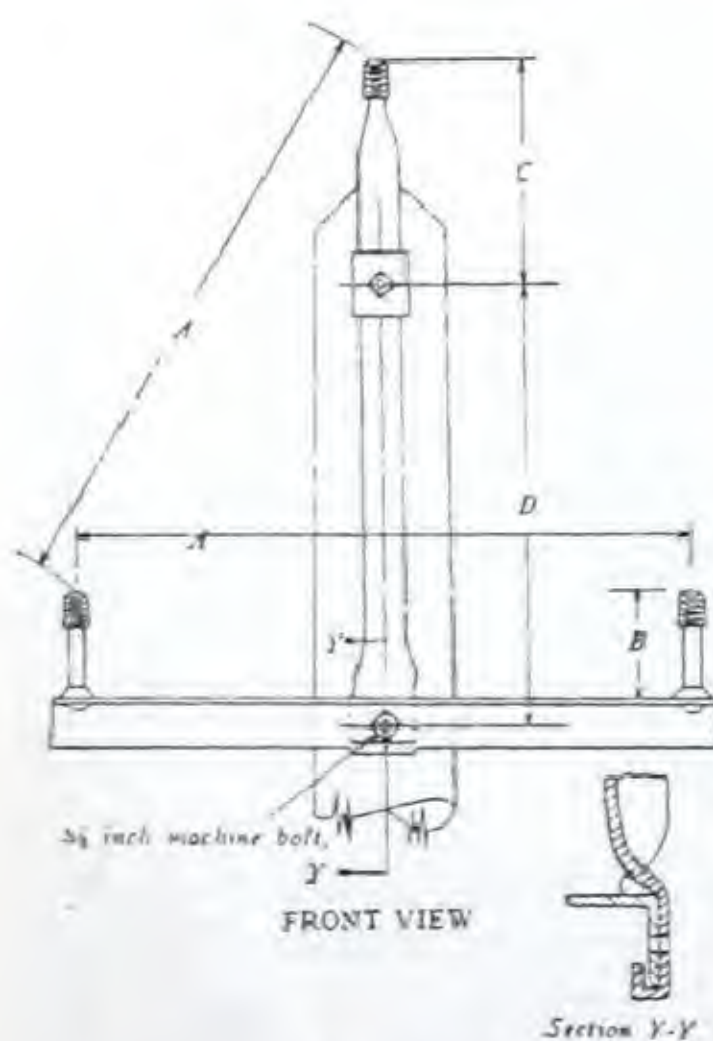
No. 1117
Double Arm Fixture



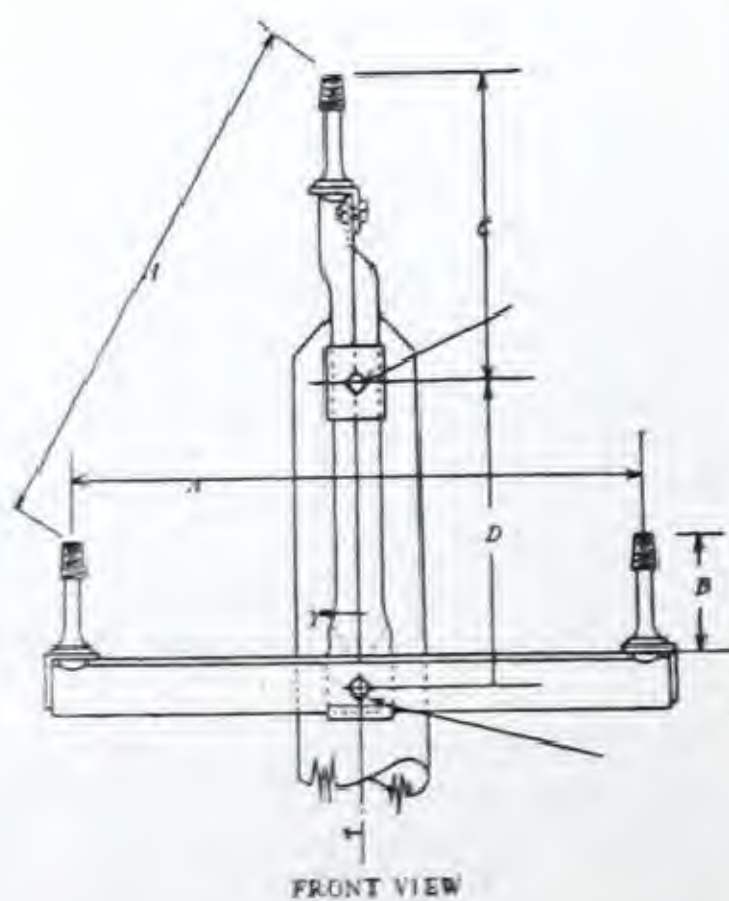
No. 1118
Single Arm Fixture



No. 1118
Double Arm Fixture



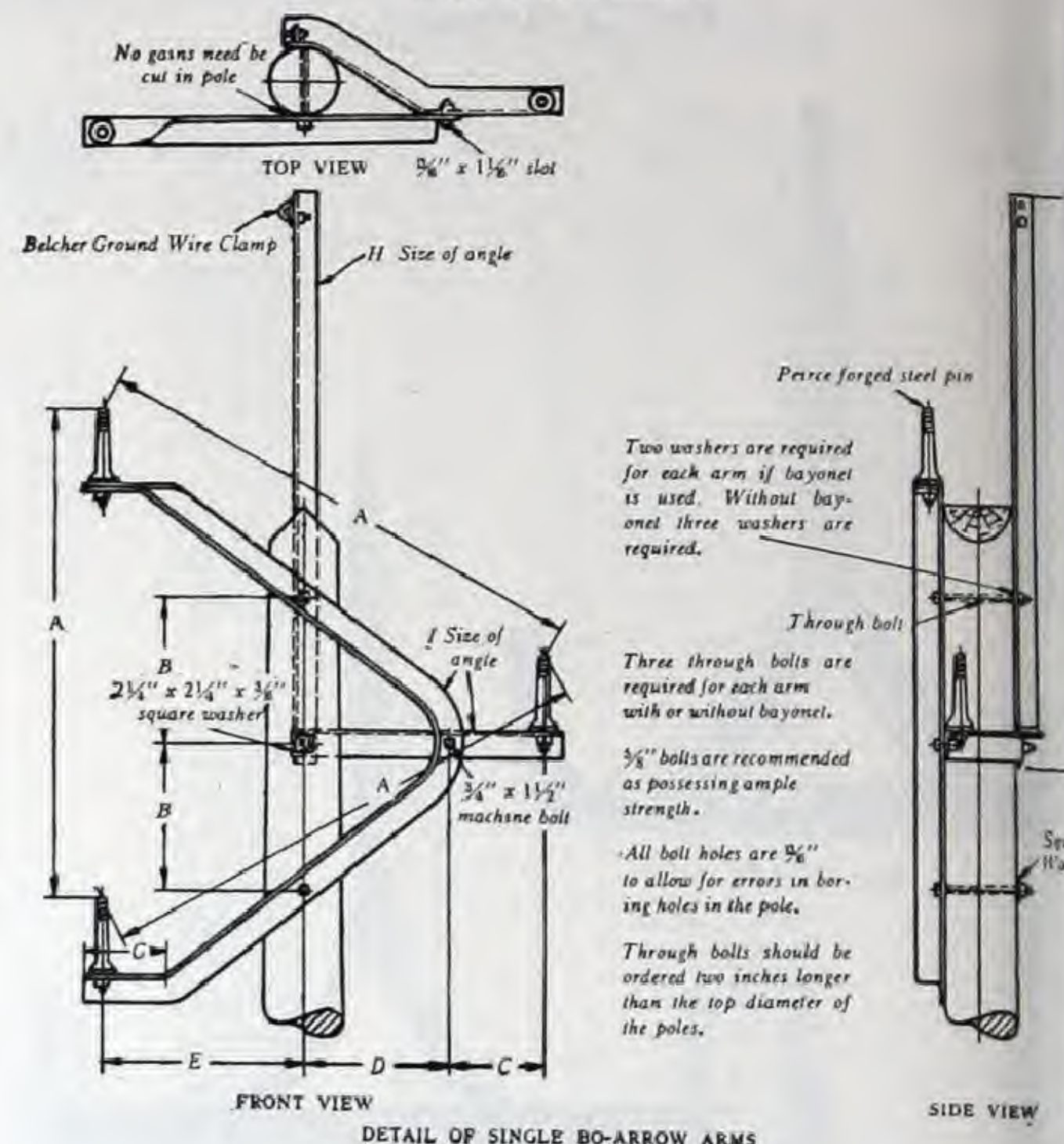
No. 1119
Single Arm Fixture



No. 1119
Double Arm Fixture

SLATER SINGLE BO-ARROW ARMS

Hot Galvanized



A Single Bo-Arrow Arm consists of one bow, one arrow and one $\frac{3}{4}$ x $1\frac{1}{2}$ -inch machine bolt for fastening the bow and arrow together.

Type B arms, not listed, notched for Slater clamp pins furnished at the same price as the standard arms, were specified. Through bolts are not included in Bo-Arrow prices on account of the great variation in the lengths required for the different classes of poles used. Three bolts are needed for a single set, the proper length being about 2 inches longer than the top diameter of the pole. When bayonets are used with single arms, two washers are required per arm without bayonets, three washers.

List No.	Wire Spacing	Dimensions in Inches Size Angle	Weight Lbs. Eac.
6024	24	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	21
6030	30	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	25
6036	36	3 x 3 x $\frac{1}{4}$	39
6052	52	3 x 3 x $\frac{1}{4}$	52
6072	72	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{16}$	69

Size In.	A	B	C	D	E	F	G	H	I
24	24	$7\frac{7}{8}$	5	7	$9\frac{1}{4}$	31	$4\frac{1}{2}$	2	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$
30	30	$9\frac{1}{8}$	7	8	11	37	$5\frac{1}{2}$	2	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$
36	36	$12\frac{5}{16}$	6	12	$13\frac{1}{2}$	46	$7\frac{1}{4}$	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	3 x 3 x $\frac{1}{4}$
52	52	$15\frac{3}{8}$	10	15	20	66	$8\frac{1}{2}$	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	3 x 3 x $\frac{1}{4}$
72	72	$21\frac{7}{16}$	18	$20\frac{1}{2}$	24	80	$8\frac{3}{4}$	3	$3\frac{1}{2}$ x $3\frac{1}{2}$ x $\frac{5}{16}$

SLATER STRAIGHT BAYONETS

Hot Galvanized

Straight Bayonets are used with single Bo-Arrow sets. additional bolts are required for attaching the bayonet pole, the upper and middle cross arm bolts serving purpose.

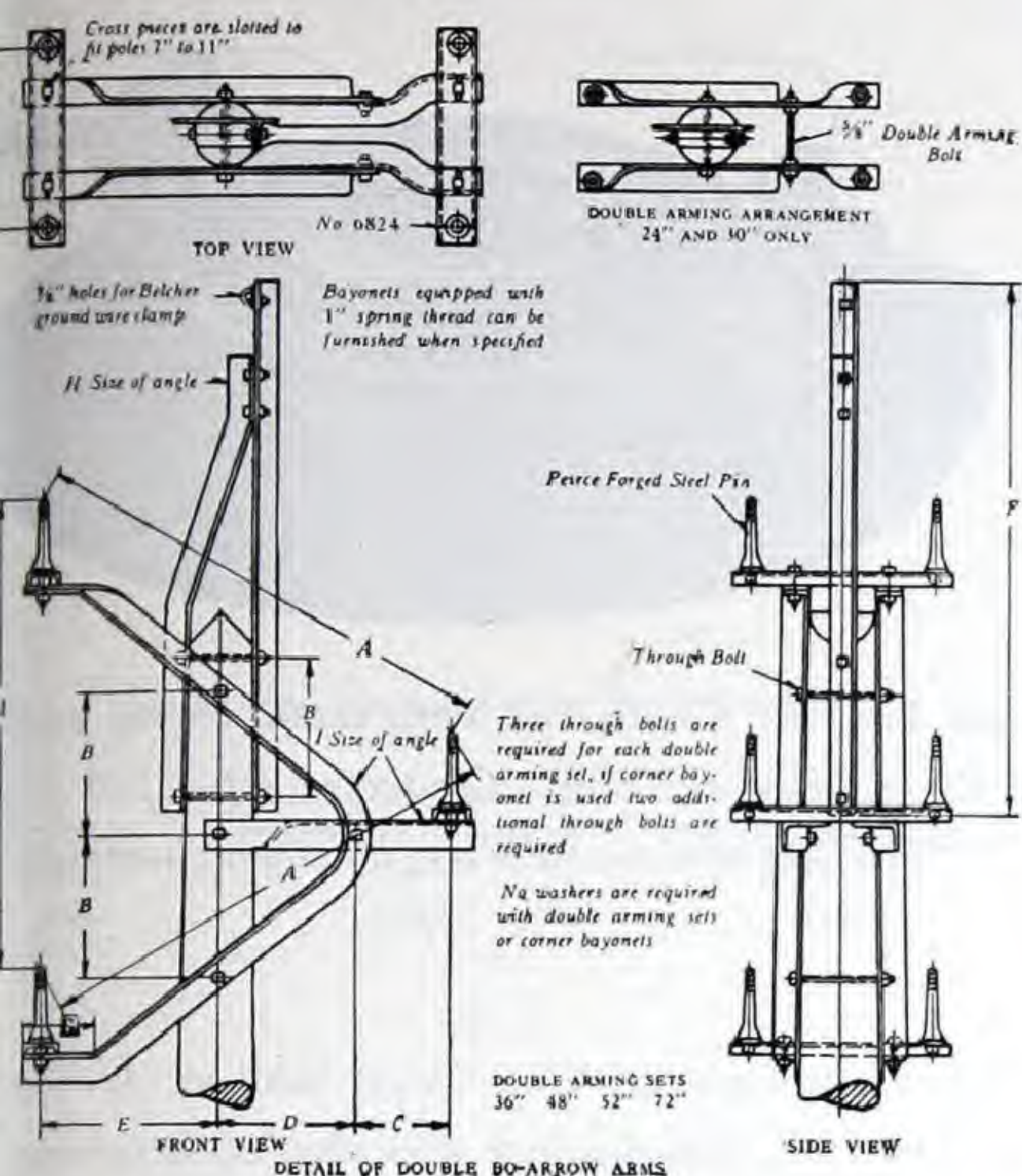
Prices cover bayonets punched for attaching any of ground wire clamps. Bayonets equipped with 1-inch SI spring threads for standard insulators in place of clamps be furnished when specified. All bolt holes and slots punched $\frac{13}{16}$ -inch.

List No.	Used with Bow-Arrow Arm	Dimensions in Inches Length	Size Angle	Wt. Eac.
6031	6024	31	2 x 2 x $\frac{1}{4}$	8 1/2
6037	6030	37	2 x 2 x $\frac{1}{4}$	10
6046	6036	46	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	15 1/2
6066	6052	66	$2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$	22
6080	6072	80	3 x 3 x $\frac{1}{4}$	33

Prices on application.

WATER BO-ARROW DOUBLE ARMING SETS

Hot Galvanized



These sets are adjustable by means of the slots in the cross pieces for poles of from 7 to 11 inches in top diameter. The 24 and 30-inch sets consist of a right and a left-hand bow, right and a left-hand straight arrow; three double arming sets or angles, depending on whether forged steel or cast pins are used; two $\frac{3}{4}$ x $1\frac{1}{2}$ -inch bolts for fastening the bows and arrows together and six $\frac{5}{8}$ -inch bolts for clamping the cross pieces to the arms. These cross pieces are necessary to give sufficient clearance between the two large high voltage conductors required in each line wire, but are not needed on the 36 and 48-inch sets, in which cases two bows, two straight arrows and a $\frac{5}{8}$ x 12 inch double arming or spreader bolt for joining the four parts together are furnished. Three through bolts are required for a double set but are included in the prices.

Dimensions of Standard Sizes, in Inches

	A	B	C	D	E	F	G	H	I
24	7 $\frac{7}{8}$	5	7	9 $\frac{1}{4}$	31	41 $\frac{1}{2}$	2	x2	x $\frac{3}{16}$ 2 $\frac{1}{2}$ x2 $\frac{1}{2}$ x $\frac{1}{4}$
30	9 $\frac{1}{8}$	7	8	11	37	51 $\frac{1}{2}$	2	x2	x $\frac{3}{16}$ 2 $\frac{1}{2}$ x2 $\frac{1}{2}$ x $\frac{1}{4}$
36	12 $\frac{5}{16}$	6	12	13 $\frac{1}{2}$	46	71 $\frac{1}{4}$	2	x2	x $\frac{1}{4}$ 3 x3 x $\frac{1}{4}$
48	15 $\frac{3}{8}$	10	15	20	66	81 $\frac{1}{2}$	2 $\frac{1}{2}$	x2 $\frac{1}{2}$	x $\frac{1}{4}$ 3 x3 x $\frac{1}{4}$
72	21 $\frac{7}{16}$	18	20 $\frac{1}{2}$	24	80	83 $\frac{3}{4}$	2 $\frac{1}{2}$	x2 $\frac{1}{2}$	x $\frac{1}{4}$ 3 $\frac{1}{2}$ x3 $\frac{1}{2}$ x $\frac{5}{16}$

Prices on application.

	Used with	Dimensions in Inches			Wt.,
st	Bo-Arrow Arm	Length	Size	Angle	Lbs.
o.	Number				Each
24	...	24	2½ x 2½	x ¼	43
30	...	30	2½ x 2½	x ¼	51
36	...	36	3 x 3	x ¼	113
52	...	52	3 x 3	x ¼	139
72	...	72	3½ x 3½	x ⅝	173

Corner Bayonets

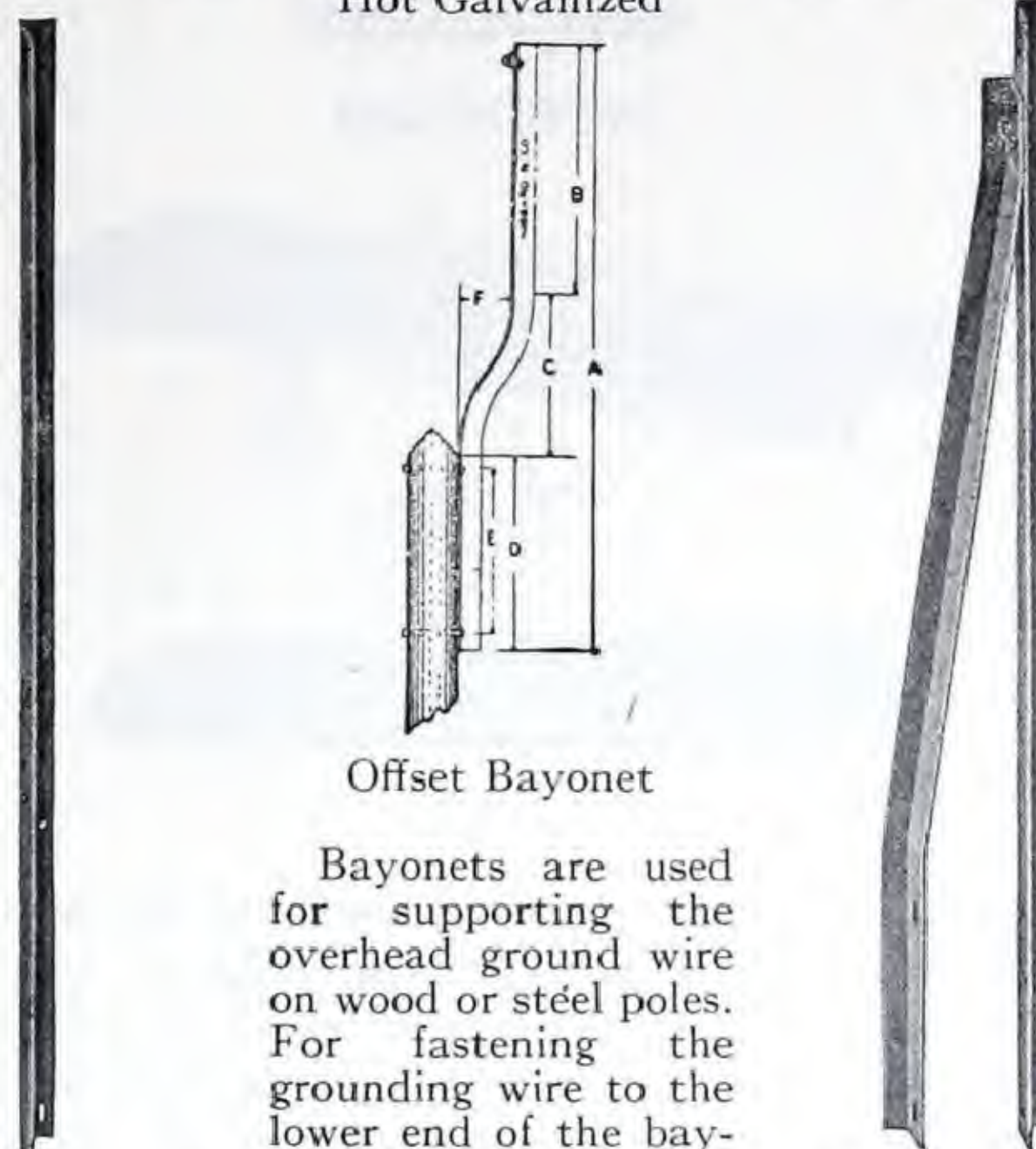
Two extra through bolts are required for attaching the corner bayonet to a pole. Each corner bayonet consists of one straight piece of angle steel, one bent piece and two $\frac{1}{2}$ x 2-inch machine bolts for fastening them together.

Prices cover bayonets punched for attaching any of the standard wire clamps. Bayonets equipped with 1-inch Slater Ground Wire Threads for standard insulators in place of clamps can be furnished when specified. Corner Bayonets have $\frac{1}{16}$ -inch slots and slots for through bolts. Hot Galvanized.

	No.	Length	Size Angle	Wt.,
31	6224	31	2 x 2 x $\frac{1}{16}$	12 $\frac{3}{4}$
37	6230	37	2 x 2 x $\frac{1}{16}$	15
46	6236	46	2 x 2 x $\frac{1}{4}$	24
66	6252	66	2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x $\frac{1}{4}$	43
80	6272	80	2 $\frac{1}{2}$ x 2 $\frac{1}{2}$ x $\frac{1}{4}$	49

SLATER GROUND WIRE BAYONETS

Hot Galvanized



Straight Bayonet Wire Terminal is used. Corner Bayonet

Bayonets are used for supporting the overhead ground wire on wood or steel poles. For fastening the grounding wire to the lower end of the bayonet the Slater Ground Wire Terminal is used.

All bayonets have two $\frac{1}{16}$ -inch holes for $\frac{5}{8}$ -inch through bolts, and their upper ends have two $\frac{9}{16}$ -inch holes, which allow the use of the No. 6450 or the No. 6455 or Ground Wire Clamps. Bayonets are fastened to the back of the pole by the upper cross arm bolt and a lag screw or a second through bolt.

Corner bayonets are for use at all points at which double arms are required, and consist of two angles, one bent, the other straight, fastened together by two $\frac{1}{2}$ -inch machine bolts. The angle is bent for an 8-inch pole top, but the angles may be spread to fit any size of pole. The through bolt holes in the bent leg of the bayonet are slotted $\frac{1}{16}$ -inch wide by $1\frac{1}{2}$ inches long, to allow for any inaccuracy in boring bolt holes in the poles.

Bayonets equipped with Slater 1-inch Spring Threads will be furnished when specified.

Straight Bayonets

List No.	—Dimensions in Inches—				Wt., Lbs. Per 100
	A	E	Size	Angle	
6436	36	10	2	x 2 x $\frac{1}{4}$	957
6448	48	12	2½	x 2½ x $\frac{1}{4}$	1640
6466	66	15	2½	x 2½ x $\frac{1}{4}$	2255
6484	84	20	3	x 3 x $\frac{1}{4}$	3430

Corner Bayonets

6536	36	10	2	x	2	x	$\frac{3}{16}$	1464
6548	48	12	2	x	2	x	$\frac{3}{16}$	1952
6566	66	15	2	x	2	x	$\frac{1}{4}$	3509
6584	84	20	2 $\frac{1}{2}$	x	2 $\frac{1}{2}$	x	$\frac{1}{4}$	3740

OFFSET GROUND WIRE BAYONETS

Hot Galvanized

The Offset type of Bayonet is used when an overhead ground wire is installed on a single circuit transmission line employing pole top pin or ridge iron construction. The bayonets listed are suitable for use on lines of 24, 36 and 52-inch conductor spacing, respectively, and have two $\frac{1}{16}$ -inch holes for $\frac{5}{8}$ -inch through bolts, the upper ends having two $\frac{9}{16}$ -inch holes, which allow the use of the No. 6450 or No. 6455 Ground Wire Clamps. Slater Copper Terminals should be used for fastening the grounding wire to the lower end of the bayonet.

The Ground Wire Clamps illustrated are not included in bayonet prices. Bayonets equipped with Slater 1-inch Spring Threads will be furnished when specified.

List No.	—Dimensions in Inches—								Lbs Per 100
A	Size	Angle	B	C	D	E	F		
6420	54	2½ x 2½ x ¼	23½	12	18½	15	8	2050	
6421	72	2½ x 2½ x ¼	37½	14	20½	17	10	2829	
6422	81	3 x 3 x ¼	39⅝	15⅞	25½	22	12	3800	
Prices on application.									

Prices on application.

SLATER DOUBLE ARMING CHANNELS AND PLATES

Hot Galvanized



No. 6824



No. 6844

The Double Arming Channels are made of channel 4 inches wide by $1\frac{1}{2}$ inches deep. The plates from 4 x $\frac{1}{2}$ -inch flat steel. Both are adjustable for poles from 7 to 12 inches, top diameter, with gains $\frac{1}{2}$ -inch deep. The pin holes are $\frac{1}{8}$ -inch diameter 2 inches from each end. Slots are $\frac{1}{16}$ x 3-inch.

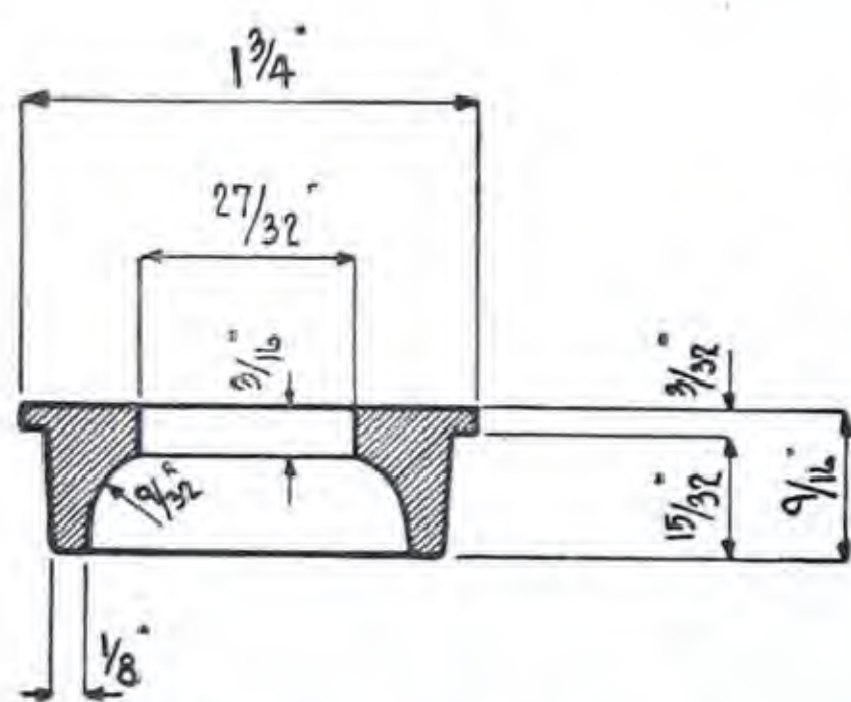
List No.	Material	Length Inches	Pin Spacing	Wt., Lbs. Per 100
6824	Channel	24	20	1080
6927	"	27	23	1226
6830	"	30	26	1350
6844	Plate	24	20	1300
6847	"	27	23	1477
6850	"	30	26	1650



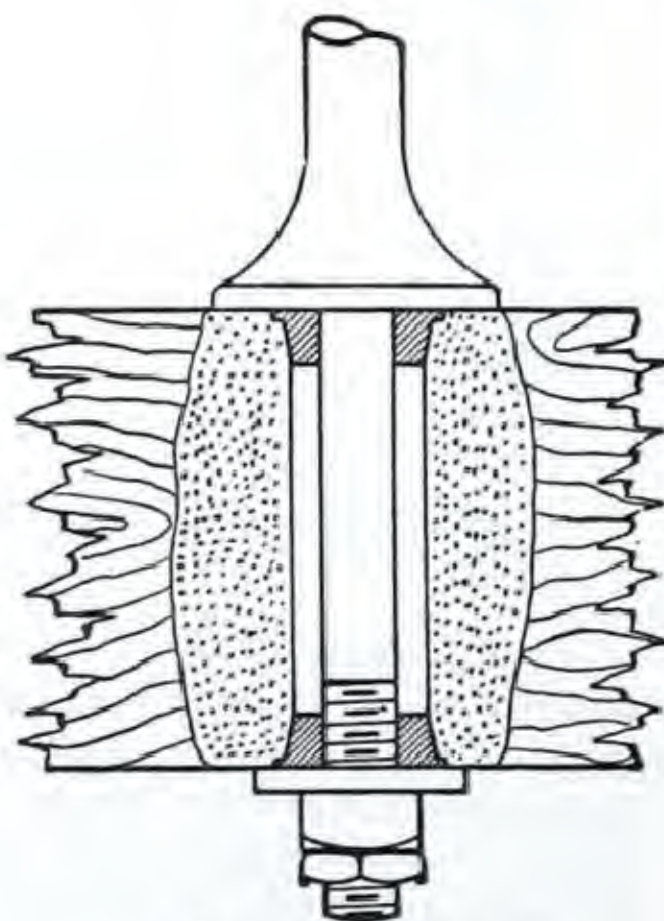
No. 2050

SLATER CENTERING WASHER

Hot Galvanized



Dimensions in detail



Installed View

The Centering Washer illustrated is especially suitable for installing pins in wood arms already drilled with $1\frac{1}{2}$ -inch holes for wood pins, due to the fact that they may be used on flat or roofed arms. They effectively seal the hole and at the same time provide rigid bearing areas for the pin shank either $\frac{3}{4}$ " or $\frac{5}{8}$ " diameter.

List No.	Item	Wt. in Lbs. per 100 pcs.
2050	Centering Washer	15 lbs.

SLATER INSULATOR WIRE CLAMP



Slater Insulator Clamp, No. 2060, shown on top section 88 Kv. pin-type insulator. Conductor is No. 2/0 A.C.S. (clamping sections have cast aluminum bushings)

The Slater Insulator Wire Clamp has been developed to overcome the long-standing difficulty of attaching conductors to pin-type insulators.

Loose tie wires are responsible for a very large amount of radio trouble in the form of interference, making it difficult to operate receivers in the neighbourhood of many lines. A loose tie wire is a prolific transmitter of radio noise on any line of 1000 volts or more.

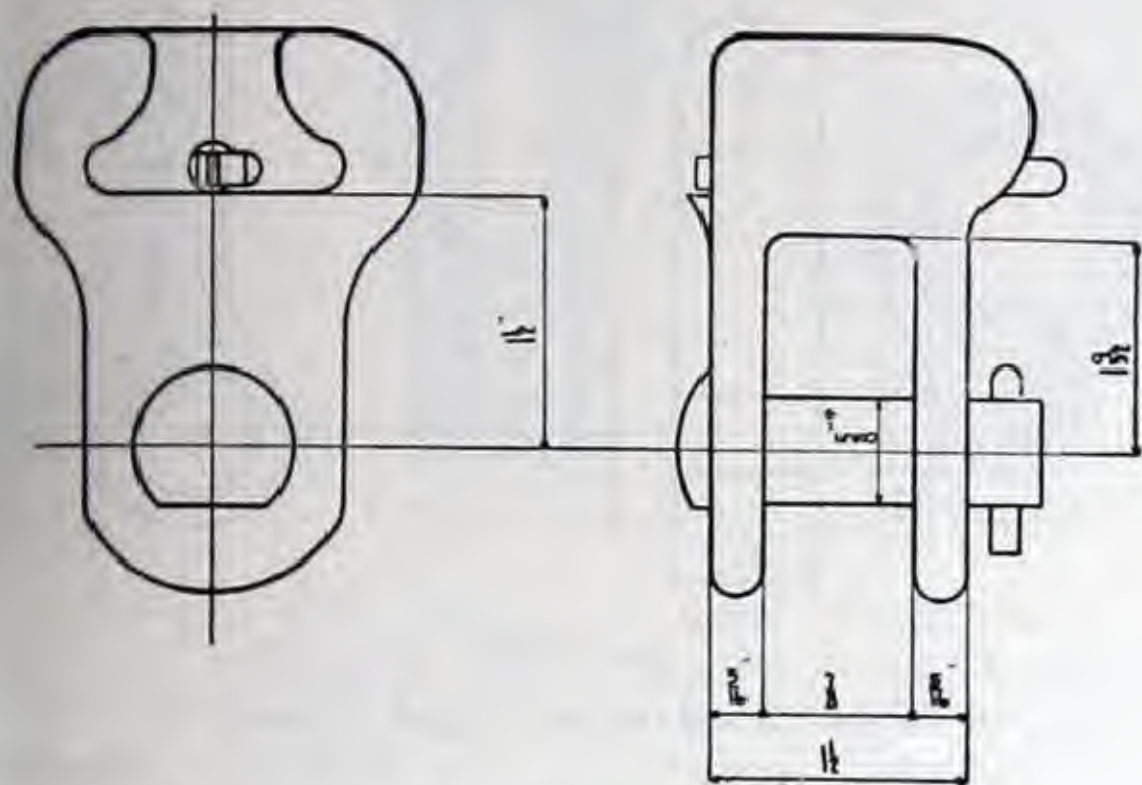
The Slater Tie Wire Clamp has been developed to attach the wire securely in a manner which eliminates wear. It also has a slight amount of flexibility in the complete attachment as it does not rigidly attach to the insulator. Consequently, the conductor is free by this means to seek its angle at the span ends, and to conform to variations in ground levels and pole heights.

The secure attachment of the Slater Tie Wire Clamp to the conductor does not allow any intermittent separation from the conductor electrically, and results in entirely continuous operation.

The Slater Tie Wire Clamp is made with interchangeable cast bronze or aluminum liners to suit the size and nature of the conductor. Nut locks are used on the insulator attachment parts and double nuts on the conductor clamping parts. All parts except the liners are Slater hot dip galvanized.

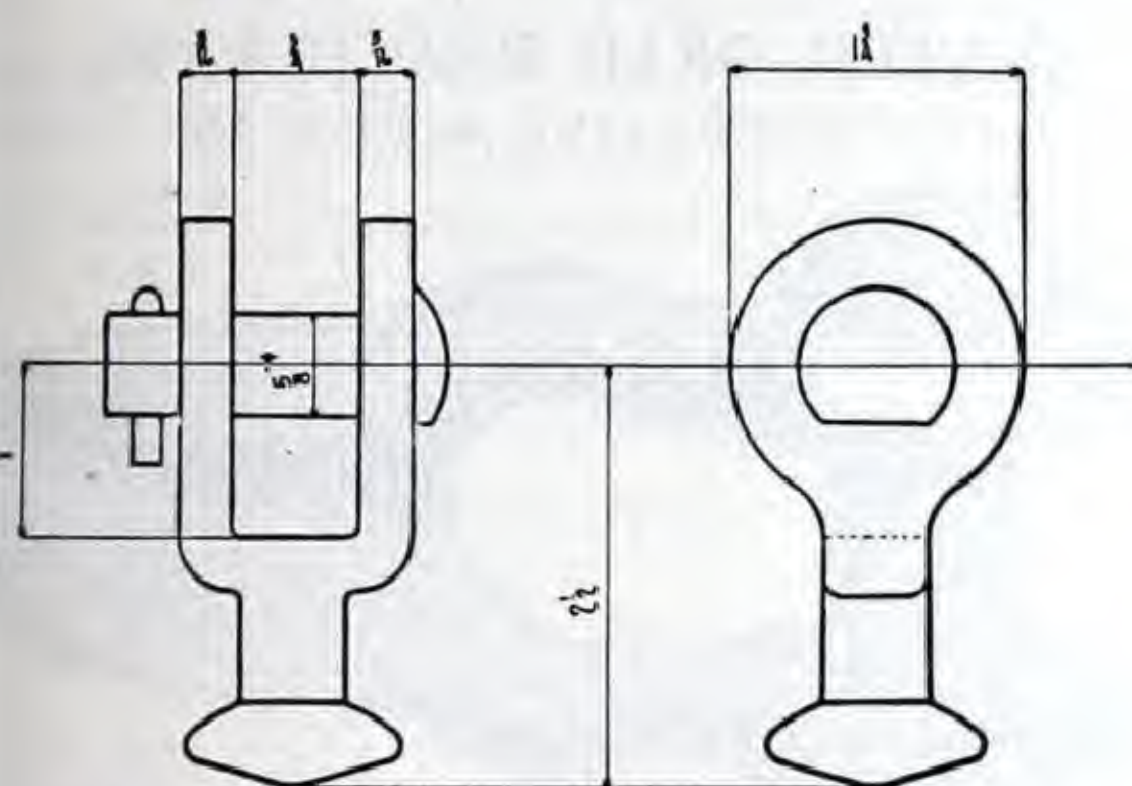
SLATER FITTINGS FOR SUSPENSION INSULATORS

Hot Galvanized



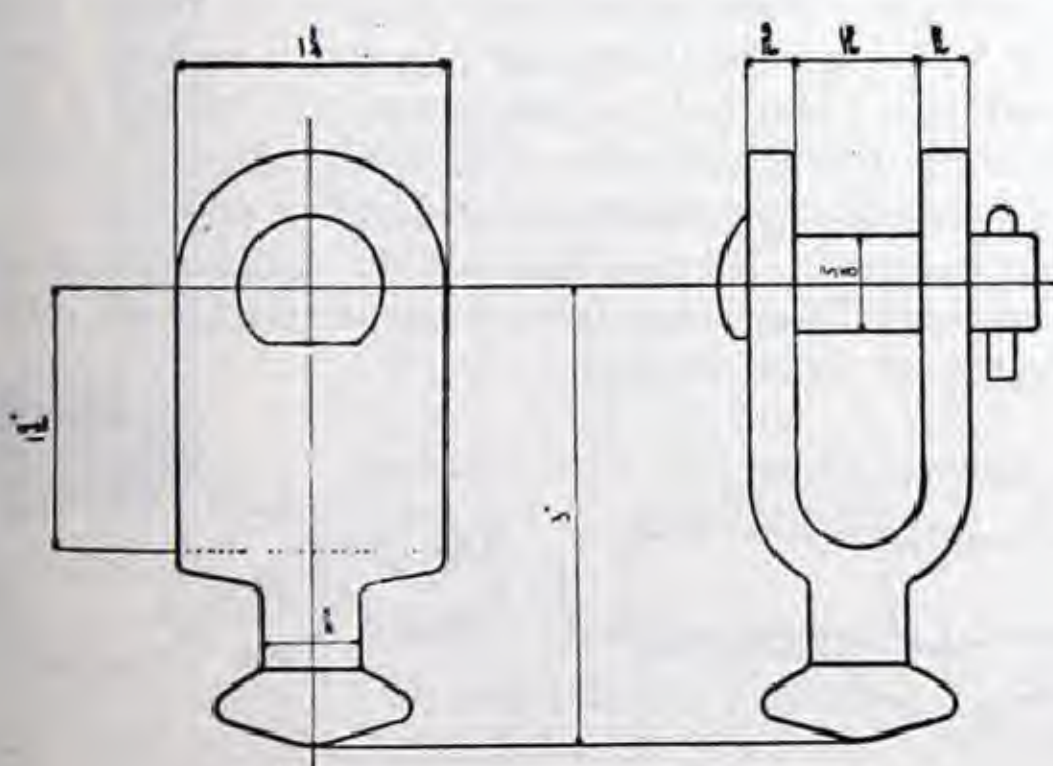
Slater Ball Socket Clevis Attachment

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
760	10,000	152



Slater Ball Clevis Attachment

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
761	15,000	104

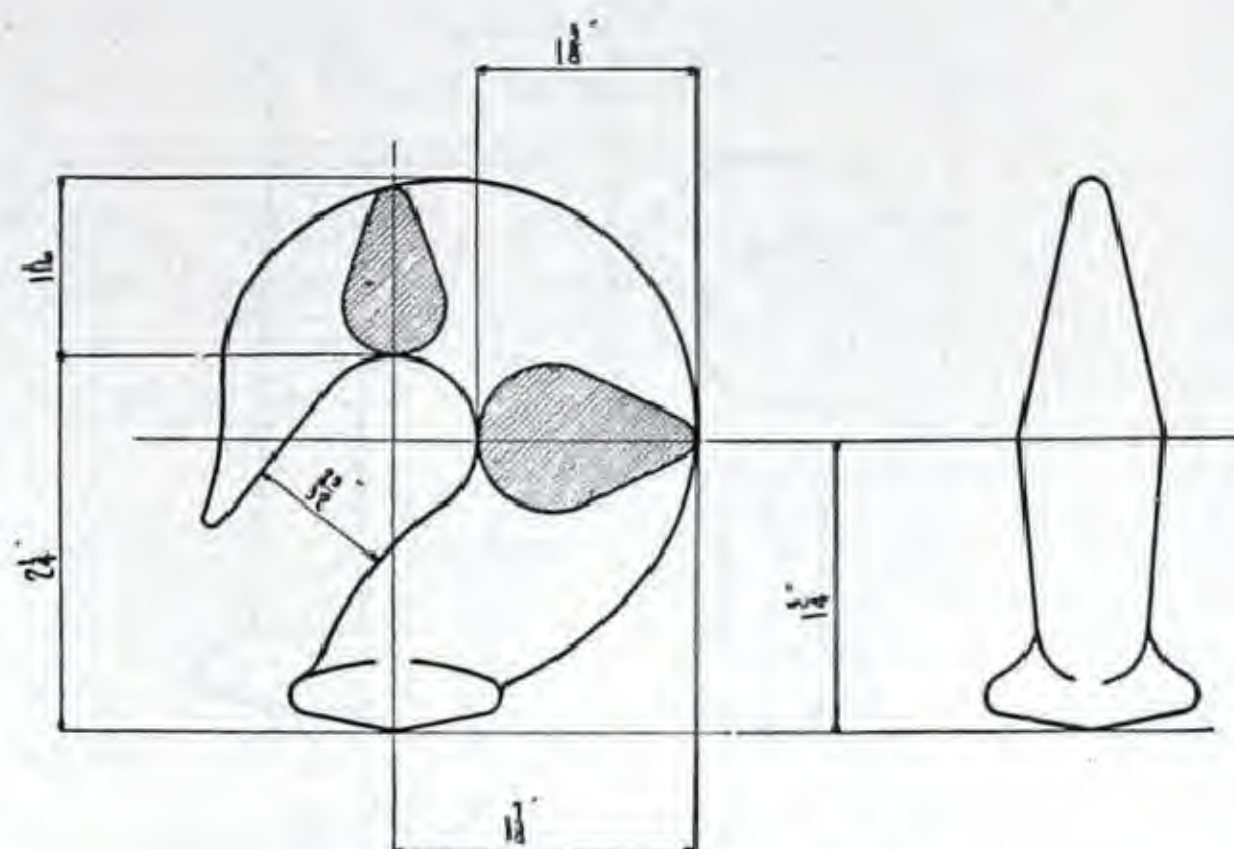


Slater Tower Clevis Attachment

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
761A	15,000	113

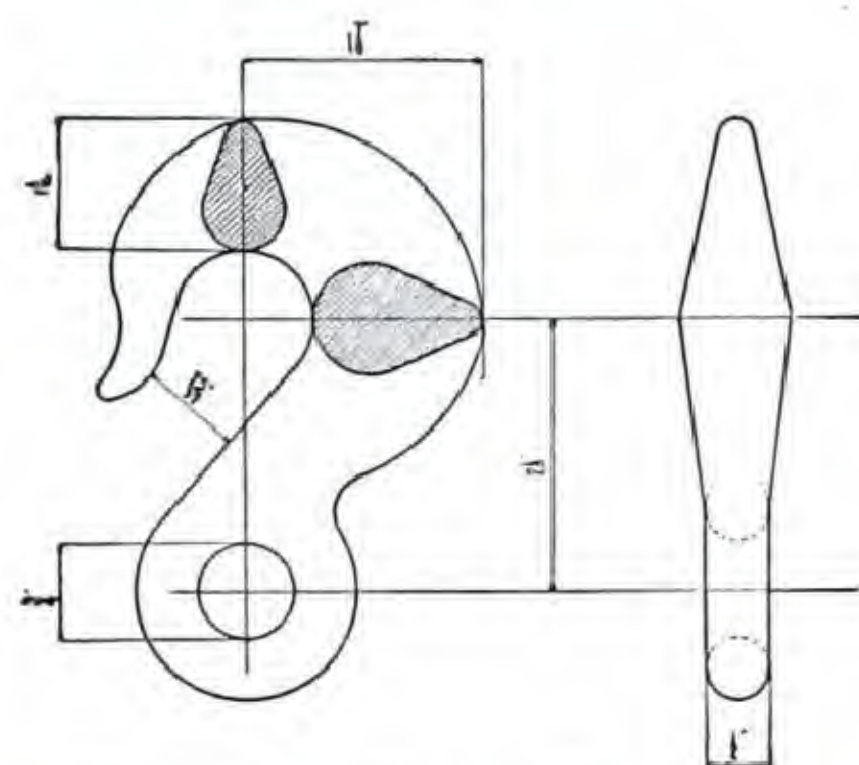
SLATER FITTINGS FOR SUSPENSION INSULATORS

Hot Galvanized



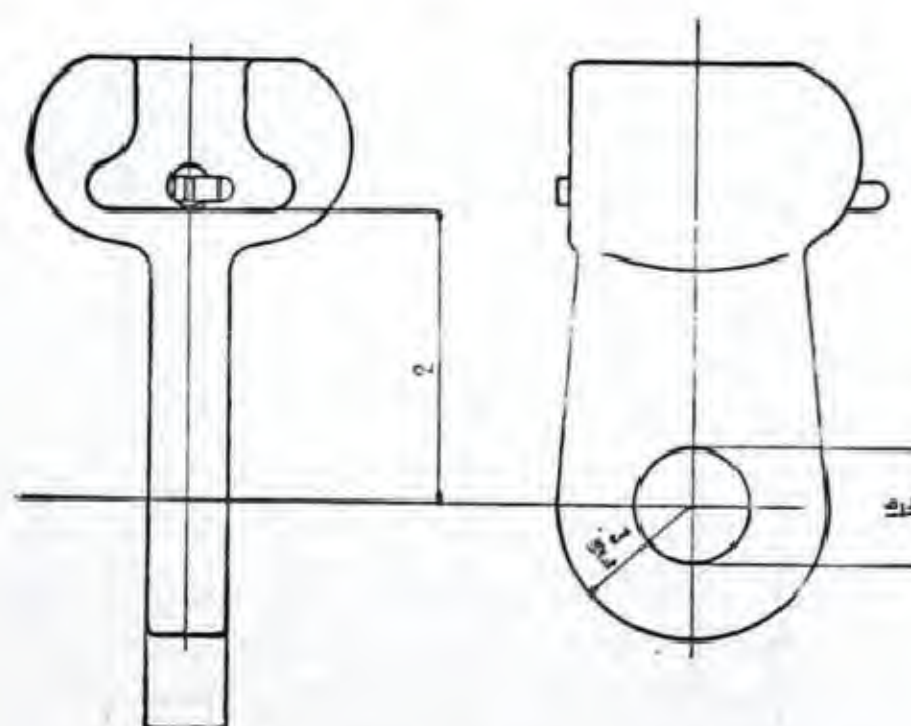
Slater Drop Forged Ball Hook

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
762	10,000	76



Slater Drop-Forged Eye Hook

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
763	10,000	113

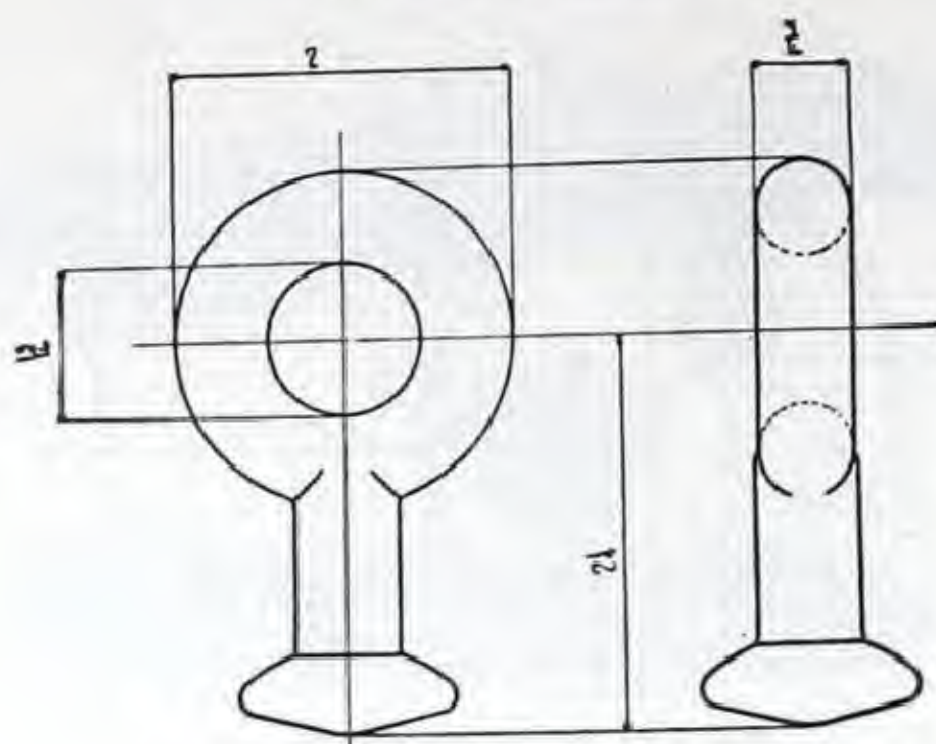


Ball Socket Eye Attachment

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
764A	10,000	113

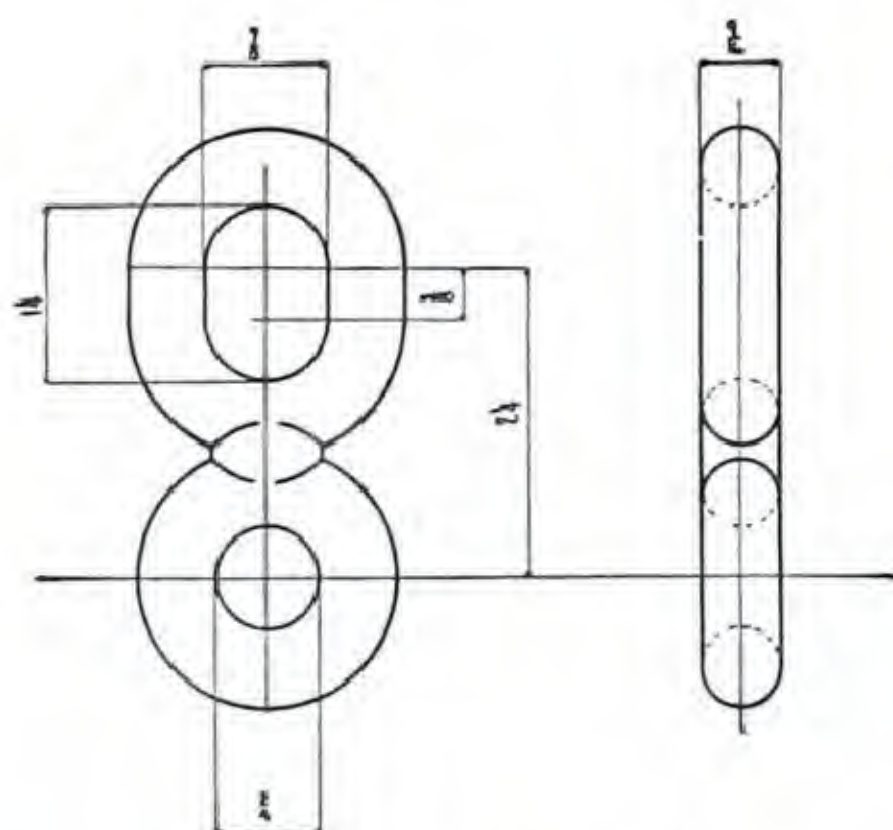
SLATER FITTINGS FOR SUSPENSION INSULATORS

Hot Galvanized



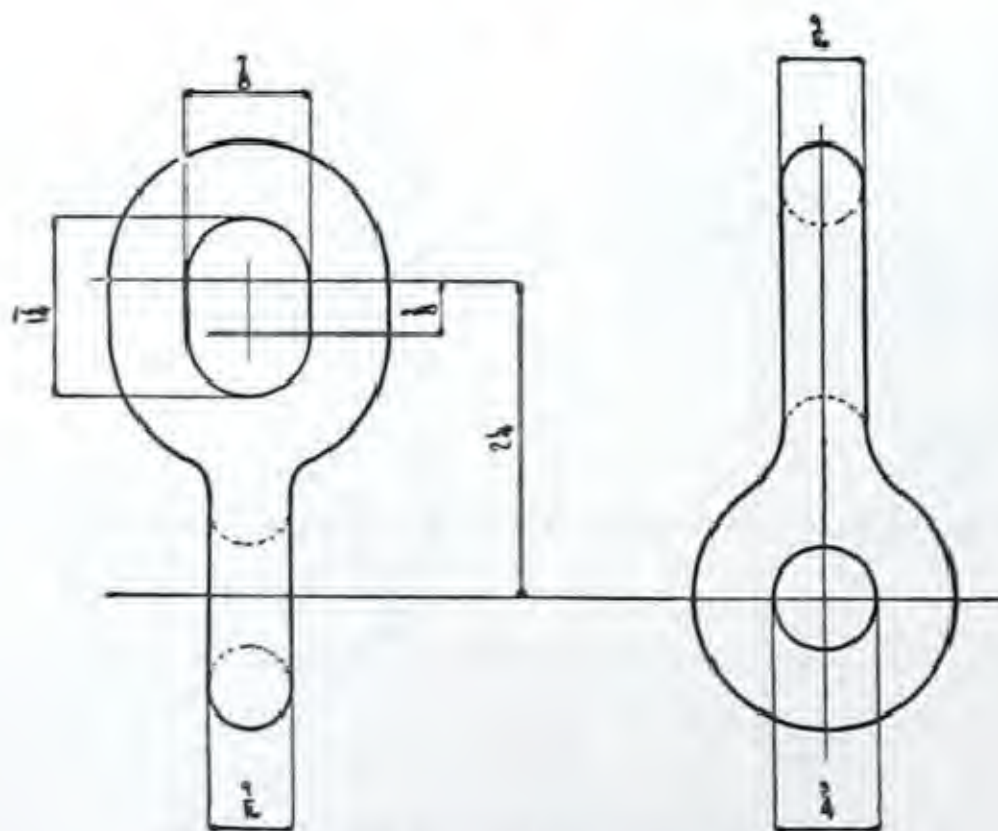
Slater Drop Forged Ball Eye

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
6785	15,000	88



Slater Drop-Forged Eye

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
6789	15,000	76

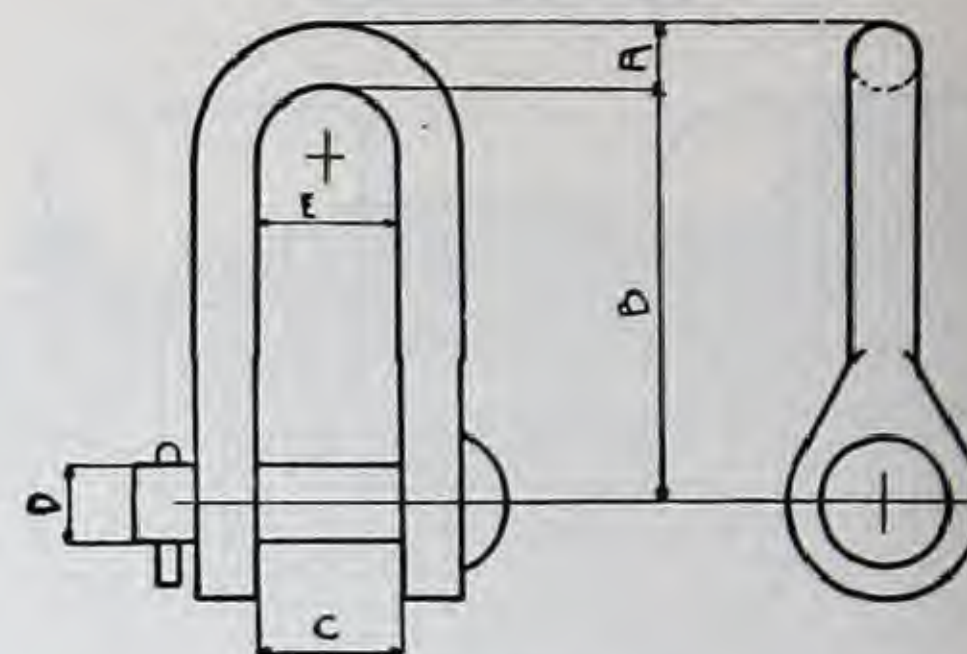


Slater Drop-Forged Eye

Stock No.	Pounds Mechanical Strength in excess of	Approximate Shipping Weight 100 pcs.
6790	15,000	76

SLATER FITTINGS FOR SUSPENSION INSULATORS

Hot Galvanized



No. 6793

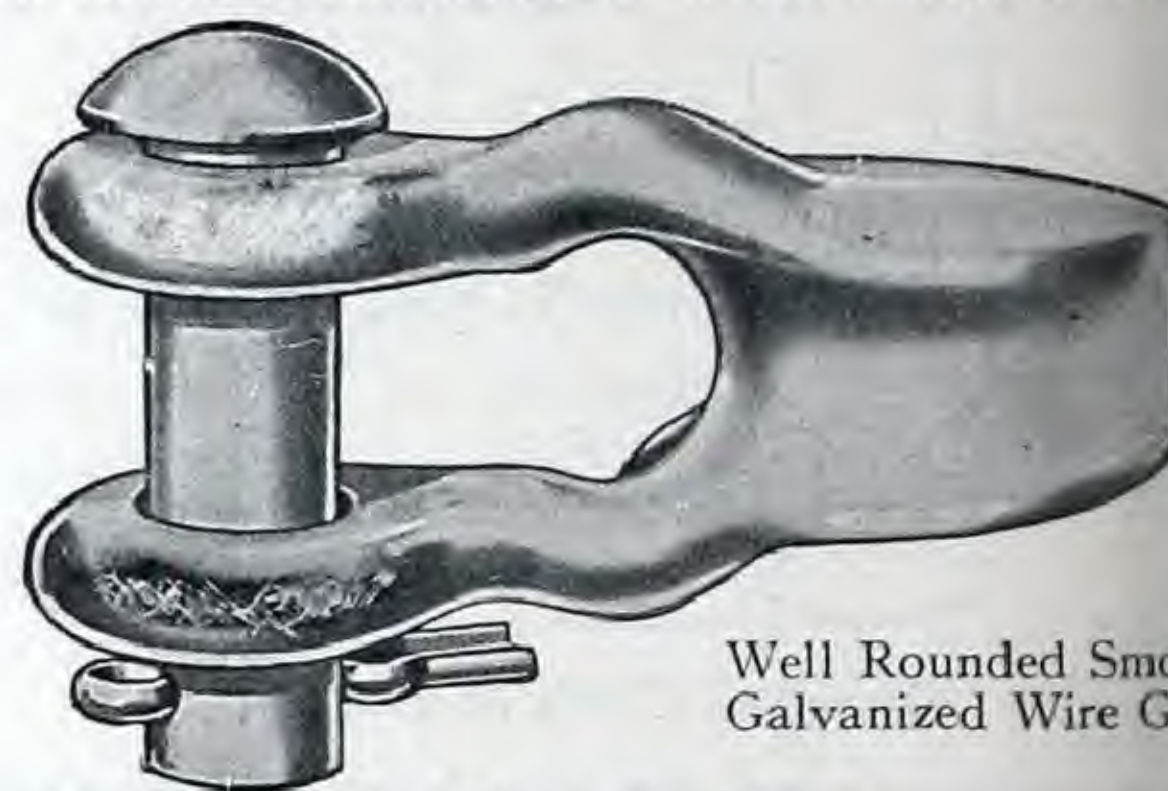
Type A—Drop Forged Clevis

List No.	A	B	C	D	E	Approximate Shipping Weight Lbs., per
6793	$\frac{1}{2}$	2	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	66
6798	$\frac{9}{16}$	2	$1\frac{3}{8}$	$\frac{3}{4}$	$1\frac{3}{8}$	146
6799	$\frac{9}{16}$	4	$1\frac{3}{8}$	$\frac{3}{4}$	$1\frac{3}{8}$	160
6800	$\frac{1}{2}$	3	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{11}{16}$	85
6802	$\frac{3}{8}$	2	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{11}{16}$	60
6803	$\frac{9}{16}$	$4\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	160

List No.	A	B	C	D	E	Approximate Shipping Weight Lbs., per
6801	$\frac{1}{2}$	$2\frac{5}{32}$	$\frac{3}{4}$	$\frac{9}{16}$	$1\frac{5}{16}$	77

SLATER DEAD END CLEVIS

FOR DEAD ENDING LIVE WIRES—Hot Galvanized



Well Rounded Smooth Galvanized Wire Groove

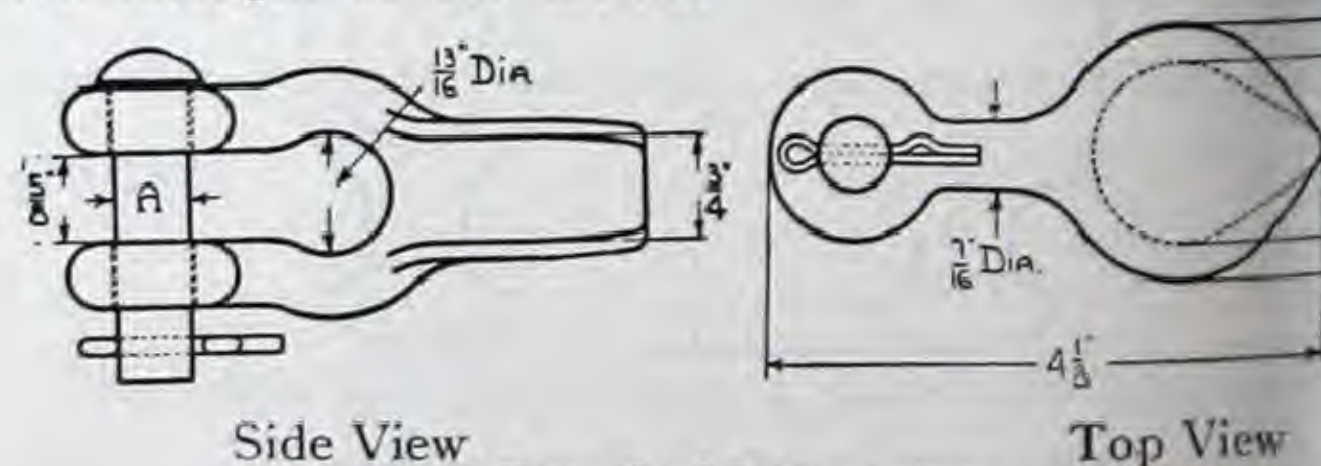
Slater Dead End Clevis No. 654 (Drop Forged).

The Drop Forged Clevis has been developed to replace the old pressed steel type which could not be uniformly maintained to a true and safe radius.

Both sizes are assembled from the same forging, their difference being in the diameter of the bolt used.

They are used for dead-ending lines to suspension insulators where a clevis is only as effective as the smallest radius of the wire groove. The minimum radius of these new Slater Clevises is $\frac{5}{8}$ " and the Forging has an ultimate strength of 20,000 pounds. The full strength of the clevis is developed by the $\frac{5}{8}$ " bolt used with No. 655 while the $\frac{1}{2}$ " bolt used with No. 654 shears at approximately 15,000 pounds.

The new Forged Clevises have 100% greater strength than the old Presteel Type, are better appearing and develop full strength of the strand.



Side View

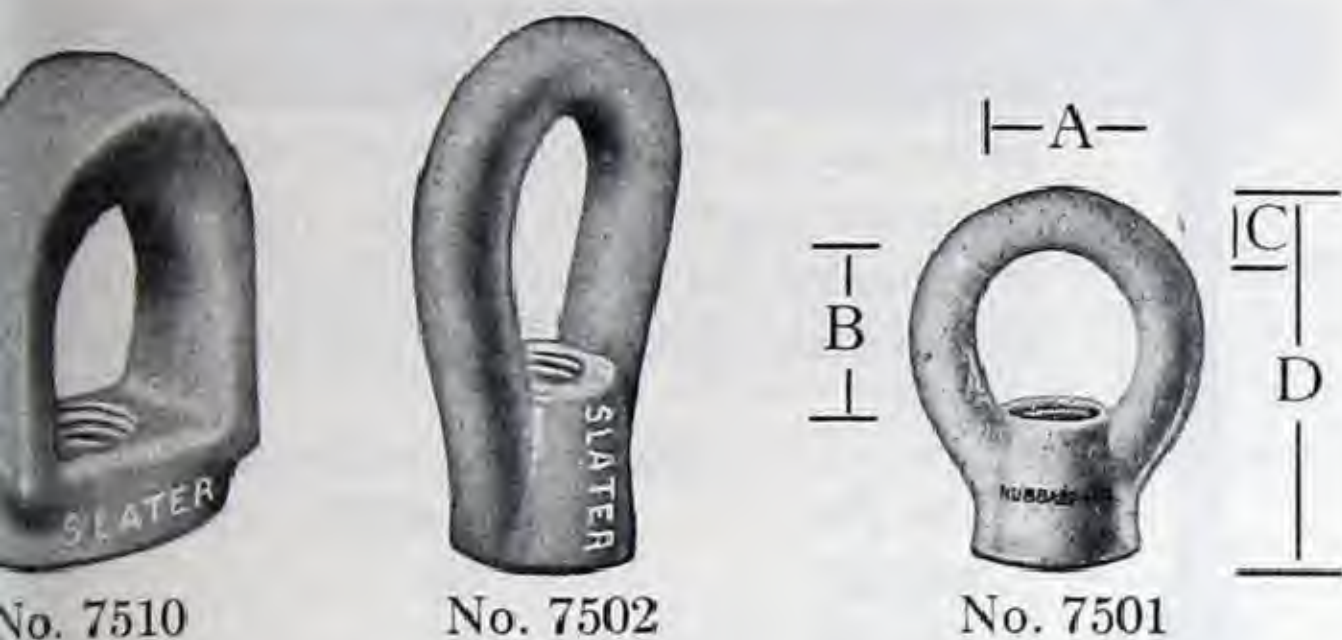
Top View

Detail of Dimensions

List No.	"A" Bolt Diameter, Inches	Wire or Strand Size, Inches	Approximate Shipping Weight Lbs., per
654	$\frac{1}{2}$	$\frac{3}{4}$ or under	105
655	$\frac{5}{8}$	$\frac{3}{4}$ or under	111

SLATER DROP FORGED EYE NUTS

Hot Galvanized



Eye nuts are used extensively on the threaded end of machine bolts passed vertically through the cross arm for attaching suspension type insulators. They are also useful for dead ending lines. By their use an eye may be added to either end of a double arming bolt or a second eye may be added to an eye bolt, which permits the attachment of a back guy to the same bolt that supports the strain insulators to the dead ended wire, thus removing the stress from the cross arm without the trouble and expense of using an additional eye bolt. A pole head guy can be attached to an eye nut on the end of a cross arm bolt. The half-inch eye nuts may be used on the end of a Peirce cross arm strap for guying a line dead ended on a Peirce clamp pin.

GUYEYE

List No.	Diam. Bolt	Dimensions in inches				Wt., lbs. per 100
		A	B	C	D	
10	5/8	1 3/8	7/8	1 1/2	1/2	121
11	3/4	1 3/8	7/8	1 1/2	1/2	117
12	1	1 5/8	1 1/4	1 11/16	1/2	170

STANDARD

00	1/2	1 1/8	1 1/8	1/2	2 5/8	49
01	5/8	1 1/8	1 1/8	1/2	2 5/8	46

N. E. L. A. STANDARD

02	5/8	1 1/2	1 11/16	1/2	3 1/16	60
03	3/4	1 1/2	1 11/16	1/2	3 1/16	56

The guyeye nuts eliminate the guy thimble and are well designed so that the guy strand will not kink.

Prices on application.

SLATER DROP FORGED BOLT EYES

Hot Galvanized



No. 7515

The many uses found for eye nuts may be also applied to bolt eyes. These eyes may be used on either the head or nut end of a machine bolt. The standard bolt eye may be used for attaching suspension insulators with clevis type cap to the cross arm. The long type may be used for supporting suspension insulators with a hook in the cap of the upper unit. Both styles are used extensively for dead ending and guying.

STANDARD EYE

List No.	Diam. Bolt	Dimensions in Inches				Wt., lbs. per 100
		A	B	C	D	
14	5/8	1 1/8	1 21/32	1/2 x 5/8	2 5/8	83

LONG EYE

15	5/8	1 1/4	3 9/32	1/2 x 5/8	4 1/2	103
16	3/4	1 1/4	3 9/32	1/2 x 5/8	4 1/2	100

N. E. L. A. Standard.

Prices on application.

SLATER DROP FORGED HOOK BOLTS

For Suspension Insulators

Hot Galvanized

Hook Bolts are used for supporting strings of suspension type insulators from cross arms. The Hooks are drop forged, and are made in three lengths above the shoulder, 1 1/2 inches for angle steel arms, 6 inches for wood arms up to 4 x 5 inches, and 9 inches for the double channel cross arms used on steel towers. Bolts of any length can be furnished.

List No.	Length Shank Inches	Wt., Lbs. per 100
6751 1/2	1 1/2	130
6756	6	390
6759	9	416

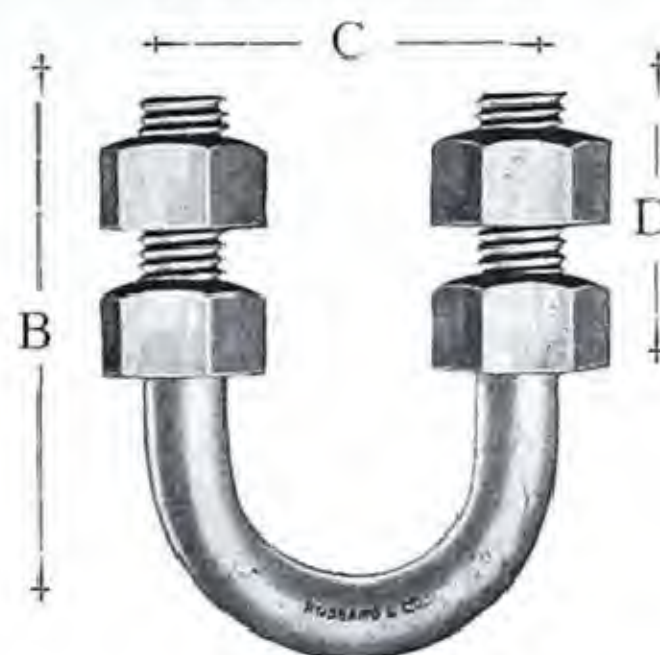
Prices on application.



No. 6759

SLATER "U" BOLTS

Hot Galvanized



No. 6795

TYPE A

List No.	Dimensions in Inches				Number and Kind of Nuts	Wt., Lbs. Per 100
	A	B	C	D		
6791	1/2	2	1 1/2	1 1/4	2 Hex.	39
6792	5/8	3	1 1/2	1 3/4	4 Hex.	93
6794	5/8	3 9/16	1 3/4	3	4 Sq.	165
6795	3/4	4 1/2	3	3	4 Hex.	221

TYPE B

6797	5/8	3 15/16	1 27/32	1 3/8	2 Hex.	138
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Prices on application.

SLATER STRAIN YOKES

Hot Galvanized



For Standard Suspension many operating companies are ready to protect their high tension lines by double suspension throughout. The best way to do this is with two strings hanging at an angle with each other, with one Belcher Strain Yoke and standard conductor suspension clamps.

The Strain Yokes are formed of Steel Plate 1/4-inch thick, hot pressed to shape, and support the two strings of insulators 13 inches apart on centres, which is the standard for 10-inch discs. Each yoke is furnished with the five bolts illustrated, and with a hole for the discharge horn bolt.

Discharge or Arcing Horns for use with these yokes can be furnished to meet your specifications.

List No.	Thickness of Steel	Insulator String Spacing	Wt. Lbs. Per 100
6770	1/4"	13"	960

Price on application

SLATER DROP FORGED TURNBUCKLES

Hot Galvanized



No. 8602



No. 8622



No. 8642

All parts of Turnbuckles, except the clevis bolts, are of drop forged steel, insuring reliability and strength. The clevis bolts are made by forging the U-shaped clevis to the bolt in such a way as to develop the full strength of the bolt. $\frac{3}{8}$ -inch bolts are used in the $\frac{1}{2}$ -inch clevises, $\frac{1}{2}$ -inch bolts in the $\frac{5}{8}$ -inch clevises, and $\frac{5}{8}$ -inch bolts in the $\frac{3}{4}$ -inch clevises.

Diam. of Bolt Inches	Eye to Eye Open Inches	Eye to Eye Closed Inches	Length of Opening Inches	Width Eye Inches	Opening of Clevis Inches	Opening of Hook Inches	Weight Pounds per 100
$\frac{3}{8}$	$16\frac{1}{2}$	$10\frac{1}{2}$	6	$\frac{9}{16}$	*	$\frac{1}{2}$	85
$\frac{1}{2}$	$17\frac{3}{4}$	$11\frac{3}{4}$	6	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{8}$	160
$\frac{1}{2}$	$23\frac{3}{4}$	$14\frac{3}{4}$	9	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{8}$	185
$\frac{1}{2}$	$29\frac{3}{4}$	$17\frac{3}{4}$	12	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{8}$	210
$\frac{5}{8}$	$19\frac{1}{2}$	$13\frac{1}{2}$	6	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	260
$\frac{5}{8}$	$25\frac{1}{2}$	$16\frac{1}{2}$	9	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	310
$\frac{5}{8}$	$31\frac{1}{2}$	$19\frac{1}{2}$	12	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	360
$\frac{3}{4}$	20	14	6	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	370
$\frac{3}{4}$	26	17	9	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	430
$\frac{3}{4}$	32	20	12	$1\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	490

* $\frac{3}{8}$ -inch Clevises not carried in stock.

Table of List Numbers

Type of Assembly

Size	List No. Eye and Eye	List No. Eye and Hook	List No. Eye and Clevis	List No. Hook and Hook	List No. Hook and Clevis	List No. Clevis and Clevis
$\frac{3}{8}$ x 6	8601	8621	8641	8661	8681	8701
$\frac{1}{2}$ x 6	8602	8622	8642	8662	8682	8702
$\frac{1}{2}$ x 9	8603	8623	8643	8663	8683	8703
$\frac{1}{2}$ x 12	8604	8624	8644	8664	8684	8704
$\frac{5}{8}$ x 6	8605	8625	8645	8665	8685	8705
$\frac{5}{8}$ x 9	8606	8626	8646	8666	8686	8706
$\frac{5}{8}$ x 12	8607	8627	8647	8667	8687	8707
$\frac{3}{4}$ x 6	8608	8628	8648	8668	8688	8708
$\frac{3}{4}$ x 9	8609	8629	8649	8669	8689	8709
$\frac{3}{4}$ x 12	8610	8630	8650	8670	8690	8710

Prices on application.

SLATER FORK BOLTS



No. 357 insulators with $\frac{3}{8}$ -inch bolts. Fork has 6-inch thread.

List No.	Diam. In.	Length, In. from Center of Bolt Hole	Wt., Lbs. per 100
8810	$\frac{1}{2}$	10	104
8811	$\frac{1}{2}$	12	114
8812	$\frac{1}{2}$	14	124
8813	$\frac{5}{8}$	12	156
8814	$\frac{5}{8}$	14	171
8815	$\frac{5}{8}$	16	186

Prices on application.

SLATER BALL-LINK EYE BOLTS

Hot Galvanized



No. 106785

Slater Ball-Link Eye Bolts for hi-tension w provide flexible joint for dead-ending, as v as for use on suspension type transmission li They are supplied in lengths from 10 inches If required for double arming, these bolts be supplied threaded the full length of dim sion A.

List No.	Dimensions in Inches Bolt Length	Wt., Lb. Per 10
106785	10	200
126785	12	216
146785	14	232
166785	16	248

SLATER CLEVIS LINK-EYE BOLTS

Hot Galvanized

These bolts are similar in purpose to the Ball-Link Eye Bolts, but for clevis type connection, in lengths from 10 inches and up. These bolts, can be supplied threaded full length for double arming purposes.

List No.	Dimension in Inches Bolt Length	Wt. Lbs. Per 100
106789	10	210
126789	12	226
146789	14	242
166789	16	258



No. 106789

SLATER BALL-HEAD MACHINE BOLTS

Hot Galvanized

The Slater Ball-Head Machine Bolts are made in lengths from 10 inches up. W flexibility is not a requirement, this bolt ma an inexpensive connection, being used for same purpose as the other bolts on this p and also supplied where required threaded length.

List No.	Dimension in Inches Bolt Length	Wt. L. Per 10
166790	10	195
162790	12	210
146790	14	226
166790	16	242



No. 106790

SLATER LINK-EYE NUTS

Hot Galvanized

This combination is usually used on the opposite end of the Slater No. 106785 Ball-Link Eye Bolts, to provide flexible joint for dead-ending.

List No.	Eye Nut	Ball Eye	Link	Wt. Lbs. Per 100
750267	$\frac{5}{8}$	No. 6785	No. 6784	210
750367	$\frac{3}{4}$	No. 6785	No. 6784	210



No. 750

CARRIAGE OR CROSS ARM BRACE BOLTS



Carriage Bolts are used for attaching the braces to wood cross arms on most overhead lines, the standard N. E. L. A. sizes being $\frac{3}{8} \times 4$, $4\frac{1}{2}$ and 5 inches. Carriage Bolts have standard heads, square nuts and cut threads. Rolled threads may be supplied if required.

$\frac{3}{8}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9633	3	$1\frac{3}{4}$	12.9
9633 $\frac{1}{2}$	$3\frac{1}{2}$	$1\frac{3}{4}$	14.3
9634	4	$1\frac{3}{4}$	15.8
9634 $\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{3}{4}$	17.2
9635	5	$1\frac{3}{4}$	18.7
9635 $\frac{1}{2}$	$5\frac{1}{2}$	$1\frac{3}{4}$	20.1
9636	6	$1\frac{3}{4}$	21.6

$\frac{1}{2}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9643	3	$2\frac{1}{2}$	24.7
9643 $\frac{1}{2}$	$3\frac{1}{2}$	3	27.3
9644	4	3	29.8
9644 $\frac{1}{2}$	$4\frac{1}{2}$	3	32.4
9645	5	3	34.9
9645 $\frac{1}{2}$	$5\frac{1}{2}$	3	37.5
9646	6	3	40.0

EVERYTHING For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."

DOUBLE ARMING OR SPACING BOLTS



The Double Arming Bolt, used with four square washers, represents a much more economical means of tying two cross arms together than the old method of a wooden block with a hole through it, and a long machine bolt. The bolts include 4 square nuts but no washers.

$\frac{1}{2}$ -INCH

List No.	Dimensions in Inches Length Over All	Length of Thread	Approximate Shipping Weight Lbs., 100 Pcs.
9842	12	5	76
9844	14	6	85
9846	16	6	93
9848	18	8	102
9850	20	8	110
9852	22	8	120
9854	24	8	128

$\frac{5}{8}$ -INCH

List No.	Dimensions in Inches Length Over All	Length of Thread	Approximate Shipping Weight Lbs., 100 Pcs.
9862	12	5	144
9864	14	6	158
9866	16	7	172
9868	18	8	186
9870	20	8	200
9872	22	8	214
9874	24	8	228

$\frac{3}{4}$ -INCH

List No.	Dimensions in Inches Length Over All	Length of Thread	Approximate Shipping Weight Lbs., 100 Pcs.
9882	12	5	230
9884	14	6	250
9886	16	6	270
9888	18	8	290
9890	20	8	310
9892	22	8	330
9894	24	8	350

SOCKET HEAD SCREWS

Round Head



Flat Head



Oval Head

Fetter Drive Screw

The following varieties of Socket Head Steel Wood Screws are invoiced from this list at varying discounts:

$\frac{1}{4}$ -INCH		
List No.	Length Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9722	2	2.8
9722 $\frac{1}{2}$	2 $\frac{1}{2}$	3.3
$\frac{5}{16}$ -INCH		
9732	2	4.7
9732 $\frac{1}{2}$	2 $\frac{1}{2}$	5.6
9733	3	6.5
9733 $\frac{1}{2}$	3 $\frac{1}{2}$	7.4
$\frac{3}{8}$ -INCH		
9742 $\frac{1}{2}$	2 $\frac{1}{4}$	7.8
9742 $\frac{1}{2}$	2 $\frac{1}{2}$	8.3
9743	3	9.6
9743 $\frac{1}{2}$	3 $\frac{1}{2}$	10.9
9744	4	12.2
9744 $\frac{1}{2}$	4 $\frac{1}{2}$	13.5
9745	5	14.8
9746	6	17.4

1/2-INCH		
List No.	Length Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9752 1/2	2 1/2	16.7
9753	3	19.0
9753 1/2	3 1/2	21.3
9754	4	23.6
9754 1/2	4 1/2	25.9
9755	5	28.2
9755 1/2	5 1/2	30.5
9756	6	32.8
9756 1/2	6 1/2	35.1
9757	7	37.4
5/8-INCH		
9764	4	35.1
9764 1/2	4 1/2	38.9
9765	5	42.7
9765 1/2	5 1/2	46.5
9766	6	50.3

Flat Head	Brass Plated	Copper Plated	Lacquered
Round Head	Bronze Plated	Galvanized	Tinned
Oval Head	Blued	Chromium Plated	Felco
Drive	Cadmium Plated	Japanned	

List Price Per Gross											
$\frac{3}{8}$ inch		$\frac{1}{2}$ inch		$\frac{5}{8}$ inch		$\frac{3}{4}$ inch		$\frac{7}{8}$ inch		1 inch	
No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$
4	.90	4	.90	4	.90	4	.95	4	.95		4
5	.90	5	.90	5	.95	5	.95	5	1.00		5
6	.90	6	.90	6	.95	6	1.00	6	1.05		6
7	.90	7	.95	7	1.00	7	1.05	7	1.10		7
8	.90	8	1.00	8	1.05	8	1.10	8	1.15		8
		9	1.05	9	1.10	9	1.15	9	1.20		9
		10	1.10	10	1.15	10	1.20	10	1.25		10
				11	1.20	11	1.25	11	1.30		11
				12	1.25	12	1.30	12	1.35		12
						14	1.40	14	1.50		14
$1\frac{1}{4}$ inch		$1\frac{1}{2}$ inch									16

[illegible]

3 inch	3½ inch						
8	2.45	No.	\$				
9	2.55	10	3.00	4 inch	4½ inch	5 inch	
10	2.65	11	3.20	No.	\$	No.	\$
11	2.80	12	3.40	12	3.80	14	5.10
12	3.00	14	4.00	14	4.50	16	5.90
14	3.50	16	4.60	16	5.20	18	6.90
16	4.10	18	5.40	18	6.10	20	8.00
18	4.80	20	6.30	20	7.10	24	10.70
20	5.60	24	8.40	24	9.50		11.90
24	7.40						

The following varieties of Socket Head Brass Wood Screws are in stock from this list at varying discounts:

Flat Head	Oval Head	Bronze Plated	Lacquered
Round Head	Nickel Plated	Black Nickeled	Polished
		Chromium Plated	

List Price Per Gross																					
$\frac{3}{8}$ inch				$\frac{1}{2}$ inch				$\frac{5}{8}$ inch				$\frac{3}{4}$ inch				$\frac{7}{8}$ inch				1 inch	
No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	\$	No.	
4	1.15	4	1.20	4	1.30	4	1.40	4	1.40	4	1.50	4	1.50	4	1.65	4		4			
5	1.20	5	1.30	5	1.40	5	1.50	5	1.50	5	1.65	5	1.65	5	1.85	5		5			
6	1.30	6	1.40	6	1.55	6	1.70	6	1.70	6	1.85	6	1.85	6	2.10	6		6			
		7	1.55	7	1.75	7	1.90	7	1.90	7	2.10	7	2.10	7	2.35	7		7			
		8	1.75	8	1.95	8	2.15	8	2.15	8	2.35	8	2.35	8	2.60	8		8			
				9	2.15	9	2.40	9	2.40	9	2.60	9	2.60	9	2.90	9		9			
				10	2.40	10	2.65	10	2.65	10	2.90	10	2.90	10	3.20	10		10			
$1\frac{1}{4}$ inch								11	2.95	11	3.20	11	3.20	11	3.55	11		11			
								12	3.25	12	3.55	12	3.55	12				12			
No.	\$	$1\frac{1}{2}$ inch																			
6	2.30																				
7	2.60	No.	\$	$1\frac{3}{4}$ inch																	
8	2.95	6	2.65																		
9	3.30	7	3.00	No.	\$	2 inch															
10	3.65	8	3.35	8	3.75																
11	4.10	9	3.75	9	4.25	No.	\$	$2\frac{1}{4}$ inch													
12	4.60	10	4.20	10	4.80	8	4.25														
14	5.65	11	4.70	11	5.40	9	4.75	No.	\$	$2\frac{1}{2}$ inch											
		12	5.35	12	6.10	10	5.35	10	5.95												
		14	6.55	14	7.45	11	6.00	11	6.70	No.	\$	3 inch									
$3\frac{1}{2}$ inch								12	6.80	12	7.50	10	6.60	No.							
No.	\$							14	8.35	14	9.30	11	7.40	12							
12	11.25							16	10.20	16	11.30	12	8.25	14	1						
14	14.00							18	12.30	18	13.60	14	10.25	16	1						
16	17.00											16	13.00	18	1						
18	20.50											18	15.00								

Lengths and diameters not listed are special; but are furnished to extent they may be in stock, or when required in sufficient quantity a size to warrant being made to order. Such non-listed lengths and diameters take the list prices of the next longer or larger listed sizes.

STEEL WOOD SCREWS



Oval Head



Flat Head



Round Head

The following varieties of steel wood screws are invoiced at this list at varying discounts.

Light Steel	Copper Plated	Fillister Head	Nickel Plated
Medium Steel	Cadmium	Flat Head	Oval Head
Heavy Steel	Dowel	Hot Galvanized	Pinched
Stainless Steel	Drive	Headless	Round Head
Aluminum	Electro Galvanized	Japanned	Silver Plated
Brass	Felloe	Lacquered	Tinned
			Winged

List Price Per Gross—Adopted Feb. 13th, 1928

inch	$\frac{3}{8}$ inch	$\frac{1}{2}$ inch	$\frac{5}{8}$ inch	$\frac{3}{4}$ inch				
	No.	No.	No.	No.				
\$0.24	0	\$0.26	1	\$0.28	2	\$0.30	2	\$0.32
.24	1	.26	2	.28	3	.30	3	.32
.24	2	.26	3	.28	4	.30	4	.32
.24	3	.26	4	.28	5	.30	5	.32
.24	4	.26	5	.28	6	.32	6	.34
	5	.26	6	.30	7	.34	7	.36
	6	.28	7	.32	8	.36	8	.38
	7	.30	8	.34	9	.38	9	.40
	8	.32	9	.36	10	.40	10	.42
			10	.38	11	.42	11	.46
					12	.46	12	.50
							14	.65
inch	1 inch	$1\frac{1}{4}$ inch	$1\frac{1}{2}$ inch	$1\frac{3}{4}$ inch				
	No.	No.	No.	No.				
\$0.34	3	\$0.36	4	\$0.38	4	\$0.40	6	\$0.50
.34	4	.36	5	.40	5	.44	7	.55
.34	5	.36	6	.42	6	.46	8	.60
.36	6	.38	7	.44	7	.48	9	.65
.38	7	.40	8	.46	8	.50	10	.70
.40	8	.44	9	.50	9	.55	11	.75
.44	9	.46	10	.55	10	.60	12	.80
.46	10	.50	11	.60	11	.65	14	1.00
.50	11	.55	12	.65	12	.70	16	1.20
.55	12	.60	14	.80	14	.90	18	1.35
.70	14	.75	16	1.00	16	1.10	20	1.75
	16	.90	18	1.15	18	1.25		
					20	1.60		
inch	$2\frac{1}{4}$ inch	$2\frac{1}{2}$ inch	$2\frac{3}{4}$ inch	3 inch				
	No.	No.	No.	No.				
\$0.55	6	\$0.60	6	\$0.65	8	\$0.75	8	\$0.80
.60	7	.65	7	.70	9	.80	9	.85
.65	8	.70	8	.75	10	.90	10	1.00
.70	9	.75	9	.80	11	1.00	11	1.15
.75	10	.80	10	.85	12	1.10	12	1.35
.80	11	.85	11	.90	14	1.45	14	1.70
.85	12	.90	12	1.00	16	1.80	16	2.05
1.10	14	1.20	14	1.30	18	2.20	18	2.50
1.30	16	1.40	16	1.60	20	2.60	20	2.90
1.45	18	1.60	18	1.90			24	4.00
1.95	20	2.05	20	2.30				
$3\frac{1}{2}$ inch	4 inch	$4\frac{1}{2}$ inch	5 inch					
	No.	No.	No.					
\$1.25	12	\$1.90	14	\$2.60	14	\$2.90		
1.40	14	2.30	16	3.00	16	3.30		
1.60	16	2.70	18	3.50	18	4.00		
2.00	18	3.10	20	4.10	20	4.70		
2.40	20	3.60	24	5.60	24	6.20		
2.80	24	5.10						
3.20								
4.50								

For weights see next column.

BRASS WOOD SCREWS

The following varieties of brass wood screws are invoiced from this list at varying discounts.

Made of Brass, Bronze or Phosphor Bronze

Flat Head
Fillister Head

Oval Head
Round Head

Made of Brass

Bronze Plated
Nickel Plated

Silver Plated
Socket Head

Lacquered
List Price per Gross

1/4 inch	3/8 inch	1/2 inch	5/8 inch	3/4 inch
No.	No.	No.	No.	No.
0	0	1	2	2
1	1	2	3	3
2	2	3	4	4
3	3	4	5	5
4	4	5	6	6
	5	6	7	7
	6	7	8	8
		8	9	9
			10	10
				11
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				948
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				956
				960
				964
				968
				972
				976
				980
				984
				988
				992
				996
				1000

Approximate Weight per Gross of Steel Wood Screws
(For Weights of Brass add 7 9/10% to these Weights)

1/4 inch	3/8 inch	1/2 inch	
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CROSSARM, MACHINE OR THROUGH BOLTS



Machine and Through Bolts, unless otherwise specified, are furnished with cut threads, which insure a perfect nut fit the full length of the thread.

 $\frac{3}{8}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9601	1	1	7.3
9601 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	8.3
9601 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	9.3
9602	2	2	10.3
9602 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	11.7
9603	3	3	13.1
9603 $\frac{1}{2}$	3 $\frac{1}{2}$	3	14.6
9604	4	3	16.
9604 $\frac{1}{2}$	4 $\frac{1}{2}$	3	17.5
9605	5	3	18.9
9605 $\frac{1}{2}$	5 $\frac{1}{2}$	3	20.4
9606	6	3	21.8

 $\frac{1}{2}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9701	1	1	16.
9701 $\frac{1}{4}$	1 $\frac{1}{4}$	1 $\frac{1}{4}$	17.3
9701 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	18.5
9702	2	2	21.
9702 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	23.6
9703	3	3	26.1
9703 $\frac{1}{2}$	3 $\frac{1}{2}$	3	28.7
9704	4	3	31.2
9704 $\frac{1}{2}$	4 $\frac{1}{2}$	3	33.8
9704 $\frac{3}{4}$	4 $\frac{3}{4}$	3	35.
9705	5	3	36.3
9706	6	3	41.4
9707	7	3	46.5
9708	8	4	51.6
9710	10	4	61.8
9712	12	6	72.
9714	14	6	82.2
9716	16	6	92.4
9718	18	6	102.6
9720	20	6	112.8

 $\frac{5}{8}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9801 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	32
9802	2	2	26
9802 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	40
9803	3	3	44
9803 $\frac{1}{2}$	3 $\frac{1}{2}$	3	48
9804	4	3	52
9805	5	3	59
9806	6	3	66
9807	7	3	74
9808	8	4	82
9810	10	4	98
9812	12	6	114
9814	14	6	130
9816	16	6	146
9818	18	6	150
9820	20	6	164
9822	22	6	178
9824	24	6	192
9826	26	6	206
9828	28	6	220

 $\frac{3}{4}$ -INCH BOLTS

List No.	Length Inches	Length of Thread Inches	Approximate Shipping Weight Lbs., 100 Pcs.
9901 $\frac{1}{2}$	1 $\frac{1}{2}$	1 $\frac{1}{2}$	49
9902	2	2	55
9902 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{1}{2}$	60
9903	3	3	66
9903 $\frac{1}{2}$	3 $\frac{1}{2}$	3	71
9904	4	3	77
9905	5	3	88
9906	6	3	99
9907	7	3	106
9908	8	4	112
9910	10	4	134
9912	12	6	156
9914	14	6	178
9916	16	6	200

SLATER DROP FORGED EYE BOLTS

Hot Galvanized



N. E. L. A. Standard



Double Arming Eye Bolt

All standard bolts are cut threaded 6 inches. The 6-in bolts are cut threaded 4 inches. Prices include one square nut but no washer.

The Double Arming Eye Bolts are cut threaded up within two inches of the eye and are provided with three nuts but no washers.

$\frac{1}{2}$ -Inch Length to			$\frac{3}{4}$ -Inch Length to		
List No.	Eye Center Inches	Wt., Lbs. Per 100	List No.	Eye Center Inches	Wt., Lbs. Per 100

$\frac{3}{4}$ -inch x 1-inch eye			1 $\frac{1}{2}$ -inch x 2-inch eye		
*9936	6	55	9976	6	116
*9938	8	65	9978	8	140
*9940	10	75	9980	10	164
*9942	12	85	9982	12	188
*9944	14	95	9984	14	212
*9946	16	105	9986	16	236
*9948	18	125	9988	18	260
*9950	20	125	9990	20	284

$\frac{5}{8}$ -Inch 1 $\frac{1}{2}$ -inch x 2-inch eye			$\frac{5}{8}$ -Inch Double Arming N. E. L. A. Eyes		
*9956	6	84	9786	16	188
*9958	8	100	9788	18	204
*9960	10	116	9790	20	220
*9962	12	132	$\frac{3}{4}$ " Double Arming		
*9964	14	148	9796	16	289
*9966	16	164	9798	18	308
*9968	18	180	9700	20	330
*9970	20	196			

Prices on application.

*N. E. L. A. Standard.

SLATER THIMBLE EYE BOLTS

Hot Galvanized



DROP FORGED THIMBLE EYES

Dimensions in Inches

A	B	C	D	E
$\frac{1}{2}$	1 $\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	1 $\frac{3}{8}$
$\frac{5}{8}$	1 $\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	1 $\frac{7}{16}$
$\frac{3}{4}$	1 $\frac{5}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	1 $\frac{7}{8}$
1	1 $\frac{7}{8}$	$\frac{5}{8}$	1 $\frac{1}{8}$	2 $\frac{1}{4}$

 $\frac{5}{8}$ -INCH THIMBLE EYE BOLTS $\frac{3}{4}$ -INCH

List No.	Approximate Ship. Wt. Lbs., 100 Pcs.	Length Inches	List No.	Approximate Ship. Wt. Lbs., 100 Pcs.
9060	140	10	9080	210
9062	160	12	9082	240
9065	190	15	9085	300
9068	220	18	9088	340

WASHERS

Hot Galvanized



Galvanized Washers are cleanly cut and are galvanized in a manner as to insure a heavy, even coat of pure zinc with no large drops to interfere with the fit of the bolt or nut. Special sizes of round washers for use under the heads of carriage bolts are listed, No. 3 being the standard of the T. & T. Company and the N. E. L. A. Square Washer No. 7 is the standard of the A. T. & T. Company and N. E. L. A. for cross arm and double arming bolts, and Nos. 9 and 12 for anchor rods.

ROUND WASHERS

Dimensions in Inches

Outside Diam.	Diam. Hole	Size Mach.	Size Bolt Carriage	Thick Gauge	Galv. Wt. Lbs. Per 100
1	$\frac{7}{16}$	$\frac{3}{8}$		14	16
$1\frac{1}{4}$	$\frac{1}{2}$		$\frac{3}{8}$	14	30
$1\frac{3}{8}$	$\frac{9}{16}$	$\frac{1}{2}$	$\frac{3}{8}$	12	42
$1\frac{3}{4}$	$\frac{11}{16}$	$\frac{5}{8}$	$\frac{1}{2}$	10	75
2	$\frac{13}{16}$	$\frac{3}{4}$	$\frac{5}{8}$	9	112

SQUARE WASHERS

Dimensions in Inches

Size Washer	Diam. Hole	Size, Bolt or Rods	Galv. Wt. Lbs. per 100
2 x2 x $\frac{1}{8}$	$\frac{11}{16}$	$\frac{1}{2}$ or $\frac{5}{8}$	145
$2\frac{1}{4}$ x $2\frac{1}{4}$ x $\frac{3}{16}$	$\frac{13}{16}$	$\frac{5}{8}$ or $\frac{3}{4}$	240
3 x3 x $\frac{3}{16}$	$\frac{13}{16}$	$\frac{5}{8}$ or $\frac{3}{4}$	435
3 x3 x $\frac{1}{4}$	$\frac{13}{16}$	$\frac{5}{8}$ or $\frac{3}{4}$	585
4 x4 x $\frac{3}{16}$	$\frac{13}{16}$	$\frac{5}{8}$ or $\frac{3}{4}$	830
4 x4 x $\frac{1}{4}$	$\frac{15}{16}$	$\frac{3}{4}$ or $\frac{7}{8}$	1170
4 x4 x $\frac{1}{2}$	$1\frac{3}{16}$	1	2150

N. E. L. A. Standard.

Prices on application

STUBBING WASHER

Hot Galvanized



No. 7825

The Stubbing Washer is used in securing a pole, rotted off at the butt, to a new stub. A washer is used on each end of a through bolt bolted through the pole and stub, also, on each end of the bolt used for drawing together the wire wrapped around the pole and stub.

Dimensions in Inches

Size Washer	Diam. Hole	Size Bolt	Wt. Lbs. per 100
$3\frac{1}{4}$ x $3\frac{1}{4}$ x $\frac{1}{4}$	$\frac{3}{4}$	$\frac{5}{8}$	75

Price on application

FLAT CROSS ARM BRACES

Hot Galvanized



$1\frac{3}{4}$ -INCH x $\frac{9}{32}$ -INCH BRACES
T. & T. CO. STANDARD

Length Over All	Wt., Lbs. Per 100	List No.
20	142	8
22	156	9
24	170	10
26	184	11
28	198	*12
30	212	13
32	226	14

$1\frac{1}{4}$ -INCH x $\frac{1}{4}$ -INCH BRACES
N.E.L.A. STANDARD

Length Over All	Wt., Lbs. Per 100
20	167
22	183
24	200
26	216
28	233
30	250
32	266

No.	Size, Inches	Wt., Lbs. per 100
	$1 \times \frac{1}{4} \times 20$	139
	$1 \times \frac{1}{4} \times 22$	153
	$1 \times \frac{1}{4} \times 24$	167
	$1 \times \frac{1}{4} \times 26$	180
	$1 \times \frac{1}{4} \times 28$	194

Prices on application.

POLE STEPS FOR WOOD POLES

Hot Galvanized



No. 7125



No. 7126

Pole Steps are made of the best grade of open hearth steel and can be bent through an angle of 75 degrees about a diameter equal to the diameter of a step, without breaking. All lengths given are over-all dimensions.

Hook Head Steps have a fetter drive thread, which makes them easy to install and does not tear the wood of the pole when driven.

The No. 7126 Long Hook Step is used at points on the pole where the lineman stands to work. The 3-inch hook prevents the foot from slipping off the end of the step.

The 10-inch Button Head Step has the twist driven thread and a square shoulder under the head for a wrench hold.

List No.	Type	Diameter Inches	Length Inches	Wt., Lbs. Per 100
7123	Std. Hook Head	$\frac{9}{16}$	9	70
*7125	Std. Hook Head	$\frac{5}{8}$	10	95
7126	Long Hook Head	$\frac{5}{8}$	10	115

Prices on application.

*N.E.L.A. Standard.

SLATER DETACHABLE POLE STEP

Hot Galvanized

Lag and Plate
No. 7235



Step
No. 7236

To install the step, slip the plate, which acts as a bearing surface for the step, over the lag and screw the lag in the pole until the plate bites into the wood. The step slides down in a groove on each side of the head of the lag. When the step is removed nothing but the well-

rounded head of the lag extends from the pole.

List No.	Description	Extension from Pole, Inches	Wt., Lbs. per 100
7235	Lag and Plate		34
7236	Step	$5\frac{1}{8}$	54

Prices on application.

SLATER POLE BRACKETS

Hot Galvanized



No. 152



No. 144

No. 144 is extensively used for telephone circuits on transmission line poles. No. 152 is similar to No. 144, only heavier and is recommended for electric railway feeders.

List No.	Channel	Extension Inches	Holes	Std. Pkg.	Wt., Lbs. per 100
144	1	$2\frac{1}{2}$	$\frac{7}{16}$	25	80
152	$1\frac{1}{2}$	5	$\frac{11}{16}$	25	130

Prices on application.

SLATER VERTICAL BRACES

Hot Galvanized



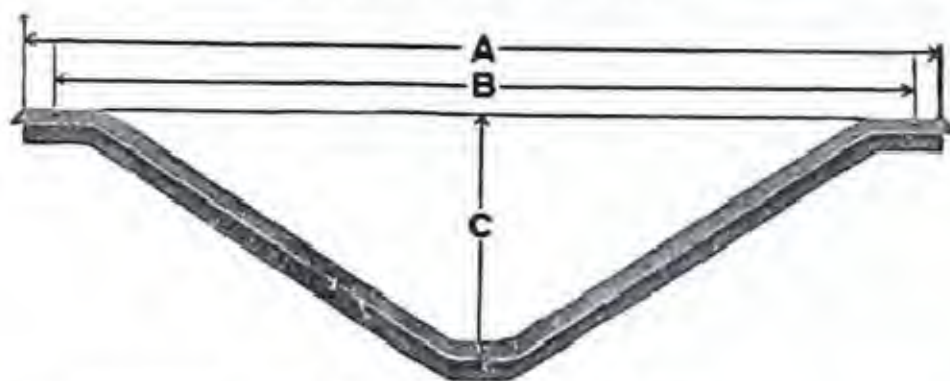
No. 7987

List No.	18-Inch Spacing—9/16-Inch Holes		Size Angle Inches	Wt., Lbs. Per 100
	No. of Arms	Length Over All, Inches		
7976	2	20	1½ x 1½ x 3/16	300
7977	3	38	1½ x 1½ x 3/16	570
7978	4	56	1½ x 1½ x 3/16	840
List No.	24-Inch Spacing—9/16-Inch Holes		Size Angle Inches	Wt., Lbs. Per 100
	No. of Arms	Length Over All, Inches		
*7986	2	26	1½ x 1½ x 3/16	390
*7987	3	50	1½ x 1½ x 3/16	750
7988	4	74	1½ x 1½ x 3/16	1110

Prices on application.

SLATER ANGLE CROSS ARM BRACES

Hot Galvanized



In the construction of heavy pole lines, a one-piece cross arm brace made of angle steel is in general use. It is fastened to the arm by a ½-inch machine bolt at each end, and to the pole by a 5/8-inch through bolt or lag screw.

Braces of any desired dimensions can be furnished. When ordering special sizes give dimensions A, B and C, as indicated in the illustration, and state size of angle and size of holes desired.

List No.	Dimensions in Inches			Wt., Lbs. Per 100
	Size Angle	A	B	
7950	1½ x 1½ x 3/16	40	37	700
7952	1½ x 1½ x 3/16	51	48	860
7953	1¾ x 1¾ x 3/16	63	60	1250
7954	1¾ x 1¾ x 3/16	69	66	1360
7955	1¾ x 1¾ x 3/16	75	72	1460
7956	2 x 2 x 3/16	75	72	1640
List No.	N. E. L. A. Standards			Wt., Lbs. Per 100
	Size Angle	A	B	
*7940	1½ x 1½ x 3/16	45	42	700
*7941	1½ x 1½ x 3/16	51	48	860
*7942	1½ x 1½ x 3/16	63	60	1060
*7943	1¾ x 1¾ x 3/16	75	72	1260

Prices on application.

Note.—The No. 7940 Brace is for use with the N. E. L. A. 7-foot 2-pin medium voltage cross arm; the No. 7941, with the 10-foot 8-pin low voltage cross arm; the No. 7942 with the 10-foot 4-pin medium voltage cross arm; and the No. 7943 for special high voltage cross arm.

SLATER ALLEY ARM BRACES

Hot Galvanized



Alley or Side Arm Braces made of steel angles are used extensively on distribution lines in alleys. Where more than one cross arm is supported, Vertical Braces listed below are used in addition.

Two types of braces are made, the No. 7979 being the N. E. L. A. standard. All other braces listed are made similar to the No. 7984. Each type is supplied with steps for the linemen. These Braces are fastened by ½-inch lag screws to the street side of the pole and by a ½-inch machine bolt to the side of the cross arm.

List No.	Length, Feet	Size Angle, Inches	Wt., Lbs. Per 100
*7979	5	1¾ x 1¾ x 3/16	1295
7981	5	1½ x 1½ x 3/16	1100
7982	6	1½ x 1½ x 3/16	1300
7984	7	1¾ x 1¾ x 3/16	1760
7985	10	2 x 2 x 1/4	3800

Prices on application.

* N. E. L. A. Standard.

SLATER ANGLE CLAMPS

Hot Galvanized



Slater Angle Clamps are used for supporting clamp pins on cross arms of angle section, such as the Bo-Arrow, Hi-Ten Extensions and An Steel Arms.

No. 161 They are made of 5/8-inch round steel, formed to fit angles having notches ¼-inch deep in each leg, which holds the pins in a vertical position.

Standard pins and clamps will not fit unnotched angle but special pins and clamps to fit any desired size of angle, channel, beam, pipe or rail section can be supplied.

List No.	Size of Angle, Inches	Wt., Lbs. Per 10
159	2½ x 2½ Notched Angle	114
160	3 x 2 " "	110
161	3 x 3 " "	125
162	3½ x 3½ " "	141

Prices on application.

SLATER PIPE CLAMPS

Hot Galvanized

The Slater Pipe Clamp is designed to grip firmly pipes of from 3¼ to 2-inch nominal diameter, and consists of a cast block and a 5/8-inch U bolt.



No. 16

List No.	Nominal Diameter of Pipe Inches	Wt., Lbs. Per 10
165	1¼	158
166	1½	163
167	2	170

Prices on application.

SLATER DROP FORGED CROSS ARM STRAPS

Hot Galvanized



No. 1872

These Straps are used for attaching Nos. 4400 and 4401 Channel Clamp Pins, the cross arm in an horizontal position running vertical leads between the arms transformers or lighting fixtures.

List No.	Dimensions in Inches			Wt., Lbs. Per 10
	Size Arm	Size Strap Flat	Size Strap Round	
1871	3¼ x 4¼	3/16 x 1 1/8	1/2	94
1872	3½ x 4½	3/16 x 1 1/8	1/2	100
1873	3¾ x 4¾	3/16 x 1 1/8	1/2	106
1874	4 x 5	3/16 x 1 1/8	1/2	112

SLATER CROSS ARM STRAPS

Hot Galvanized

Slater Cross Arm Straps are drop forged from round steel and have a broad flat bearing on the arm, which helps to hold the pins firmly upright.

The Nos. 2001 to 2004 are for mounting Slater High Tension Clamp Pins on wood cross arms. These are of the same type as Slater Straps Nos. 1001 to 1004, but are heavier, the ends being 5/8-inch diameter.

No. 1002

List No.	Size Arm Inches	Size Strap, Inches		Wt., Lbs. Per 10
		Flat Section	Round Section	
1001	3¼ x 4¼	3/16 x 1 1/8	1/2	80
1002	3½ x 4½	3/16 x 1 1/8	1/2	85
1003	3¾ x 4¾	3/16 x 1 1/8	1/2	90
1004	4 x 5	3/16 x 1 1/8	1/2	95
2001	3¼ x 4¼	3/16 x 1 1/8	5/8	132
2002	3½ x 4½	3/16 x 1 1/8	5/8	138
2003	3¾ x 4¾	3/16 x 1 1/8	5/8	144
2004	4 x 5	3/16 x 1 1/8	5/8	150

Prices on application.

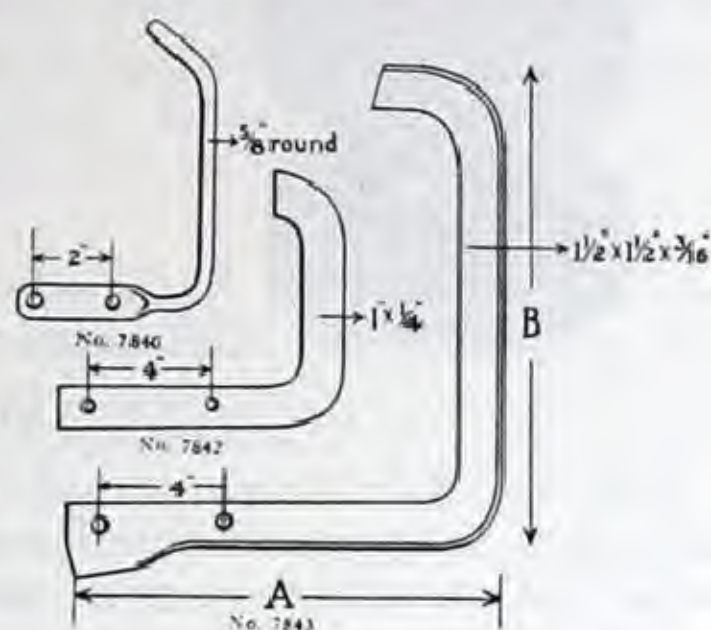
SLATER GUARD HOOKS

Hot Galvanized

Guard Hooks are advisable in many places, to prevent wires which have become loose from insulators falling upon foreign wires or endangering life by falling from the pole.

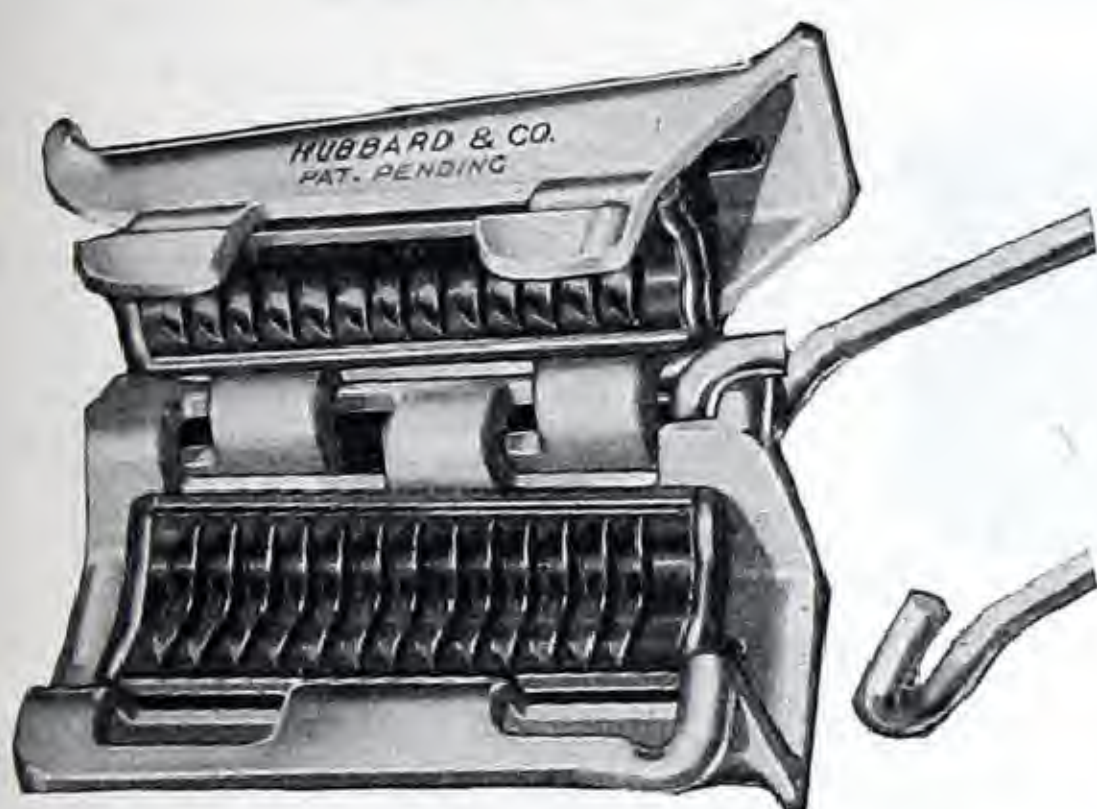
Dim. in Ins.	Wt. Lbs.
A B per 100	
5½ 8½	105
9½ 9¼	132
9½ 12	300

Prices on application.



No. 7843

SLATER OPEN JAW WEDGE-GRIP BRACKET



No. 3932

(Round Cable)

Due to the increase in the use of multiple conductor cables special emphasis has been placed on the development of attachment units.

The answer to the service attachment problem lies in the Slater Open Jaw Wedge-Grip Bracket. Cables need never be threaded through the jaws, and cut to length before attachment. The whole installation may be made right up to the last connections without cutting the cable, a notable economy feature. Cables are laid inside the open jaw, not threaded through, and quickly clamped securely in place without altering the sag. This feature is a great time and labor saver. A positive locking arrangement prevents accidental opening.

The wedge principle provides an ample anchorage for all service tensions.

Attachment to Racks is made by looping the bale of the bracket around the Rack Bolt. Bracket styles are furnished for flat or round cable as listed in the table below.

Style	Cable Size—Inches	Approx. Shipping Wt., Lbs., 100 Pcs.
Flat Cable	1½" max. width—¼" to ¾" thick.....	120
Round Cable	½" to 1" diameter.....	120

SLATER CABLE SUSPENSION CLAMPS

Hot Galvanized



These, the standard A.T. & T. Company Cable Suspension Clamps, are shaped so as to securely grip messenger strands of the sizes shown.

The one-bolt type is used for light cables and on cable arms, and the three-bolt clamp for heavy cables and long spans. The one-bolt clamp is furnished without a bolt, as the ½-inch through bolt is used both for attaching the clamp to the pole and tightening the clamp on the strand.

The three-bolt clamp is actually furnished with but two ½-inch high carbon steel guy bolts, the centre hole being left blank for the ½-inch through bolt.

In attaching to the pole, a nut and square washer are placed between the clamp and pole to provide clearance for the cable. Where cables are to be mounted on both sides of the pole, a ½-inch double arming bolt is usually used instead of the through bolt.

List No.	Type	Length In.	Size Strand Inches	Wt., Lbs. per 100
8901	1-bolt	2¾	¼ to 7/16	74
8903	3-bolt	5⅝	¼ to 7/16	220

Prices on application.

SLATER REINFORCING AND SAFETY STRAPS

For Suspension Clamps
Hot Galvanized



The straps illustrated are standard with the American Telephone & Telegraph Company. No. 8905 is used to support the messenger bolt at points of extreme stress, such as long spans. No. 8906 is a safety strap to prevent the cables falling if the messenger gives way. Its upper hole fits over the messenger bolt, and its lower end is fastened to the pole by a ½-inch lag screw. No. 8907 is a combination of Nos. 8905 and 8906.

List No.	Description	Size Steel Inches	Wt., Lbs. per 100
8905	Reinforcing Strap	1½ x 1/8	36
8906	Safety Strap	1¾ x 1/8	76
8907	Combination Strap	1¾ x 1/8	116

Prices on application.

SLATER CROSSOVER CLAMPS

Hot Galvanized



No. 8930

Crossover Clamps are used for joining two cable messengers when they cross each other at right angles. They are of A.T. & T. Company design, and are used in telephone work where cables turn corners, or where branch cables leave the main line at points some distance away from the supporting poles. The bolts furnished are standard ½-inch high carbon clamp bolts.

List No.	Size Strand	Size of Sides Inches	Wt., Lbs. per 100
8930	¼" to 7/16"	1½ x 3¼ x ½	160

Prices on application.



No. 358

SLATER SECONDARY RACKS

Standard Type

Hot Galvanized

Slater, the original secondary racks are strong enough for the heaviest work, with an ample factor of safety. They are equipped with No. 5897 insulators, although Nos. 356, 455 and 456 insulators can be furnished if desired. The insulators are packed in corrugated paper boxes and the racks are wired in bundles of ten.

The width of the back of the rack is $2\frac{3}{4}$ inches with a slot $\frac{3}{4}$ -inch wide between the two angles, which allows the use of $\frac{5}{8}$ -inch through or lag bolts for fastening the rack to the pole, brick or concrete wall.

List No.	No. of Line Wires	Wire Spacing	Overall Length	Standard Bundle	Wt. Lbs. Per 100
250	2	4	$9\frac{1}{2}$	10	591
258	2	8	$13\frac{1}{2}$	10	734
350	3	4	$13\frac{1}{2}$	10	866
358	3	8	$21\frac{1}{2}$	10	1116
450	4	4	$17\frac{1}{2}$	10	1108
540	5	4	$21\frac{1}{2}$	10	1380
3058	3	8	$13\frac{1}{2}$	10	914



No. 1350

EXTENDED BACK TYPE

Slater Extended Back Secondary Racks are similar in all respects to the standard rack except that the angles forming the back are extended to accommodate through bolts for attaching the rack. Some construction men like this feature as the insulators can be assembled on the rack in the storeroom and attached to the pole without removing them.

The width of the back of the rack is $2\frac{3}{4}$ inches with a slot $\frac{3}{4}$ -inch wide between the two angles, which allows the use of $\frac{5}{8}$ -inch through or lag bolts for fastening the rack to the pole.

List No.	No. of Line Wires	Wire Spacing	Overall Length	Standard Bundle	Lbs. Wt. Per 100
1250	2	4	$13\frac{9}{16}$	10	664
1258	2	8	$17\frac{9}{16}$	10	804
1350	3	4	$17\frac{9}{16}$	10	936
1358	3	8	$25\frac{9}{16}$	10	1186
1450	4	4	$21\frac{9}{16}$	10	1178
1540	5	4	$25\frac{9}{16}$	10	1450
3158	3	8	$17\frac{9}{16}$	10	984

SLATER EXTENSION BRACKETS FOR SECONDARY RACKS

Hot Galvanized



No. 3355

long, have a 4-inch bearing on the pole or wall, and are each equipped with a $\frac{5}{8}$ x 2-inch carriage bolt.

List No.	Type	Wt., Lbs. Per 100
3355	Curved Back, for Poles	250
3356	Flat Back, for Walls	250

Extension Brackets can be furnished in any special length.

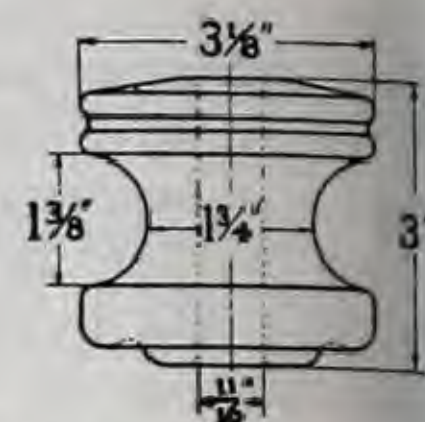
Extension Brackets are made in two styles, with flat and with curved backs, for wall and for pole use respectively.

Both types have one $\frac{11}{16}$ -inch hole and two $\frac{9}{16}$ -inch holes for mounting. The brackets are made of No. 9 gauge steel, are 6 inches

INSULATORS FOR SLATER SECONDARY RACKS



No. 355



Detail of Dimensions

STANDARD TYPE

The No. 355 brown glazed insulator, made of dry process porcelain, is the most popular secondary rack insulator and furnished on all heavy type racks unless otherwise specified.

For marking the neutral wire of a secondary circuit, so construction men use the No. 355 white glazed insulator made by the dry process.

Where high mechanical strength is required, such as dead-ending heavy lines the No. 455 brown glazed, wet process porcelain insulator is used by many companies.

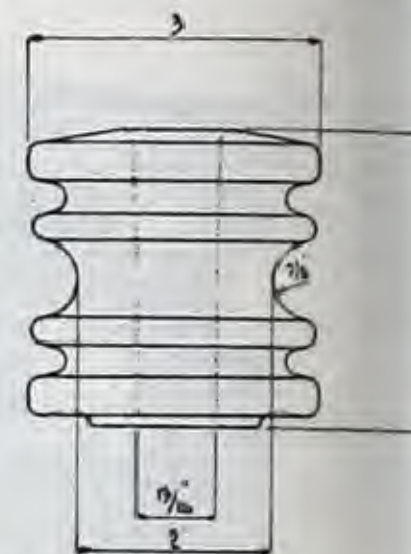
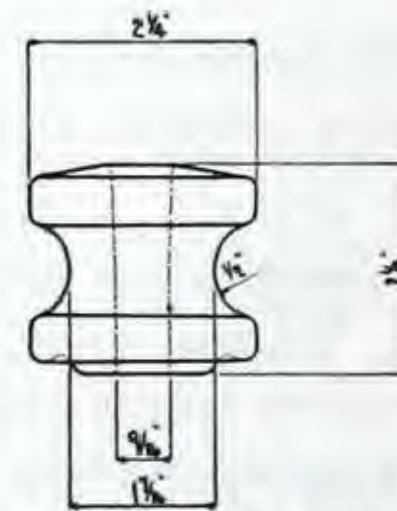
List No.	Color of Glaze	Description	Kind of Porcelain	Wt., Lbs. Per 100
355	Brown or White		Dry Process	132
455	Brown		Wet Process	132



No. 1355 THREE GROOVE TYPE

The three groove type insulator has a wide groove for the main circuit and two smaller grooves, above and below the wide groove in which to tie the service wires.

List No.	Colour of Glaze	Description	Kind of Porcelain	Wt. Lbs. Per 100
1355D	Brown		Dry Process	110
1355W	Brown		Wet Process	120



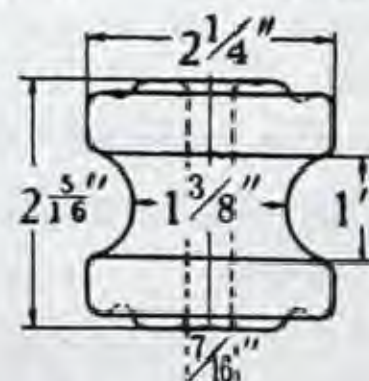
No. 1606

LIGHT RACK TYPE

Insulators for the light racks shown are furnished with either brown or white glaze, both of which are made of dry process porcelain.

The brown glazed insulator is also used on the No. 1603 clevis; on the spreader racks, light house racks, and on the sister hook and tree fixtures.

1606	Brown or white	Dry Process	45
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Detail of Dimensions

HOUSE RACK TYPE

The No. 1603 insulator, used with house racks is furnished only in brown glazed dry process porcelain. This insulator is also used on the No. 2925 swinging knob fixture.

1603	Brown	Dry Process	45
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Prices on application.



No. 1603 Standard

SLATER SECONDARY RACKS

LIGHT PRESTEEL TYPE



These Racks are for light secondary work. They are especially adaptable, on account of their strength and low cost, for running extensions from secondary mains; for lines where future development is limited; and for house service connections.

The Nos. 2768 and 3768 Racks are intended for use as Pole Service Racks for taking off services opposite the Line Rack. The bolt holes in the back of these Racks are spaced the same as on the Slater Heavy Presteel Secondary Racks, or Standard Slater Secondary Racks, with extended backs, so that they may be attached to the pole with the same bolts used for attaching the Line Racks.

The Light Presteel Racks have a presteel channel back; steel channel U-shaped points, which are inserted through riveted to the back, and a 1/2-inch through rod for attaching the No. 1606 insulators to the points. The straps on Nos. 276 and 376 are provided with 7/16 x 3/4-inch holes for attaching Lag Screws. The holes in the back are 1/8 x 1-inch 3/8-inch bolts.

276	2	6	13 1/4	10	350
376	3	6	19 1/4	10	555
476	4	6	25 1/4	10	740
276	2	6	13 1/4	10	310
376	3	6	19 1/4	10	445
476	4	6	25 1/4	10	594
768	2	8	16 1/2	10	350
768	3	8	24 1/2	10	545

SLATER POLE BANDS

FOR SECONDARY RACKS

Hot Galvanized



No. 7364

The Bands illustrated are used for attaching all styles of Slater Secondary Racks to tubular steel poles. These Bands are made of 1/4 x 1 1/2-inch steel, in two styles, the single type for attaching one rack, and the double type

attaching two racks, to the pole. Bands are furnished with 5/8 x 2-inch carriage bolts for attaching the Rack and 1/2 x 1 5/8-inch clamp bolts.

Single Type

No.	Nominal Pole Diam. Inches	Actual Outside Diam. Inches	Wt., Lbs. per 100
4	4	4.50	320
4 1/2	4 1/2	5.00	376
5	5	5.56	388
6	6	6.62	415

Double Type

4	4	4.50	366
4 1/2	4 1/2	5.00	421
5	5	5.56	433
6	6	6.62	460

Prices on application.

SLATER DEAD-ENDING STRAPS

FOR SECONDARY RACKS

No. 999

Hot Galvanized

These straps are suitable for use with all Slater Secondary Racks. They are provided with a 9/16-inch hole for 1/2-inch screw.

No.	Type	Size of Steel Inches	Wt., Lbs. per 100
	Light	14 ga. x 1 1/4	60
	Heavy	1/4 x 1 1/4	100

Prices on application.

SLATER WIREHOLDERS

Hot Galvanized



The 1607 series of Slater Wireholders has also the same wire spacings on all three in the series, giving a full range of service to the linebuilder. These wire spacings are those in general use in house services.

The strength of this series of wireholders is well in excess of any strain they would be called upon to bear. They insulate fully, and are very inexpensive to install.

This series of wireholders is used for taking off house services. The 1607 insulators have about twice the insulating qualities of the 1627 and are preferred by many engineers.

List No.	No. of Wires	Dimensions in Inches Channel Back	Wire Spacing	Wt. Lbs. Per 100
160726	2	2x5/8x13 1/2	6 1/2	420
160728	2	2x5/8x15	8	450
160720	2	2x5/8x17	10	480
160736	3	2x5/8x20	6 1/2	640
160738	3	2x5/8x23	8	680
160730	3	2x5/8x27	10	750
160746	4	2x5/8x26 1/2	6 1/2	830
160748	4	2x5/8x31	8	911
160740	4	2x5/8x37	10	1010

SLATER WIREHOLDERS

Hot Galvanized

This series of wireholders is designed to carry any voltage used in secondary construction. It is composed of Slater 1707 insulators mounted on channel backs by the use of heavy hot-dip galvanized bolts which are set in the insulator by the use of hard alloy.

These wireholders have an ultimate strength of 1000 pounds but as the load on secondary construction is never over 300 or 400 pounds, these wireholders have ample strength as well as high insulating qualities.

Wire spacings are made to conform to the generally accepted practice, namely 6 1/2-inch, 8-inch and 10-inch.



List No.	No. of Wires	Dimensions in Inches Channel Steel	Wire Spacing	No. of Through Bolts	Wgt. Lbs. Per 100
170726	2	2x5/8x13 1/2	6 1/2	3	580
170728	2	2x5/8x15	8	3	630
170720	2	2x5/8x17	10	3	670
170736	3	2x5/8x20	6 1/2	4	870
170738	3	2x5/8x23	8	4	950
170730	3	2x5/8x27	10	4	1030
170746	4	2x5/8x26 1/2	6 1/2	5	1160
170748	4	2x5/8x31	8	5	1280
170740	4	2x5/8x36	10	5	1400

SLATER CHANNEL STEEL BRACKETS

Hot Galvanized



No. A29



No. A39



No. A49

These channel brackets are for heavy secondary wires on wood poles. They are provided with the Slater alloy coated spiral spring threads or Slater perfect bond die cast thread. Specify which style you desire.

List No.	Extension	—Dimensions, Inches—				Wt. Lbs. per 100
		Base	Channel	Holes	Spacing	
A29	4	...	1 1/4	5/16	9	180
A39	4	...	1 1/4	5/16	6 1/2	300
A49	4	...	1 1/4	5/16	6 1/2	440

SLATER PRUSSIAN HOOK BRACKETS

Hot Galvanized



No. 314

The Prussian Hook is extensively used for supporting wires on poles, trees and houses. It is made with Slater Spring Thread for insulators with 1-inch diameter pin holes.

Special Hook Brackets of any dimensions or equipped with wood cobs, lead threads, or notched for cementing into the insulator pin hole can be furnished when specified.

Dimensions in Inches (See No. 312 drawing above)						Wt., Lbs.,
List No.	Size Steel	A	B	C	D	Per 100
313	5/8 Round	2 9/16	1 15/16	3 3/4	3	130
314	5/8 Square	2 1/16	3 1/16	4	2 1/2	170
315	1/2 Square	2 7/8	1 3/8	4	2 1/2	105
316	1/2 Round	2 7/8	1 3/8	4	2 1/2	86

Prices on application.

SLATER HOUSE BRACKETS

Heavy Presteel Type
Hot Galvanized

No. 254



No. 137



No. 354



No. 138



No. 154

The Heavy Presteel Brackets take the place of the old channel point Brackets Nos. 146, 206 and 306, and like Light Brackets, are more than twice as strong as those they are intended to replace. No. 138 is the same type of bracket as the No. 136 except that it is made for heavier work. Nos. 1254 1/2, 254 and 354 are intended for heavy service wires long spans. No. 137 is curved on back to fit a pole.

Dimensions in Inches

List No.	Extension	Spacing	Size of Holes	Standard Bundle	Wt. Per 100
137	4 1/2	0	7/16	25	80
138	4 1/2	0	7/16	25	80
154	4 1/2	0	1 1/8	25	100
254	4 1/4	9	1 1/8	20	235
354	4 1/4	6 1/2	1 1/8	20	400

Prices on application.

EVERYTHING
For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."

SLATER PRESTEEL HOUSE RACKS

Hot Galvanized



No. 286



No. 501

The Slater Presteel House Racks were designed to be used as house brackets, and are largely used for this work.

They are made with a 3/4-inch channel back and presteel joints. The mounting holes are 7/8 x 1/2, both in the back and the straps. The insulator through bolt is 3/8-inch.

The racks come completely assembled with No. 1603 insulators, packed in wooden boxes with insulators protected by corrugated fibre sleeves.

The Light House Racks are sometimes used for carrying secondary wires vertically on the poles where the conductor is lighter than No. 3 wire. For pole work, however, we recommend the secondary racks.

List No.	No. of Line Wires	Wire Spacing	Dimensions in Inches Length Overall	Std. Bundle	Wt., Lbs. per 100
183	1	0	6 3/8	10	150
286	2	6	12 3/8	10	300
383	3	3	12 3/8	10	356
386	3	6	18 3/8	10	448
583	5	3	18 3/8	10	548
501	Corner Iron	..	..	25	20
1603	Insulator only	..	..	100	45

Prices on application.

UNDERGROUND SYSTEMS

"Wires Underground" are taken for granted in large cities, but actually there is no good reason why many small cities and towns cannot use such a system to equal advantage. There is more to "Underground" than simply relieving congestion. Appearance of streets, particularly in the shopping area, is a big factor; better lighting and freedom from service interruptions are also important.

Hitching posts for farmers' rigs are no longer necessary. With the universal use of automobiles the trading area of a city or town has increased tremendously. The old 10 to 20 mile radius has given way to one of 40 miles or more, with the result that cities and towns are now all in competition with each other for this outside trade. There is no better way to get it than to make your town the most attractive one in the district. An underground system will give your city or town the appearance of a new place.

SLATER WIREHOLDERS

Hot Galvanized



No. 190



No. 1607



No. 1190



No. 191



No. 2921



No. 191A



No. 296



No. 394



No. 396



No. 494

The Slater Wireholders come completely assembled with insulators, packed in wooden boxes, with insulators protected by corrugated fibre sleeves. They get to the job with minimum labour, and absolutely no breakage. Their first cost is less than any other form of wall bracket.

They largely eliminate tie wires, thus saving labour and material, and are approved by the Underwriters' Laboratories. They are designed so all metal is in tension; all porcelain in compression; mechanically correct for all secondary work.

The broad base presteel type is furnished in the sizes listed below.

List No.	Number Wires	Wire Spacing Inches	Standard Package	Wt., Lbs. per 100
190	1	0	50	78
191	1	0	50	96
191-A	1	0	25	76
296	2	6	25	204
394	3	4 1/2	25	284
396	3	6	25	308
494	4	4 1/2	25	390
1190	1	0	125	147
1607	1	0	50	108
2922	1	0	100	105

Prices on application.

SLATER SWINGING KNOB FIXTURES

Hot Galvanized



No. 2925



No. 2926

SLATER SWINGING KNOB FIXTURES

The Slater Swinging Knob consists of a porcelain spool, a galvanized wire bail and a galvanized presteel base with 2 1/4" wood screw. (Exception: List No. 2945 is furnished with a 3/8" x 5" carriage bolt in place of the wood screw).

The Swinging Knob is suitable for house services, either for electric light or telephone circuits. The strength of this item is more than sufficient for average spans. The Swinging Knob is frequently preferred because of its neat appearance and adaptability to locations where space is limited.

Spool No. 1606, also used in Slater Light Presteel Racks, is used in Swinging Knobs No. 2925 and No. 2945, and has a wire groove diameter of one inch.

Spool No. 2937 is used in Swinging Knob No. 2926 and has a wire groove diameter of half an inch.

List No.	Description	Std. Pkg.	Wt., lbs. Per 100
2925	With No. 1606 Insulator	50	102
2926	With No. 2937 Insulator	50	82
2945	With No. 1606 Insulator	50	111

SLATER TREE WIREHOLDER

Screw Hot Galvanized

Slater Tree Wireholders combine the functions of wireholder and insulator where lines are running through trees.

Their use eliminates much of the necessity of trimming limbs from desirable trees.

They are easily installed.

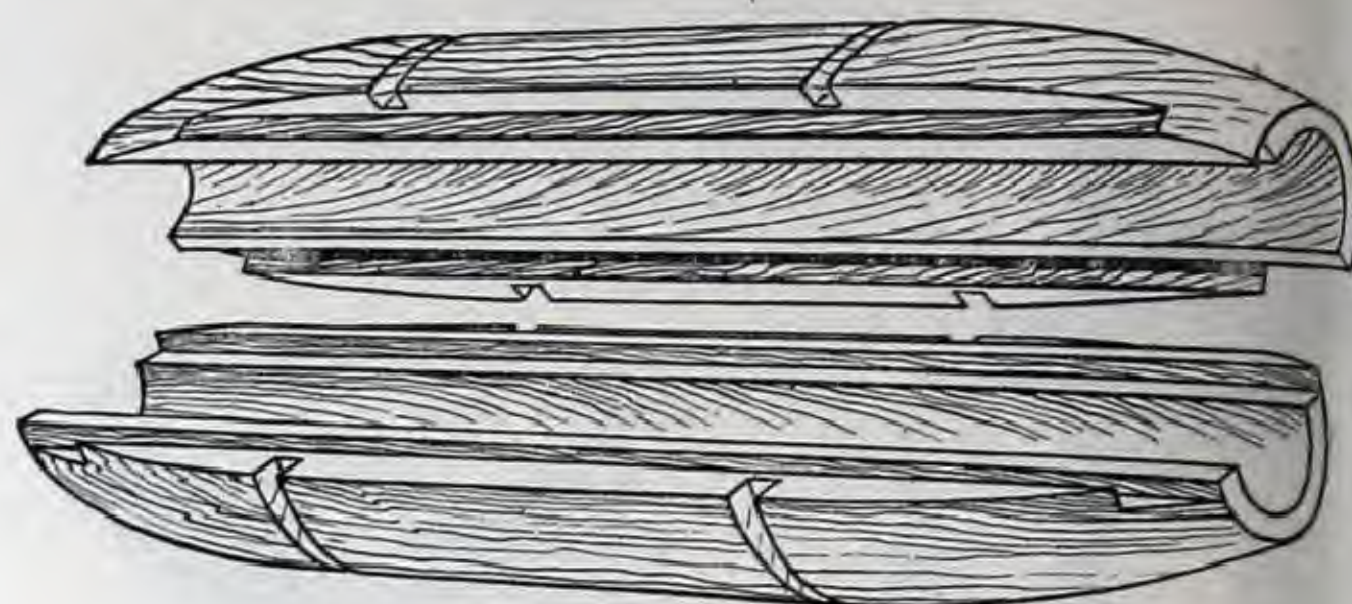
The wireholder is screwed in position on the limb adjacent to the conductor and the slot in the top of the insulator in line with it. Then by giving the wireholder a further quarter turn the conductor is thereby held in position and completely insulated from the tree. The smooth surface of the insulator does not abrade the conductor insulation.



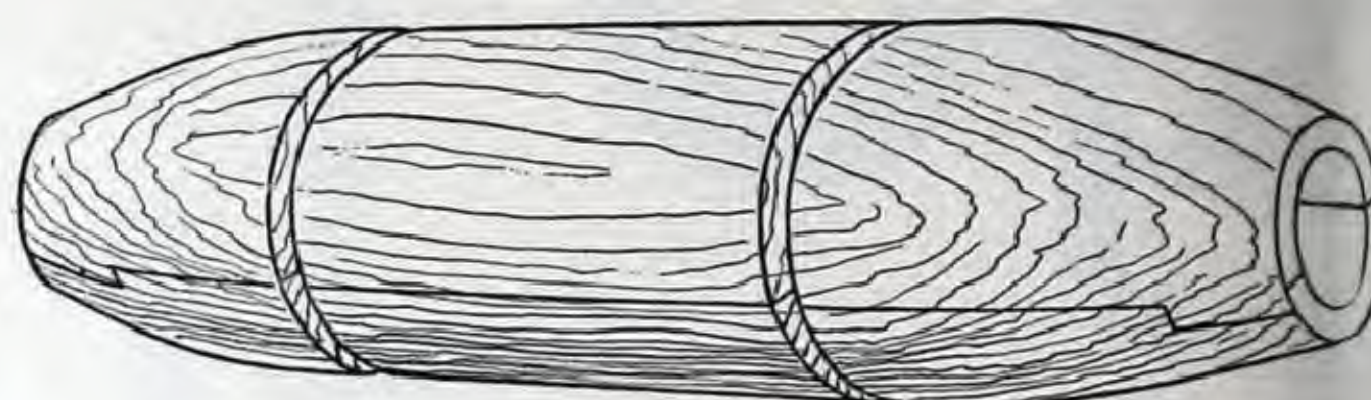
No. 1647

List No.	Dimensions of Screw, Inches	Packed in Cases of	Approximate Shipping Wgt. Per 100
1647	3/8x2 1/2	25	165

LOCUST TREE WIRE MOULDING



Exploded View



Assembled View

This moulding consists of a round locust bushing saw lengthwise, with tongue and groove edges and supplied with grooves on outside for wire for binding together. Being yellow locust they will give many years service. Used for applying to wires that pass through trees to prevent abrasion.

Outside Dia.	Length	Hole	Weight	List Price
1 9/16"	36"	9/16"	2 lbs. ea.	\$0.44
1 9/16"	60"	9/16"	3 1/2 lbs. ea.	0.72
2 1/4"	36"	3/4"	4 lbs. ea.	0.64
2 1/4"	60"	3/4"	7 lbs. ea.	1.00
2 1/2"	36"	1"	5 lbs. ea.	0.72
2 1/2"	60"	1"	8 1/2 lbs. ea.	1.08

SLATER TREE WIRE SADDLE



No. 2095

An assembly, which supplements the split-porcelain tree wireholder, consists of a standard No. 1607 Wireholder—presteel seat and a formed hanger, with a hook at each end.

The formed hanger can be quickly threaded through the hole of the porcelain and hooked to the presteel seat. It is not necessary to close the hooks, although this can be done thought desirable.

The presteel seat is well belled at each end to prevent cutting of the wire. The strength of the assembly is well above any service requirements.

List No.	Item	Weight per 100 Pieces
2095	Tree Wire Saddle with hanger	20 lbs.

SLATER INSULATED POLE BRACKETS

For Lamp Leads

Hot Galvanized



No. 174



No. 173

Slater Insulated Pole Brackets are used for supporting vertical leads of duplex cable or twisted single wires between the cross arm and the arc or incandescent lamp. These brackets are easy to install. After mounting the brackets on the pole the wire is simply run through the hole in the insulator, connected on each end, and the job is complete. There are no nuts or bolts or movable parts to bother with.

Dimensions in Inches

List No.	Size of Screw	Diameter of Screw Holes	Standard Package	Wt., Lbs. per 100
173	1/2 x 3	7/16	50	230
174	.....	7/16	50	240

Prices on application.

SLATER PRESTEEL CROSS ARM SADDLES

Hot Galvanized



No. 5004

The Cross Arm Saddle is used with Slater forged steel pins on round top cross arms. It is pressed from No. 7 galvanized sheet steel.

Dimensions in Inches

List No.	Width of Cross Arm	Size of Pin Hole	Wt., Lbs. Per 100
5001	3 1/4	1 1/16	87
5002	3 1/2	1 1/16	93
5003	3 3/4	1 1/16	99
5004	4	1 1/16	105
5005	5	1 1/16	130
5011	3 1/4	1 1/16	87
5012	3 1/2	1 1/16	93
5013	3 3/4	1 1/16	99
5014	4	1 1/16	105
5015	5	1 1/16	130

SLATER LOCK WASHERS

Hot Galvanized

The Slater Lock Washer is designed especially for use with long shank insulator pins. It will be furnished on any standard pin when specified at a slight additional cost.



No. 5040

Dimensions in Inches

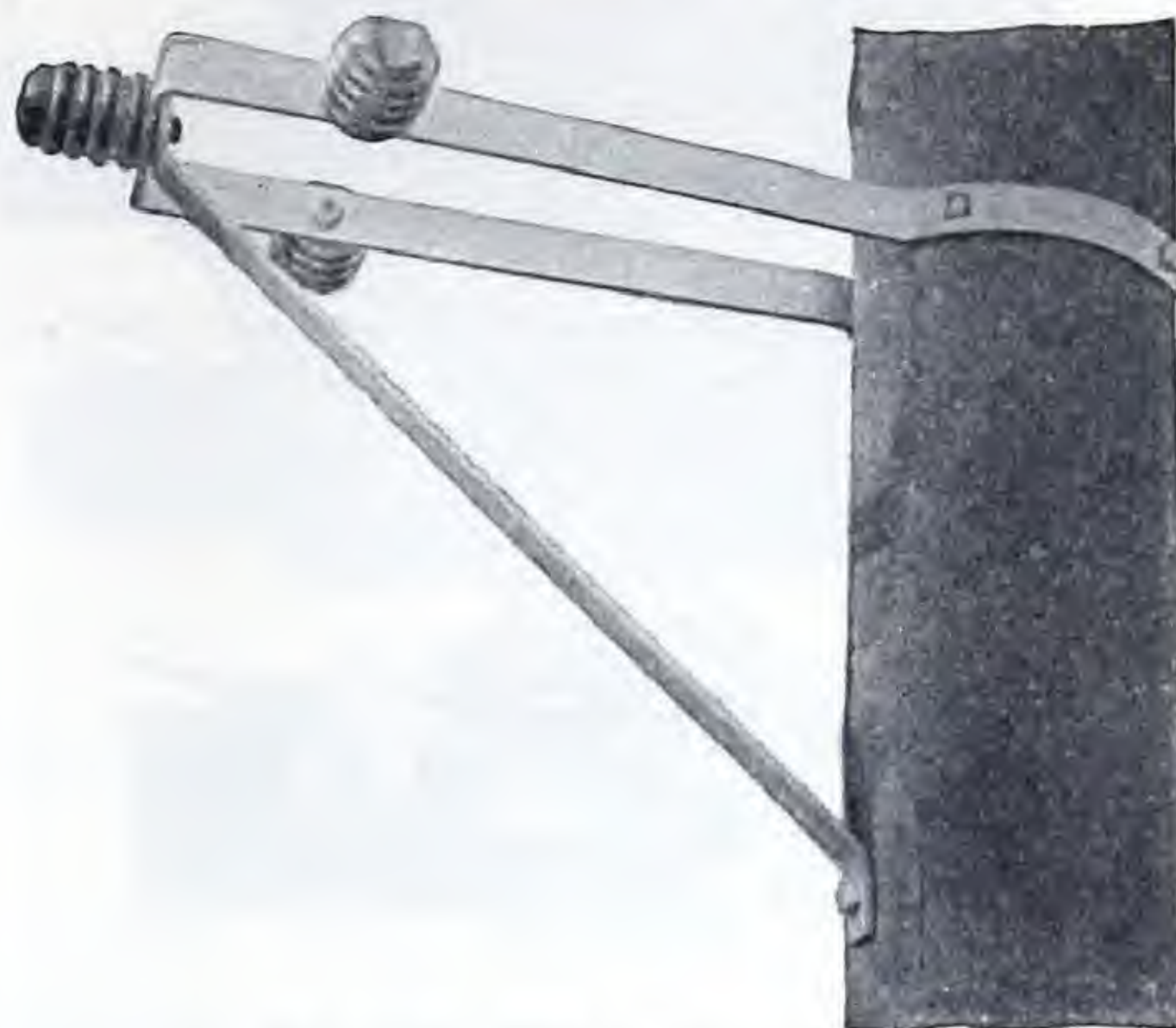
List No.	Size of Pin Hole	Size of Steel	Wt., Lbs. per 100
5039	9/16	14 Ga. x 1 1/4	9
5040	1 1/16	12 Ga. x 1 3/4	10
5041	1 1/8	12 Ga. x 1 3/4	10

Price on application.

SLATER RISER BRACKET

For Secondary Wires

Hot Galvanized



Slater No. 2016-W Riser Bracket

For secondary wires, complete with insulators.

The Slater riser bracket or spreader bracket is installed with five 1/2" lag screws. It is used on transformer poles and is located midway between the transformer and the secondary lines. It is used to rigidly hold the secondary risers from the transformer, preventing their swinging together in a high wind.

Strongly made of 5/16" x 1 3/4" steel bar, and equipped with 3 wet process porcelain wire holders. This bracket is now standard with some of the larger Canadian Utilities.

List No.	Description	Weight, lbs.
2016	Riser Bracket Complete	12

DROP WIRE HOOK

Hot Galvanized



No. 2270 Hook

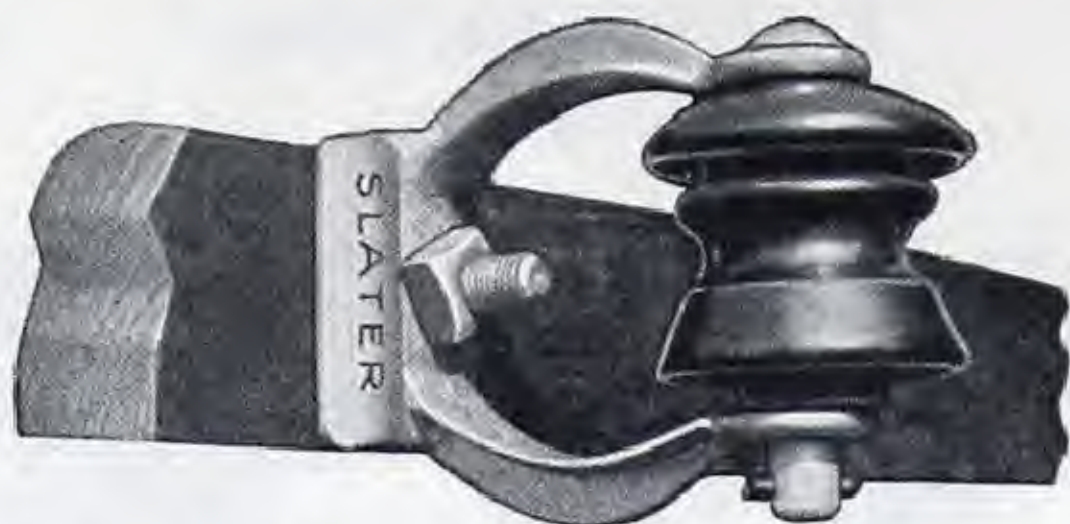
This hook is used with the standard telephone drop wire clamps types P and R, both at the pole and at the building, and is installed with a standard 3/8" lag screw.

This hook is formed of No. 7 steel wire, to accurate dimensions, and is hot galvanized.

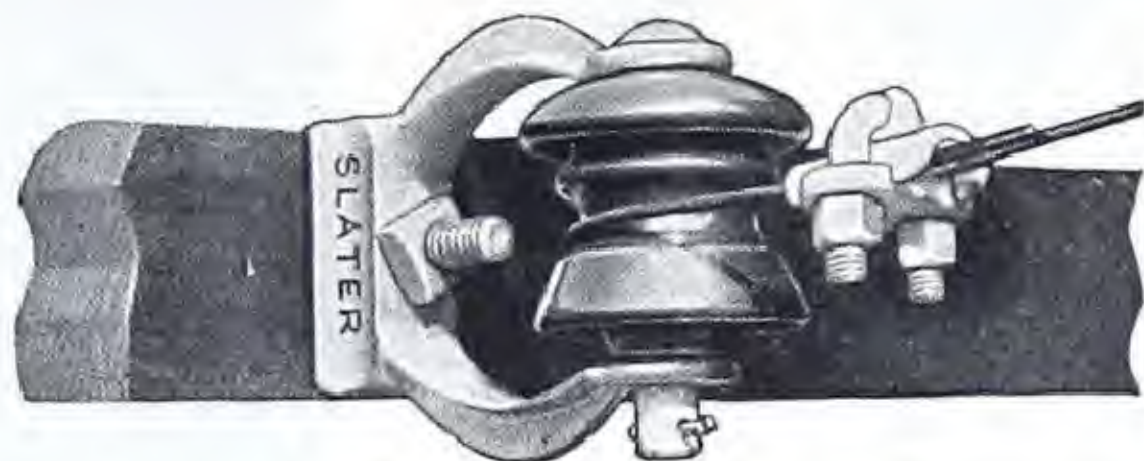
At the pole one hook is used for 3 or 4 services which can be taken off at wide angles.

List No.	Description	Weight lbs. per 100
2270	Drop Wire Hook	7 1/2

SLATER PRIMARY DEAD END CLEVIS



Slater No. 1347-M Primary Dead End Clevis with 8000 volt wet process porcelain spool, No. 1612 (Malleable Iron)



Showing the 1347-M Dead Ending Clevis with No. 6 Solid Copper Primary Wire, and No. 7479 Dead Ending Clamp

This type of dead ending clevis is the type most widely used throughout Canada for 2300 volt circuits. The clevis is now available in a stronger form with an 8000 volt wet process porcelain spool.

Noteworthy features are:—

1. Wide bearing on the cross arm.
2. Plenty of room for wrench when tightening the nut.
3. Strong pin of high strength steel.
4. Increased flashover distances.
5. Ultimate strength—6000 to 7000 pounds.

This design is also made in a larger size, with a 7" extension, and is listed as No. 1349-M. Wet Process porcelain spool No. 5930 is used. The ratings of both spools are given in the table below.

Line voltage recommendations are based on actual wet leakage values and comparative wet and dry flashovers of standard line insulators used at these voltages.

List No.	Item	Line Voltage	M'frs rating of Insulator	Wet Flash-over	Dry Flash-over	Weight Pounds, each
1612	Wet Process Porcelain	5 Kv.	8 Kv.	36 Kv.	16 Kv.	1
5930	Spool	8 Kv.	10 Kv.	45 Kv.	25 Kv.	2

List Number	Item	Extension	Weight, Pounds complete with Porcelain Spool
1347-M	Clevis, complete with spool No. 1612	5"	450
1349-M	Clevis, complete with spool No. 5930	7"	600

SLATER
UNIVERSAL DEAD ENDING CLEVIS

Hot Galvanized

This Clevis will anchor a metal cap strain insulator with any one of the three types of connections; eye, clevis and hook on the end of a bolt through the side of a cross arm or building. When a variety of insulators are used, the Universal clevis is a necessity.



No. 555

List No. 555

Length, Inches to Center of Bolt 3 1/2

Wt., Lb Per 100 94

Price on application.

SLATER CONNECTING LINKS

Hot Galvanized

Connecting Links are made of rolled steel, shaped and riveted together in such a manner as to provide a clevis on one end and an eye on the other.



No. 6786

These links are furnished complete with one clevis bolt and brass cotter. Sizes not listed can be furnished when specified.

List No.	Size of Stock	Length	Dimensions in Inches	Eye End	Clevis End	Open. in	Size of Bolt	Wt. Lb Per 100
6786	3/4 x 1 1/2	2 3/8		3/4	9/16	9/16	1/2	16
6787	5/8 x 1 3/4	14 1/4		13/16	9/16	5/8	1/2	50

Prices on application.

SLATER INSULATED CLEVISES



No. 1340

No. 1609 Insulator

For dead-ending primary line Nos. 1339 and 1340 Slater Clevises are in popular use. The No. 1339 is suitable for use with circuits up to 4000 volts, the No. 1340, up to 6600 volts.

The Yoke of the Clevis is made of 1/8 x 1 1/2-inch flat steel and is equipped with a 5/8-inch clevis bolt and brass cotter pin. The hole for mounting the No. 1339 is 1 1/16-inch.

For the No. 1340 a 3/4-inch oval hole is provided.

List No.	Style of Insulator	Length to Center of Bolt, Inches	Wt., Lb Per 100
1339	Small, Wet Process	4 3/16	125
1340	Large, Wet Process	4 13/16	269
1345	Large, Wet Process	5 1/2	340

Prices on application.

SLATER INSULATED
CLEVISES

Nos. 1341 and 1342 Slater Insulated Clevises are for secondary work. They are furnished with standard Slater rack insulators, No. 355 for the large type and No. 1606 for the small type.

Has 1 1/16-inch hole.

1341	Small, Dry Process	4 3/16	136
1342	Large, Dry Process	4 13/16	225

Prices on application.



No. 1341 with No. 1606 Insulator

SLATER PARALLEL GROOVE CONNECTORS



Fig. 1

No. 2092 Connector for No. 1 Copper or 2/0 A.C.S.R.
App.—2 lbs. each.

Up to 250,000 C.M. Copper or Aluminum

Slater Parallel Groove Connectors listed here are made for standard conductor diameters and for connecting conductors of similar or diverse materials, for example—

COPPER TO COPPER

All such connectors are made of high-copper bronze.

COPPER TO ALUMINUM

These are made of high-copper bronze with a metallurgically bonded aluminum shim.

ALUMINUM TO ALUMINUM

Made of cast aluminum.

All these Connectors are of suitable weight, bell-mouthed to avoid injury to conductors, and are furnished with high strength hot galvanized steel bolts. A special feature is a cupped washer which elastically provides for the difference in expansion inevitably encountered in even moderate changes in air temperature. The necessity for this elastic compensation is, of course, greatest where the coefficient of expansion of the parts of the connector and conductor have the greatest differences. In addition to the expansion trouble there is the oxidation of all conductor materials to slowly cold-flow which inclines to relieve the pressure of contact and finally results in arcing. This is true particularly where clamping pressures are high, and contact pressures should be reasonably high for reliability, consequently all our connectors are equipped with high strength steel bolts and the cupped washers.

Due to the center location of the steel bolts and the outside gaps, magnetic heating is unknown.

List No.	Conductor Sizes		Length
78	No. 4 solid copper	to No. 4 solid copper	2½"
79	No. 2 solid copper	to No. 2 solid copper	2½"
80	No. 2 stranded copper	to No. 2 stranded copper	2½"
81	No. 4 A.C.S.R.	to No. 4 A.C.S.R.	2½"
82	No. 2 A.C.S.R.	to No. 2 A.C.S.R.	3"
83	No. 1/0 A.C.S.R.	to No. 1/0 A.C.S.R.	3"
85	No. 4 A.C.S.R.	to No. 4 solid copper	2½"
86	No. 2 A.C.S.R.	to No. 4 solid copper	3"
87	No. 1/0 A.C.S.R.	to No. 4 solid copper	3"
88	No. 1/0 A.C.S.R.	to No. 2 solid copper	3"
89	No. 1/0 A.C.S.R.	to No. 2 stranded copper	3"

Weights per 100—2½"—100 Lbs.—3"—112 lbs.

SLATER PARALLEL GROOVE CONNECTORS

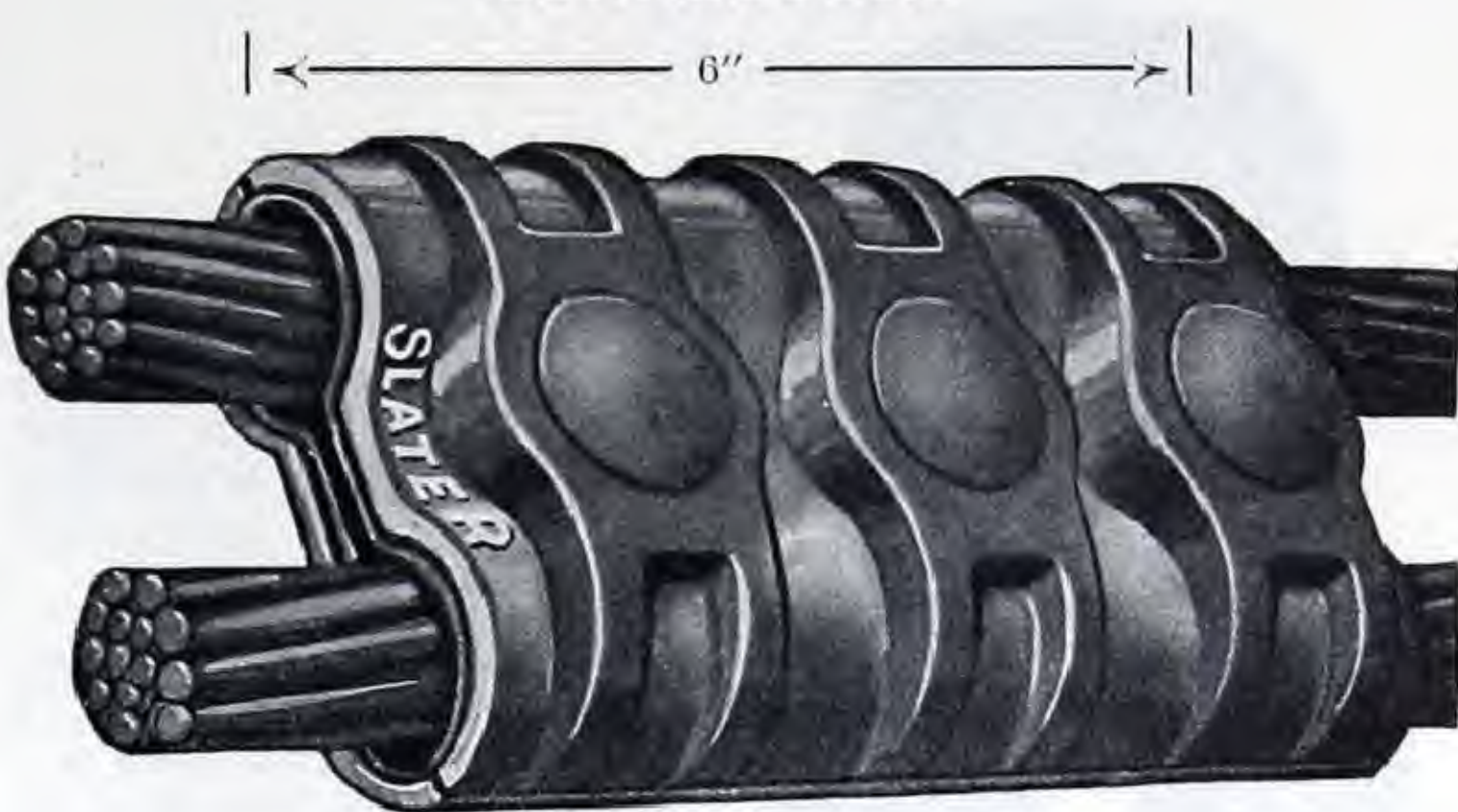


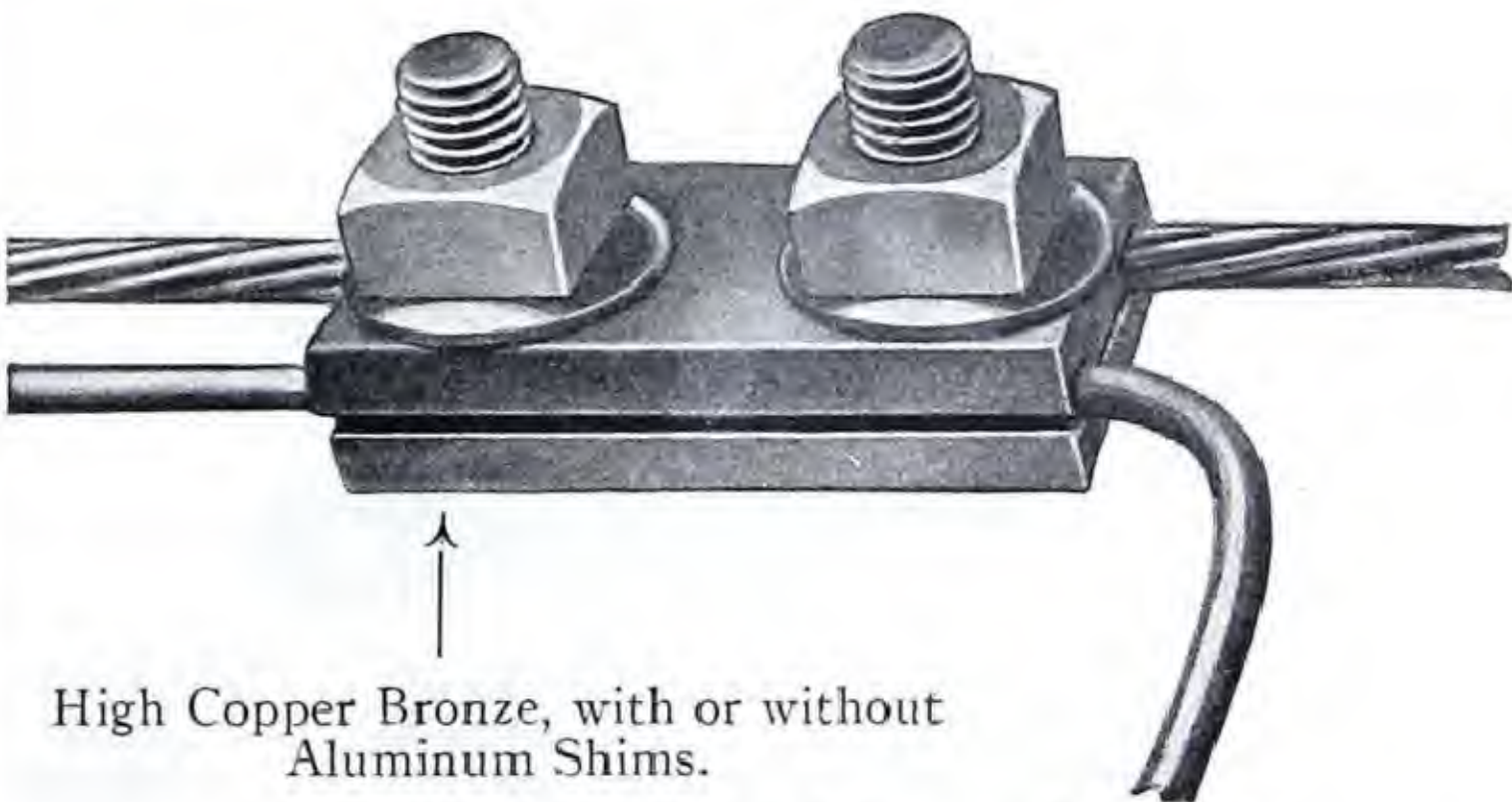
Fig. 2

No. 2093 Connector, for larger than 250,000 C.M. Copper or Aluminum
App.—4 lbs. each.

For larger Conductors, 2 or 3 bolt Connectors, (Figures 1 and 2), have the body heat-treated malleable, hot galvanized, with metal shims connecting the two conductors together, of ample thickness to carry full conductor current. These shims are pure sheet copper or sheet aluminum, as the case demands, or sheet copper having an aluminum facing for the aluminum conductor.

The two-bolt Connector illustrated in Fig. 1 fits conductors from 2/0 A.C.S.R. and No. 1 copper up to 250 M.C.M., either A.C.S.R. or Copper. Above these diameters the three-bolt clamp, (Fig. 2) is used. This Connector serves for all larger diameters in general use. Where special conductors are used special connectors are provided.

(Note: It is requested when enquiring or ordering that you specify conductor metals and diameters).



Slater No. 2088 Parallel Groove Connector



FOR COPPER No. 1 UP TO No. 3/0

List No.	Description	Weight per 100
A3287	Hard Copper, 4½" long; 3 bolts	125 lbs.

SLATER EUREKA CONNECTORS

Drop Forged Steel—Hot Galvanized



Both the top and bottom grip surfaces of this Slater-Eureka Connector are smooth and give a much larger holding surface, preventing any injury to the cable. No distortion or slippage.

The cable slip that has big, smooth surfaces for the lay of cable both top and bottom—so that it's not necessary to bite into one cable with the U-bolt.

Steel or Bronze. Steel clips are very high grade open hearth steel—drop-forged grip plates and rolled steel U-bolts. Sizes over 1½ inch are high grade electric steel castings. The Steel Eureka Wire Rope is hot galvanized. Bronze clips are drop forged from highest grade of forging bronze.

Sizes and prices of Bronze Clips sent on request.

List No.	Size Clip	Approx. Weight 100 Clips in Lbs.
7480	¼"	36
7481	⅝"	36
7482	⅜"	70
7484	½"	86
7485	⅝"	125
7486	¾"	155
7487	⅞"	260
7488	1"	275
7489	1⅛"	350
7490	1¼"	490
7491	1⅜"	580
7492	1½"	785

Will ensure a strong contact between copper conductors of equal size.

List No.	Solid	Connects Strand	Wt., Lbs. per 100
7480	No. 2 or 4		36
7481A	No. 1	No. 2	36
7482	No. 1/0 or 2/0	No. 1 or 1/0	70
7483	No. 3/0	No. 2/0	70
7484	No. 4/0	No. 3/0	86
7485		4/0 to 250 M. C.M.	125

CROSBY WIRE ROPE CLIPS

The genuine Crosby, drop-forged and galvanized.



For Size Strand In.	Net Weight Lbs. per 100	Gross Weight Lbs. per 100	List Price Each
⅜"	20	24	\$0.30
¼"	29	34	0.35
⅝"	29	34	0.35
⅜"	47	52	0.40
½"	70	76	0.45
⅝"	70	76	0.45
¾"	100	107	0.55
⅞"	150	167	0.65
1"	244	264	0.75
1⅛"	281	303	0.85
1¼"	319	350	0.95
1½"	456	501	1.10
1⅝"	488	536	1.25
1⅞"	532	585	1.50
2"	613	674	3.50
2¼"	800	880	5.50
2½"	1038	1141	7.50
2¾"	1263	1389	9.50
3"	1660	1826	11.50
3¼"	3175	3492	25.00
3½"	3300	3610	35.00

UNDERGROUND SYSTEMS

"Wires Underground" are taken for granted in large cities, but actually there is no good reason why many small cities and towns cannot use such a system to equal advantage. There is more to "Underground" than simply relieving congestion. Appearance of streets, particularly in the shopping area, is a big factor; better lighting and freedom from service interruptions are also important.

Hitching posts for farmers' rigs are no longer necessary. With the universal use of automobiles the trading area of a city or town has increased tremendously. The old 10 to 20 mile radius has given way to one of 40 miles or more, with the result that cities and towns are now all in competition with each other for this outside trade. There is no better way to get it than to make your town the most attractive one in the district. An underground system will give your city or town the appearance of a new place.

SLATER UNIVERSAL GROUNDING DEVICE



The Universal Grounding Device was designed to lessen accidents due to that human trait—carelessness. A more important lineman's tool than his spurs or belt. Its use will prevent accidents due to another's carelessness. Be sure those lines are positively grounded with the Universal Grounding Device, the design of which is approved by seven years of practical operation. Made with heavy current-carrying features, extra flexible braid-covered cables, attached quickly.

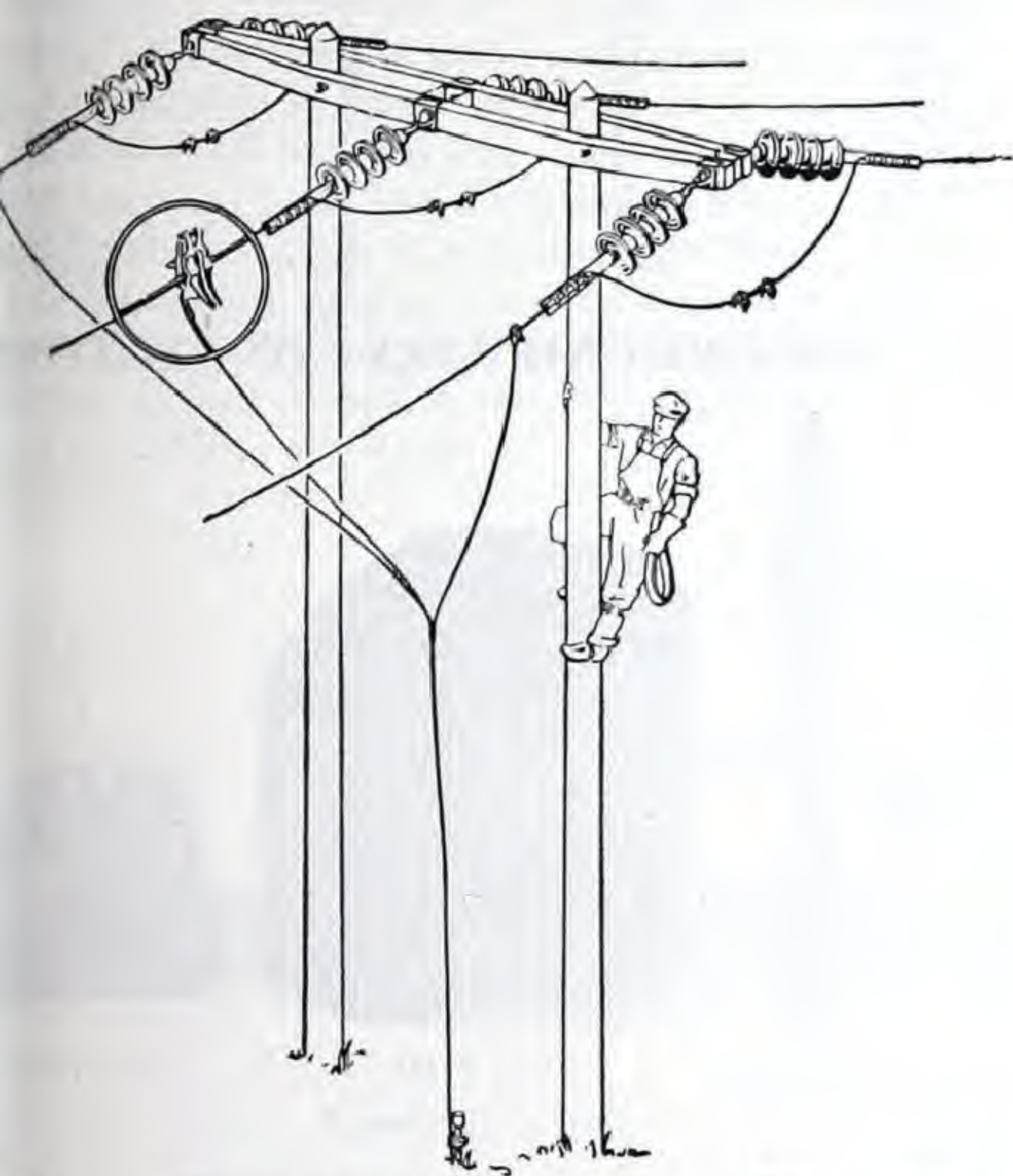


Diagram illustrating the Slater Universal Grounding Device used with Copperweld Ground Rod.

Safety Council rules state that all phases of a transmission should be grounded on both sides of the point where repairs are being made. Also, if work is being done at a point where the line branches, this branch line must also be grounded.

FEATURES

Phosphor bronze spiral wound springs give positive contact pressure.
Extra flexible, heavy-duty cable—braid covered.
Light and compact.
Clamp stick made of straight grained seasoned hickory, air-dried and varnished.
Available for system voltages from 4 Kv. to 220 Kv.
Proven in the field by several years of use.

SLATER UNIVERSAL GROUNDING DEVICE

(Continued)

ADVANTAGES

Quickly and easily installed.
Positive contact which does not depend upon set screws.
High conductivity parts used throughout.
High thermal capacity.
Self-adjusting to conductor diameter.
Constant low ohmic resistance.

List No.	Conductor Size	Cable Length
1701	No. 3/0 A.C.S.R. to 795 M.C.M., A.C.S.R.	15'-0" (Single Clamp device with clamp for use on steel tower)
1702	No. 2 Copper to No. 4/0 A.C.S.R.	7'-0" (4-clamp device for 3-phase grounding).
1703	No. 2 Copper to No. 4/0 A.C.S.R.	15'-0" (Single clamp device with clamp for use on steel tower).
1704	No. 2 Copper to No. 4/0 A.C.S.R.	6'-6" (3-clamp device with 50 foot ground extension cable and 4'-0" Copperweld Ground Rod).
*1705	No. 4 Copper to No. 2/0 A.C.S.R.	7'-0" (4-clamp device for 3-phase grounding).
*1706	No. 4 Copper to No. 2/0 A.C.S.R.	6'-0" (3-clamp device with 50 foot ground extension cable and 4'-0" Copperweld Ground Rod).
1707	12'-0" Operating Stick (of prepared hickory) in two 6'-0" sections.	

*NOTE—Nos. 1705 and 1706 are made with one contact finger and recommended for 2300 volt to 8000 volt lines.

SLATER POLE DATING NAIL

Hot Galvanized



The Slater Dating Nail is an important item in line building. It is used to identify dates of new construction, new cross arms on old poles, and also to note the depth at which poles are set—for instance, if the pole is set six feet deep the nail is placed six feet above the ground line.

The distinctive features of this nail is that the body of the nail is oval in shape, the figures are stamped in the same plane as the long axis of the nail and the point is chisel shaped to make it easy to drive. Nails are supplied with single figures from 0 to 9, and also year figures 32 and up.

List No.	Length, Inches	Packages of
32 and up	1 1/4	200
0 to 9.	1 1/4	200

SLATER "COPPERWELD" GROUND RODS

Listed as Standard by Underwriters' Laboratories

The fire and accident hazard which exists where there is a high-resistance or deteriorated ground circuit is well known. This hazard might be the result of fuses not blowing when the circuit becomes grounded; the arc may, therefore, hang on and cause fire. Protective devices might not function. Therefore, it is very advisable to maintain a low-resistance and reliable ground circuit at all times.

Copper grounding wires can be soldered directly to the solid copper exterior of Copperweld ground rods. This copper-to-copper soldered contact eliminates rusting and galvanic action. Electro-chemical action is also avoided when a copper ground-clamp is used to attach the grounding wire to Copperweld ground rods.



Ground Wire Connectors

Slater Copperweld Ground Wire Connectors listed on the following page were specially developed for attaching either solid or stranded grounded wires to ground rods. This method does away with the soldering of ground wires with the resulting uncertain joint.

Sizes recommended

Wherever Copperweld ground rods are used to replace galvanized rods or pipes, a smaller diameter may be safely employed. The molten-welded exterior thickness of copper provides permanent non-rusting qualities in all sizes. The copper exterior will not crack nor flake off under the severest kind of treatment. The weld is guaranteed to remain perfect for all time to come.

The solid steel core gives unusual rigidity and security against bending while being driven. $\frac{3}{4}$ " diameter Copperweld ground rods have been found adequate for successful driving in the hardest soils encountered.

The following sizes are generally used for the services shown:

	Diameter	Length
Signal Circuits.....	$\frac{1}{2}$ "— $\frac{5}{8}$ "	6—8 ft.
Telegraph Circuits.....	$\frac{1}{2}$ "— $\frac{5}{8}$ "	6—8 ft.
Telephone Circuits.....	$\frac{3}{8}$ "— $\frac{1}{2}$ "	5—8 ft.
Overhead Ground Wires.....	$\frac{1}{2}$ "— $\frac{5}{8}$ "— $\frac{3}{4}$ "	6—10 ft.
Power Distribution Circuits...	$\frac{1}{2}$ "— $\frac{5}{8}$ "— $\frac{3}{4}$ "	8—10 ft.
Service Grounds.....	$\frac{1}{2}$ "— $\frac{5}{8}$ "— $\frac{3}{4}$ "	8—10 ft.
Radio.....	$\frac{3}{8}$ "— $\frac{1}{2}$ "	5—8 ft.

List Prices per 100 less pigtails.

	$\frac{3}{8}$ "	Net Weight	$\frac{1}{2}$ "	Net Weight	$\frac{5}{8}$ "	Net Weight
Length	Diam.	Ea. lbs.	Diam.	Ea. lbs.	Diam.	Ea. lbs.
5 ft.	\$40.00	2.0	\$ 93.00	3.5	\$134.00	5.4
6 ft.	48.00	2.4	107.00	4.2	158.00	6.5
7 ft.	...	...	122.00	4.9	183.00	7.6
8 ft.	...	...	138.00	5.6	206.00	8.7
9 ft.	...	...	...	...	231.00	9.8
Std. Pkg. 10	...	...	10	...	10	...

	$\frac{3}{4}$ "	Net Weight	1"	Net Weight
Length	Diam.	Ea. lbs.	Diam.	Ea. lbs.
5 ft.	\$185.00	7.7	\$323.00	14.0
6 ft.	222.00	9.4	388.00	16.9
7 ft.	255.00	10.9	448.00	19.6
8 ft.	289.00	12.5	511.00	22.5
9 ft.	323.00	14.0	573.00	25.3
10 ft.	356.00	15.5	634.00	28.1
12 ft.	422.00	18.5	760.00	33.7
Std. Pkg. 10	...	...	5	...

GROUND RODS WITH COPPER WIRE



Hot Galvanized

No. 12 wire soldered to rod; free end, five inches long.							
List No.	Dia. Inches	Lgth. Feet	Wt., Lbs. per 100	List No.	Dia. Inches	Lgth. Feet	Wt., Lbs. per 100
9505	$\frac{1}{2}$	5	320	9516	$\frac{5}{8}$	6	598
9506	$\frac{1}{2}$	6	395	9538	1	8	2132

GROUND RODS WITHOUT COPPER WIRE



Hot Galvanized

Made of stiff, high carbon open hearth steel, with long sharp points. Unwired rods are provided with holes through the upper ends for attaching grounding wires. These holes are located one inch from ends of rods.

List No.	Diam. Inches	Length Feet	Wt., Lbs. per 100
9555	$\frac{3}{8}$	5	152
9556	$\frac{3}{8}$	6	196
9565	$\frac{1}{2}$	5	300
9566	$\frac{1}{2}$	6	360
9567	$\frac{1}{2}$	7	420
9576	$\frac{5}{8}$	6	600
9577	$\frac{5}{8}$	7	700
9578	$\frac{5}{8}$	8	800
9598	1	8	2167

SLATER GROUND WIRE CONNECTORS



Grounding Wires
Safety
Screw
Wrench

No. 7780

No. 7778

Slater Ground Wire Connectors

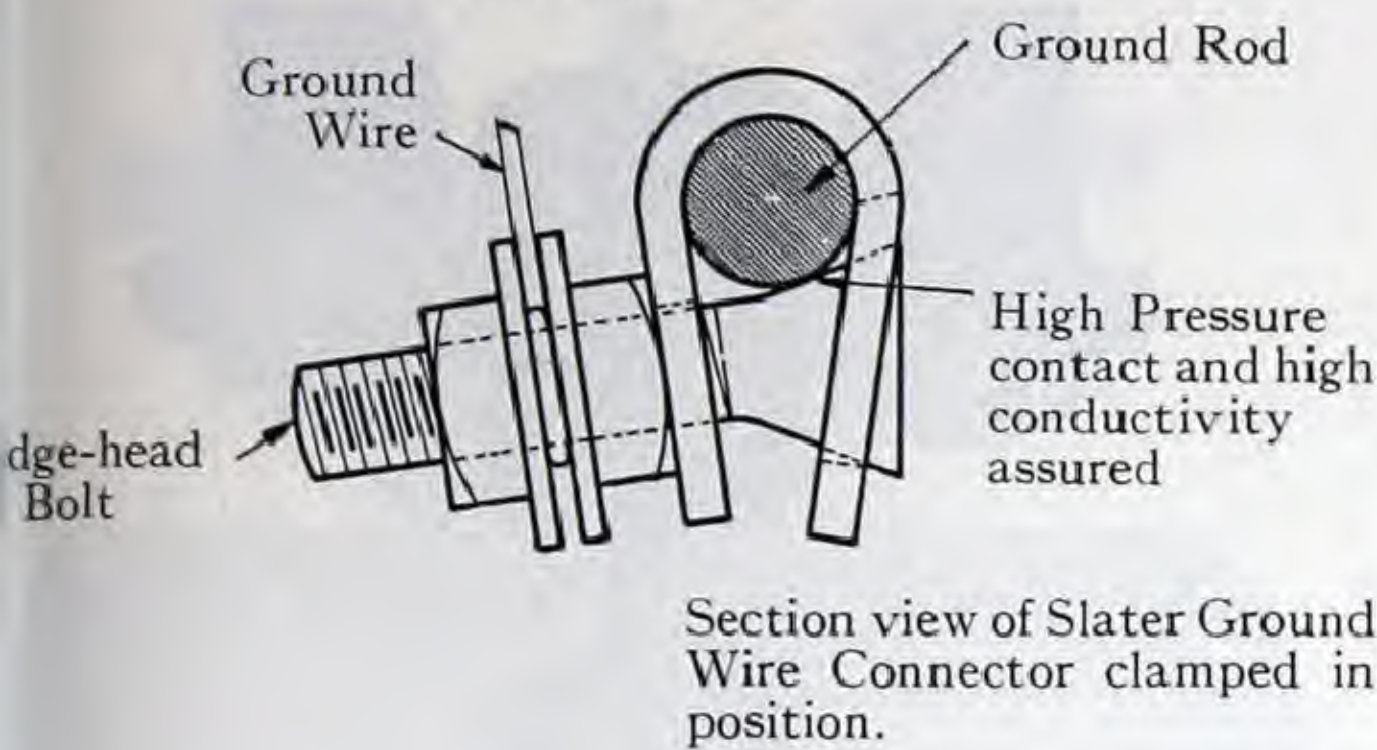
Slater Ground Wire Connectors were developed for attaching either solid or stranded grounding wires to ground rods. This method does away with the soldering of ground wire connections with the resulting uncertain joint. The connectors are made of high grade corrosion-resisting non-ferrous metal. The connection is made by the use of a safety set screw which cannot be tampered with after being tightened up but ground wires may be easily disconnected for test purposes, or adding wires, without cutting wires or re-soldering. One or more ground wires of the same or different sizes may be connected equally tight at the one time. Grounding in parallel is done without soldering with the minimum of labor. No. 7776 is specially designed to connect transformer secondary leads to the busses. No. 7780 is a special connector used with 4.0 solid wire with a one-inch Slater Copperweld Ground Rod.

Ten safety screw wrenches are furnished with every 10 clamps.

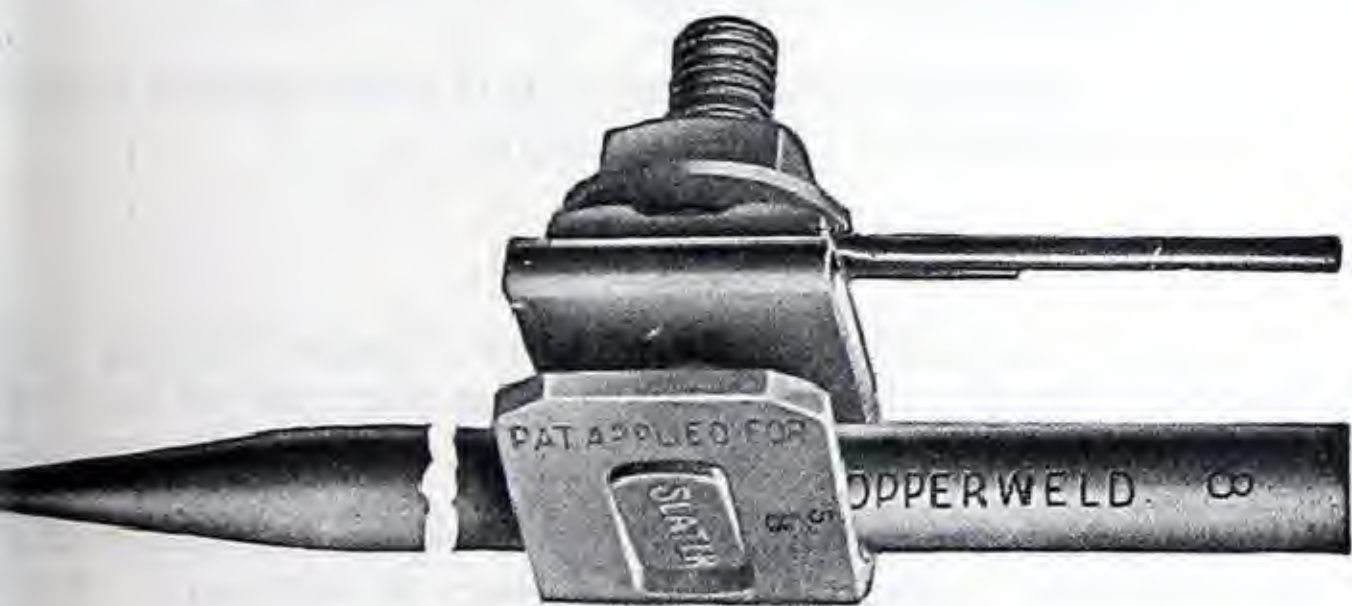
List No.	Diameter of Ground Rod in inches	Approximate Weight
7776	Transformer Connector	20
7777	$\frac{1}{2}$	21
7778	$\frac{5}{8}$	26
7779	$\frac{3}{4}$	27
7780	1	40

SLATER GROUND WIRE CONNECTOR

Hot Galvanized



The Connector consists of a "U" shaped steel band, a wedge-head bolt, two nuts and two round washers, all galvanized. One end of the band is slotted for the wedge-head of the bolt. The Connector can be slipped on the end of the Rod or, if it is burred, the bolt can be removed and the Connector installed at any point. As the inner nut is tightened the bolt-head is drawn into position between the Rod and the end of the slot insuring a perfect encircling contact between the head band and the Rod in addition to the high pressure contact of the wedge-head on the Rod. The second nut and washer are used to connect the ground wire. This can be loosened and the ground wire disconnected for inspection without loosening the Connector from the Rod. This is an obvious advantage.



Connectors Only

	Wt., Lbs. Per 100
for 1/2" Steel Rod	50
for 3/4" Steel Rod	70
for 5/8" Steel Rod	65
for 1" Steel Rod	77

For Copperweld Rods the steel band provides the mechanical strength and a copper liner and large bronze inner nut provide a path of high conductivity metal for the entire circuit. The bronze nut is recessed for the ground wire, held by a washer and outer nut. The ground wire can be disconnected for inspection at any time without loosening the contact on the Rod.

Connectors with Copper Liner and Bronze Nut

	Approx. Ship. Wt., lbs. per 100
for 1/2" Copperweld Rod	60
for 3/4" Copperweld Rod	80
for 5/8" Copperweld Rod	75
for 1" Copperweld Rod	87

SLATER GROUND WIRE CLAMPS

Hot Galvanized



The clamps illustrated will hold any size of wire from No. 8 solid to 7/16-inch stranded. A soft copper sleeve should be wrapped around copper and copper-clad steel wires to cover points of contact with the galvanized metal of the clamp.

The Style J Slater Clamp for bayonets has been very largely used. The ground wire can be strung through the clamps for several spans at a time and the clamps tightened after pulling up, which avoids the use of temporary snatch blocks.

For clamping overhead ground wires to steel towers, the Slater Style U Clamp is in general use. Two clamps are commonly used on each wire, in which case their holding power is more than the breaking strength of a 3/8-inch steel strand. Strands as large as 1/2-inch diameter are accommodated by the Style U Clamp.

List No.	Type	Bayonet Hole Spacing Inches	Wt., Lbs. per 100
6450	J	15/16	44
6451	U	1 1/2	70

Prices on application.

SLATER ROLLED STEEL GROUND WIRE CLAMPS

Hot Galvanized



Rigid Type No. 6455

The rolled steel clamps have a long smooth clamping surface with the ends belled to prevent cutting of ground wire. No. 6455 is furnished with a 1/2 x 2 1/2-inch machine bolt.

The No. 6454 Clamp, similar to No. 6455, is not furnished with a bolt, as a 3/8-inch through bolt is used both for attaching the clamp to the pole and tightening the clamp on the wire.

List No.	Size of Wire Inches	Length Inches	Approximate Shipping Wt. Lbs., 100 Pcs.
6454	No. 14 to 6 B & S	2	35
6455	5/16 to 1/2	2 1/2	120

SLATER GROUND ROD DRIVING TOOL



Showing the installation of a $\frac{3}{4}$ " Ground Rod with Slater Driving Tool.

The driving of an 8-foot or 10-foot ground rod, while standing on the ground, is no longer a difficult job.

Good practice in installing ground rods is to make a pilot hole with the digging bar, perhaps a foot deep, which gives a good start in driving a ground rod.

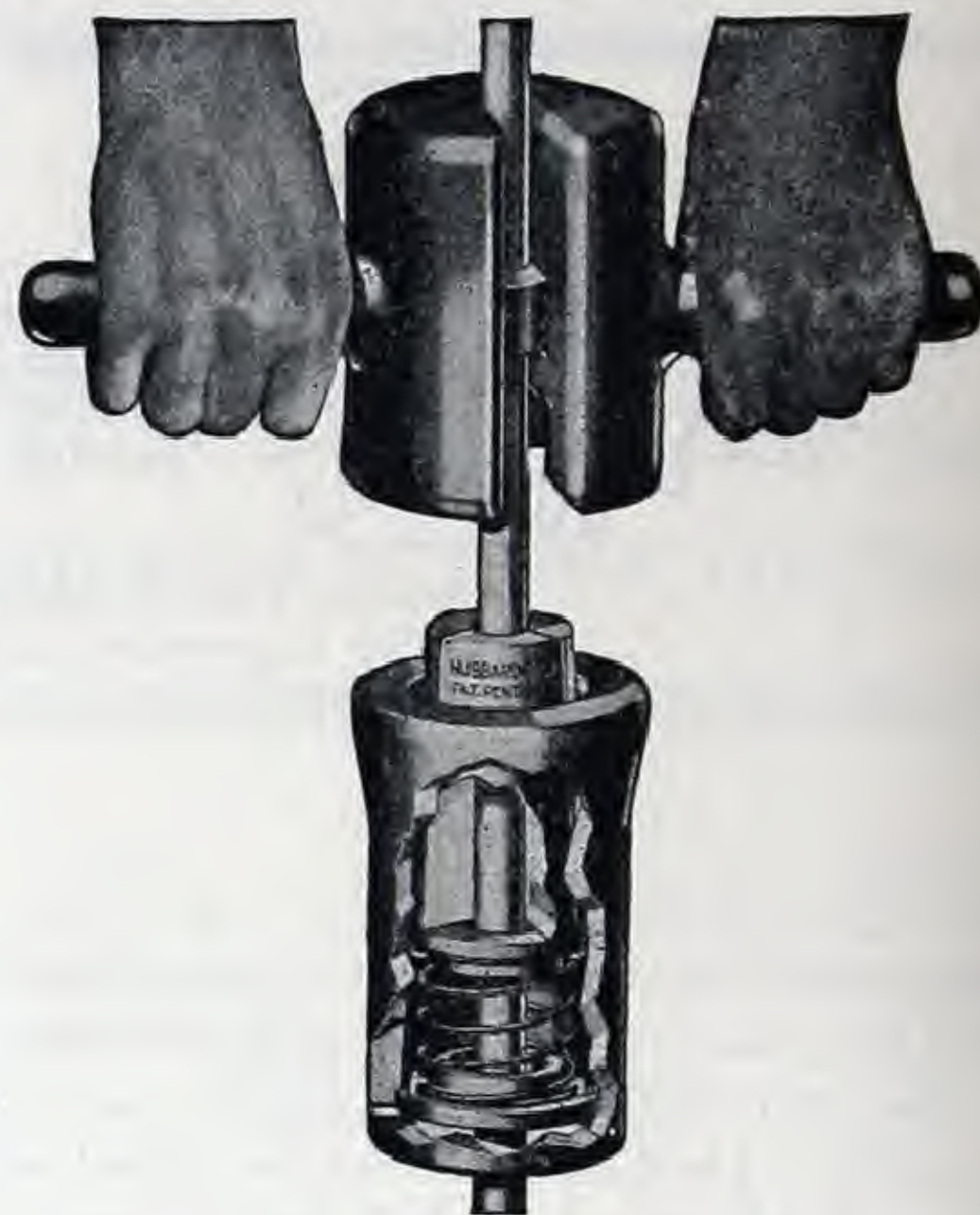
The Slater Driving Tool (No. 2005) is 40 inches long and is placed on the upper end of the ground rod before the rod is raised to the vertical position. With an 8 foot ground rod placed in the pilot hole, the lower end of the driving tool is only a few feet above the ground line. Even with a 10 foot ground rod, the driving tool is less than 6 feet above the ground line.

The driving tool is repeatedly raised a few inches and allowed to fall freely; replacing the heavy sledge hammer usually used to drive a ground rod. By driving the rod slowly there is less likelihood of bending.

The driving tool weighs 24 pounds and is suitable for $\frac{3}{4}$ " ground rods or smaller, either copperweld or all steel. Every line truck should be equipped with one of these economical tools.

List No.	Dimensions in Inches			Weight Pounds Each
	Outside Diam.	Inside Diam.	Length	
2005	1.9"	1.1"	40	24

SLATER IMPROVED GROUND DRIVER



This improved ground rod driver will drive any length rod with a minimum of effort, and with no damage to the rod itself. Briefly, its specifications are summarized as follows:

Hammer—Made of high grade malleable iron—ductile—withstanding severest of shocks without breakage. One face with recess for driving, the other face flat for releasing Chuck—force is always downward, both in driving and releasing Chuck.

Chuck—Malleable body with three manganese steel wedges. Wedges operate on a spring securely fastened—parts to come loose or fall out.

Carrier—Malleable iron. Fits over Hammer and Chuck and locks into position by twist of handle.

FEATURES

Wedges are smooth faced and have a large bearing surface on the rod, equally distributed. Rod is not marred or marked in any way.

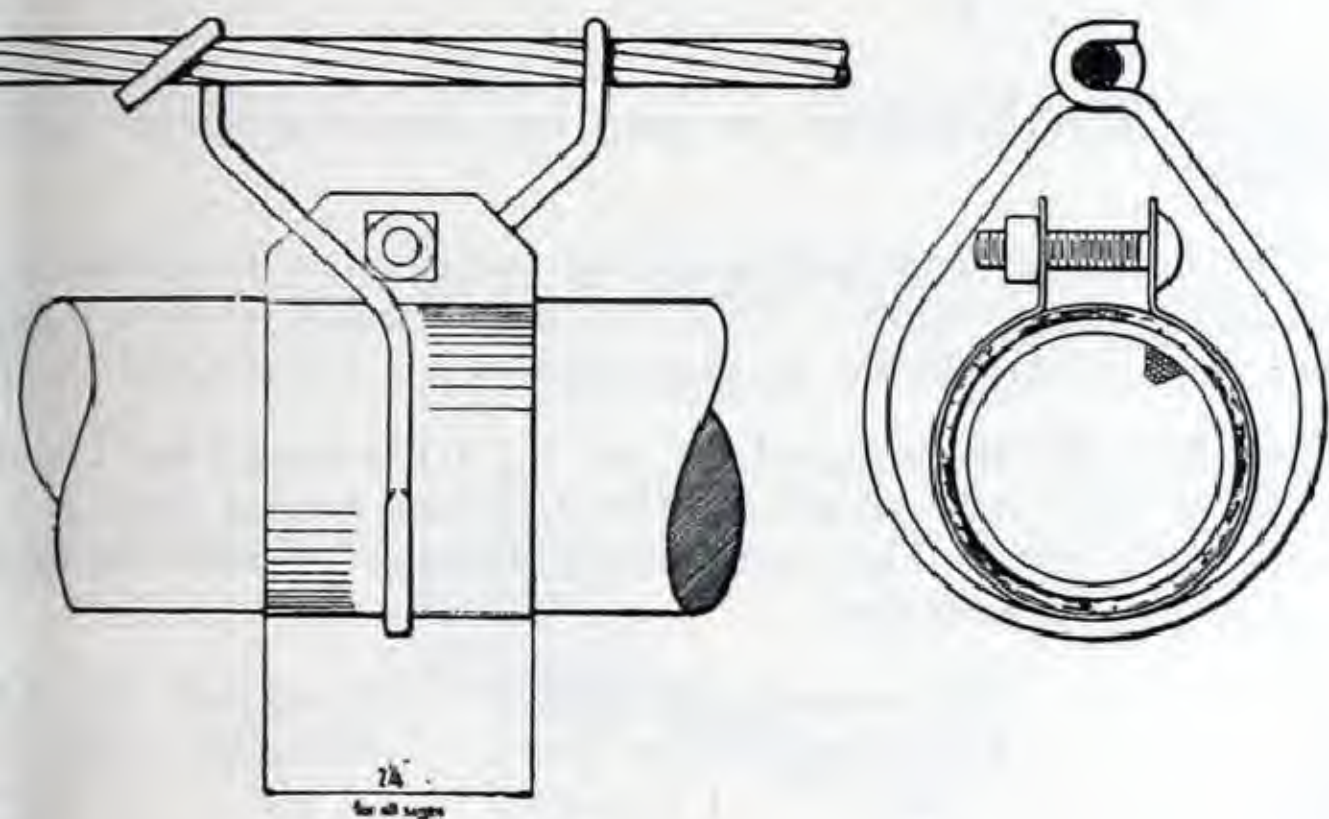
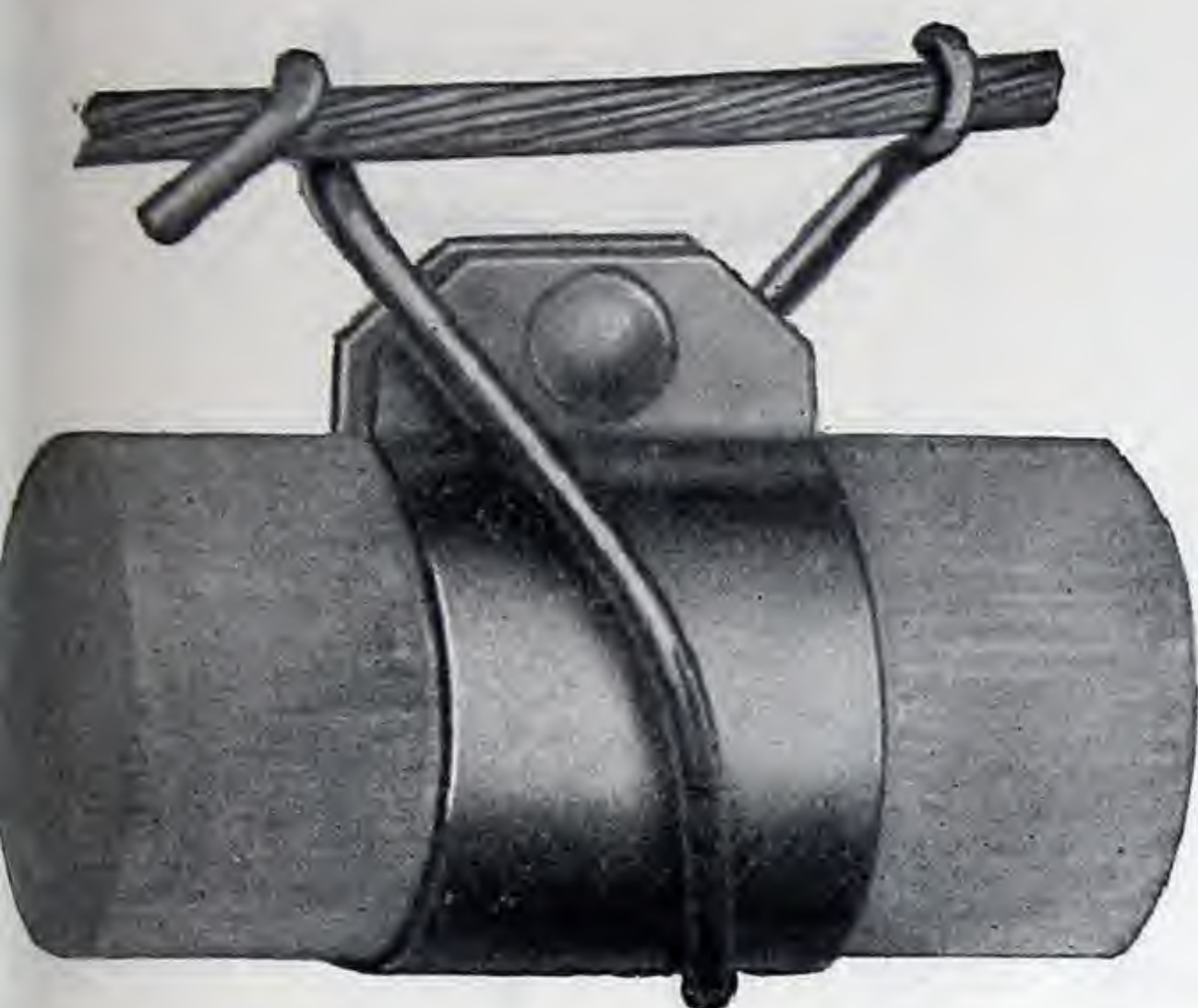
Chuck and Hammer are symmetrical; therefore, the blow is symmetrical, eliminating whipping of rod and, thereby minimizing the danger of bending.

Chuck can be operated at any height from ground, a very important factor, particularly in the case of long rods. Long rods can be driven with the Chuck close to the ground, leaving minimum unsupported length of rod between the Chuck and ground, reducing the possibility of bending. This feature makes it possible to drive long rods of small diameter. Large diameter rods can also be driven in ground where it is impossible to drive them with ordinary means.

Rods may be driven at any distance from the pole, in solid undisturbed earth, by one operator standing on the ground.

List No.	Item	Finish	Rod Diam. (Inches)	Approx. Shpg. Wt., Lb. Each
1220	Hammer	Black Enamel	$\frac{1}{2}$	22
1221	Hammer	Black Enamel	$\frac{5}{8}$	22
1222	Hammer	Black Enamel	$\frac{3}{4}$	22
1223	Hammer	Black Enamel	1	22
1224	Chuck	Black Enamel	$\frac{1}{2}$	11
1225	Chuck	Black Enamel	$\frac{5}{8}$	11
1226	Chuck	Black Enamel	$\frac{3}{4}$	11
1227	Chuck	Black Enamel	1	11
1228	Carrier	Black Enamel	..	4

ZINC CABLE SHIELDS



Made of sheet zinc, No. 18 gauge, .050" thick and is used clamping around lead-covered cable.

The shield is placed inside the cable ring to prevent injury to the sheath of the cable, which frequently occurs at the first, second and possibly the third ring position on each side of pole.

The shield is available in 6 sizes, all carried in stock. The length of the shield is 2 1/4" for all sizes.

No.	Used With Ring	Size of Cable (Outside Diam.)	Wt., Lbs. per 100
2 1/2 A	2 1/2	1 21/64 to 1 1/2	18
2 1/2 B	2 1/2	1 33/64 to 1 11/16	20
2 1/2 C	2 1/2	1 45/64 to 1 15/16	21
3 A	3	1 15/16 to 2 3/16	34
3 B	3 1/2	2 3/16 to 2 7/16	36
3 1/2	3 1/2	2 7/16 to 2 5/8	40

SLATER UNIVERSAL MESSENGER HANGERS

Hot Galvanized

Universal hangers are forged from open hearth steel with a specially curved groove, which allows them to be used at corners as well as on straight runs. Two 1/2-inch high carbon steel guy clamp bolts clamp the messenger securely at each pole. The hanger is mounted to the pole by a 5/8-inch through bolt and a 1/2-inch lag screw.



List No.	Dimensions in Inches Size Steel	Length of Legs	Wt., Lbs. per 100
8911	2 x 1/2	4 7/8 x 4 1/4	300
8912	1 3/4 x 3/8	4 7/8 x 4 1/4	230

Prices on application

SLATER NON-BREAKABLE MESSENGER HANGERS

Hot Galvanized

The Non-breakable Hanger is one of the most economical to install. It is placed on a standard 5/8-inch through bolt, requiring no extra nuts, and the vertical finger keeps the messenger in place while it is being pulled taut, after which the strand is dropped into the groove and the nut set up. It is made of malleable iron, with back curved to fit the pole, has a long clamping surface, and supports the cable well away from the pole.



List No.	Size Messenger Cable Inches	Wt., Lbs. per 100
8914	5/16 and smaller	150
8915	3/8 and larger	150

Prices on application

SLATER METAL SIDE BLOCK



The Slater No. 141 Side Block is made of sheet steel, galvanized, with an oil impregnated wood cob. The weight of this metal side block is 1/3 less than the all wood side block, and the strength is approximately 60% greater.

The metal side block cannot split during installation or due to frost—and has a 100% salvage value.

No. 141

Price on application.

STEEL TELEPHONE BRACKETS

Hot Galvanized



No. 9202



No. 9204



No. 9200

For running twisted telephone wires on poles the No. 9202, the A. T. & T. Co.'s standard bracket, is used by nearly all telephone companies.

The corner bracket is used where the lead from the pole comes to the building at an angle.

One Slater No. 9226 or Thomas No. 6062 knob with a No. 9603 machine bolt or two knobs with a No. 9605 1/2 machine bolt, listed below are used with these brackets, but not included in the price.

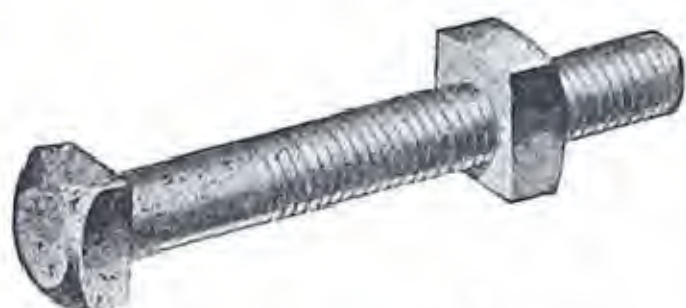
The No. 9200 is the standard house bracket of the A. T. & T. Co. for dead ending twisted telephone wires on buildings.

The Slater No. 9225 or Thomas No. 6061 knob and No. 9232 bolt, are used with this bracket, but not included in the price.

List No.	Style Bracket	Size of Holes	Dimensions in Inches			Wt., Lbs. Per 100
			Size of Steel	Length of Legs		
9202	L Pole	1 1/2	2 x 1/4	3 x 3 3/4		87
9204	Corner	1 1/2	1 7/8 x 7/8	3 x 5 5/8		80
9205	Corner	1 1/2	1 7/8 x 7/8	2 7/8 x 10 1/8		90
9206	Corner	..	1 1/2 x 3/16	2 1/2 x 4 3/4		60
9207	Corner	..	1 1/2 x 1/4	2 1/2 x 4 3/4		110
9200	L House	7/16	1 3/4 x 3/16	2 7/8 x 3 1/4		51

Bolts for Telephone Brackets

Hot Galvanized



These bolts are used for attaching porcelain knobs to Slater telephone brackets.

	Dimensions in Inches		Wt., Lbs. Per 100
	Diameter	Length	
Stove Bolt.....	5/16	2	6
Machine Bolt.....	3/8	3	13.1
Machine Bolt.....	3/8	5 1/2	20.00

SLATER TELEPHONE KNOB SCREW

Hot Galvanized



No. 2920

For twisted telephone pairs and for lighting wires the No. 2920 is used extensively, but for the latter should only be used in locations not visited by snow and sleet.

The No. 2927 white glazed porcelain knob is used with this fixture. The screw is 5/16-inch in diameter and 2 1/2 inches long.

List No.	Type	Size of Screw Inches	Wt., Lbs. per 100
2920	Screw	5/16 x 2 1/2	44

Prices on application.

SLATER BREAK ARM BRACKETS

Hot Galvanized



No. 224



No. 231

Break Arm Brackets are used for breaking series lighting circuits.

The strongest and most popular break arm brackets is the No. 231 presteel type. This bracket is made of No. 9 gauge steel, and is adjustable to cross arms 4 x 5 inches and smaller.

The No. 224 is designed for use on arms bored for 1 1/2-inch insulator pins, the shank of the bracket fitting into the insulator pin hole. This bracket should not be used for heavy long span construction.

List No.	Dimensions in Inches Spacing	Size Steel	Standard Bundle	Wt. Lbs per 100
224	12	1 Channel	10	240
231	12	9 ga. Sheet	10	360

Prices on application.

SLATER PRESTEEL CORNER BRACKET

Hot Galvanized



No. 242



No. 150

These Brackets are designed for attaching service wires the corner of buildings. They are the same weight and strength as the Slater Light Presteel Brackets. The long straps, bent to fit the corner of the building, are provided with a 1/2-inch hole and a 1/2 x 1/16-inch slot on each side. No. 342 is a three-p bracket.

List No.	Extension	Dimensions in Inches Channel	Holes	Spacing	Standard Bundle	Wt. Lb per 10
150	3 1/2	No. 12 Ga.	1 1/2	..	25	80
242	3 3/4	3/4	1 1/2	9	20	180
342	3 3/4	3/4	1 1/2	6 1/2	20	260

Prices on application.

SLATER BRIDLE RINGS

Hot Galvanized

These rings are used for carrying twisted pair wires, for either inside or outside use.

Type	Diam. of Ring	Length of Shank	Net Weight Per 1000	List Price Per 1000
E	5/8"	1"	25 lbs.	\$ 13.77
	5/8"	6"	50 lbs.	90.00
C	1 1/4"	1 7/16"	95 lbs.	30.00
	1 1/4"	6"	160 lbs.	120.00
A	1 5/8"	1 7/16"	100 lbs.	33.75

DRIVE RINGS

Hot Galvanized

These Drive Rings are usually used for inside use, carrying twisted wires.

Dimensions in Ins. of Ring	Approximate Weight, Lbs. 1000 Pieces
1/2	16



Side View Front View

ANGLE SCREWS

Galvanized



For attaching knobs for drop wiring on wood or stone structures. On brick or stone, use Slater Expansion Bolts.

Type	Diameter Wire	Dimensions Length of Screw End	Length of Shank	Weight per 100
5/8"	5/8"	2 1/4"	2 1/4"	12 lbs.
3/8"	3/8"	2"	3 1/2"	20 lbs.

Insulator not included.

INSULATED SCREW EYE



The porcelain ring has a diagonal opening which allows the easy insertion of wires and when pulled taut they cannot become released from the ring. The porcelain is glazed on the interior surface of the ring and on the surfaces of the slot. The steel Screw Eye is "Slater" Galvanized by the Hot-Dip process. Put up in containers of 100.

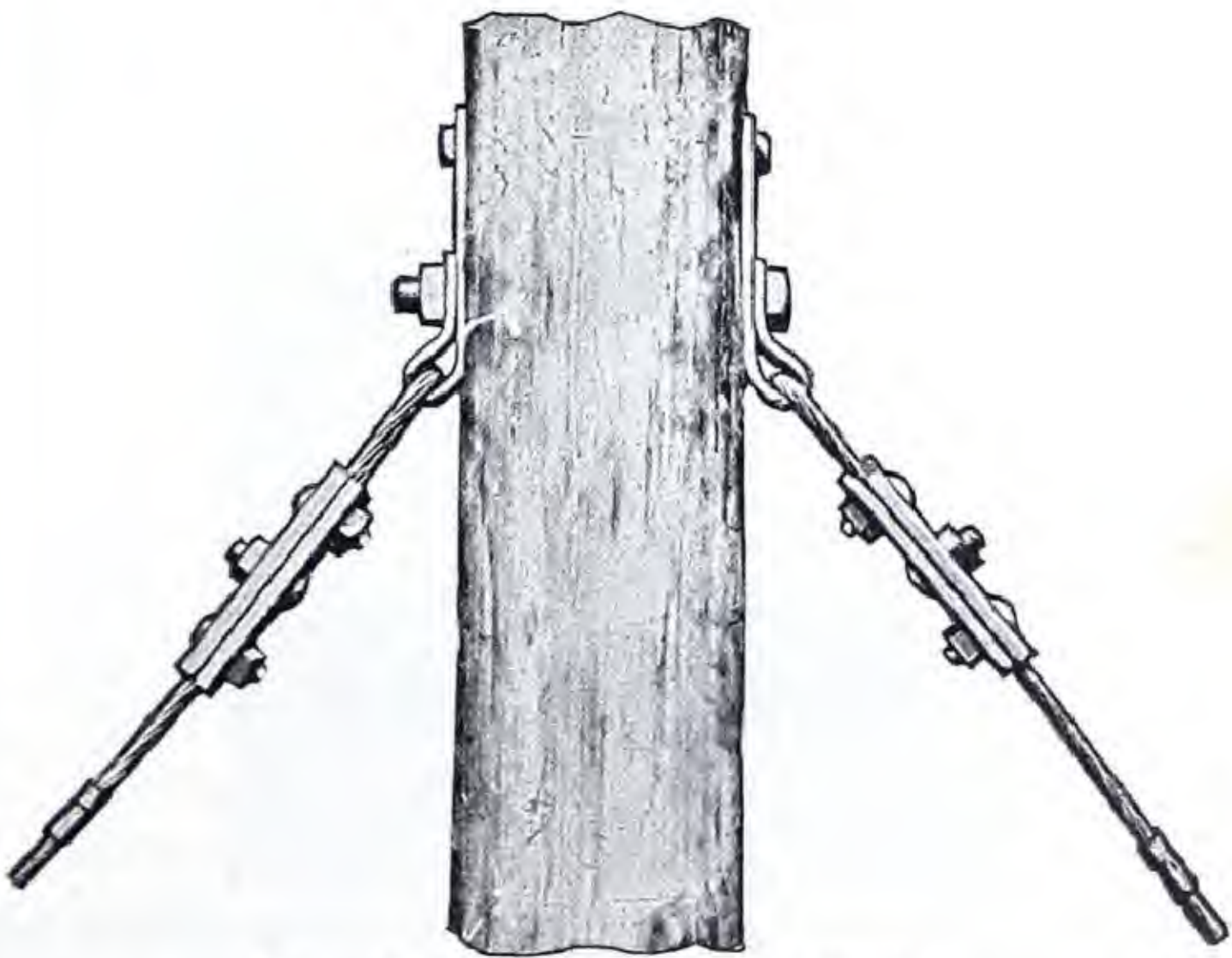
Type	Eye	Opening	Shank	Steel	Weight per 1000
3/8"S	5/8"	9/32"	1"	1/4"	85
3/8"L	5/8"	9/32"	2"	1/4"	95
1"S	1"	9/32"	1 1/8"	1/4"	175
1"L	1"	9/32"	2 1/8"	1/4"	200

Put up in containers of 100.

STORM GUY STRAP



No. 2063 Storm Guy Strap



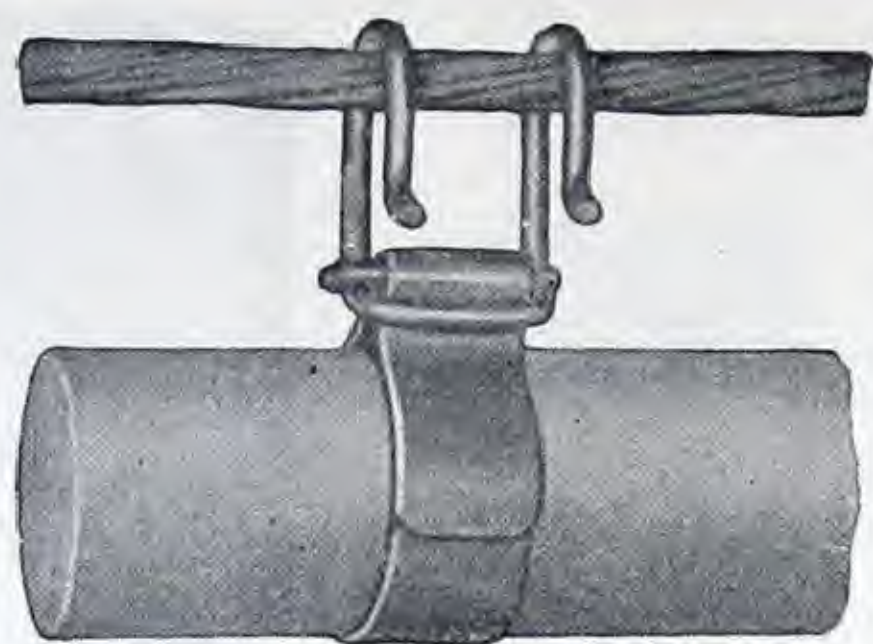
Complete Storm Guy Installation

The storm guy strap is installed with three bolts and a lag screw. Storm guying usually requires two straps as illustrated above.

The strap is made of 1/4" x 1 1/2" very special steel for strength, forged accurately to a curvature suitable to accommodate the guy strand.

List No.	Description	Wt., Lbs. Per 100
2063	Storm Guy Strap	100

SLATER BOSTON CABLE HANGERS



No. 2271 Installed



Boston Cable Hanger No. 2271, as shipped.

The Boston cable hanger is used for two special applications:

1. In short, slack spans of cable between a building and the first pole of the lines.
2. In the long spans to prevent sheath injury at the first, second and possibly the third ring positions on each side of the pole.

Due to the tight fit on the cable, the hooks will creep along the messenger strand if the cable moves due to temperature changes.

The strap section of this hanger is made of zinc $\frac{3}{4}$ " wide which is threaded through the hook and locks securely due to the weight of the cable.

The hook is formed of steel wire, hot galvanized.

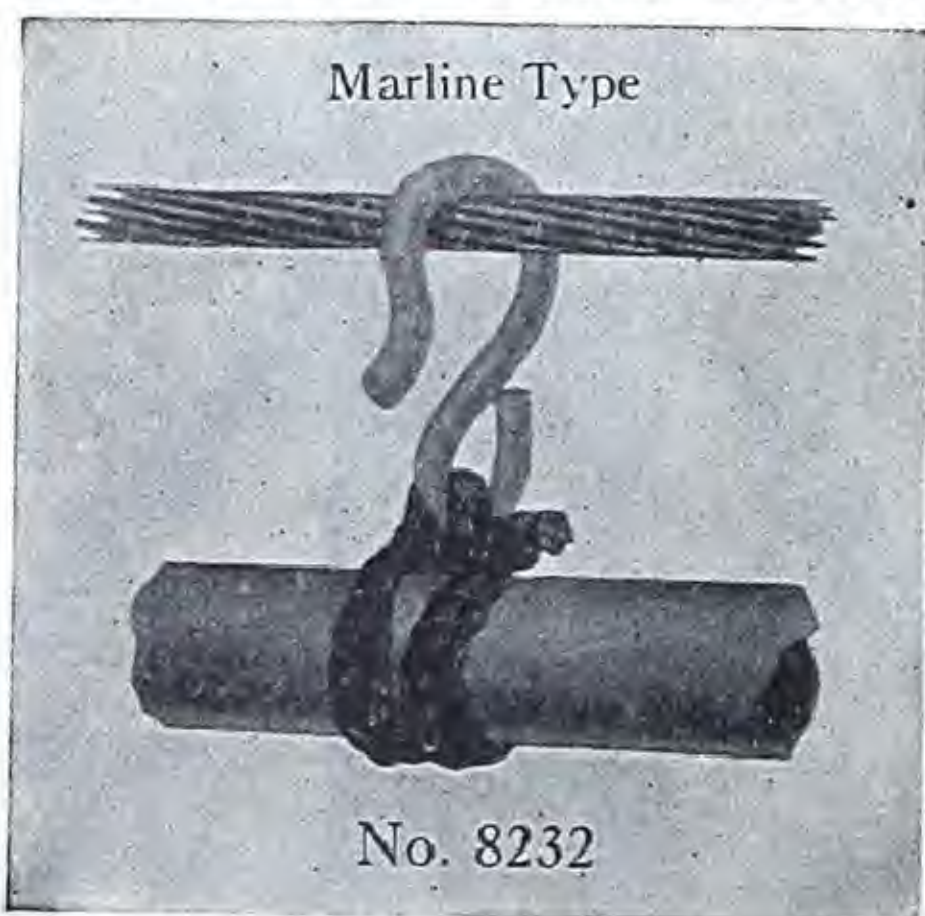
They are available in two sizes:

No. 2271 for $1\frac{1}{2}$ " rings for maximum size cable of 1" diam.

No. 2277 for 2" rings for maximum size cable of 1" diam.

List No.	Description	Length of Hook, Inches	Wt., Lbs. Per 100
2271	Complete hanger	For $1\frac{1}{2}$ " rings	$6\frac{1}{2}$
2277	Complete hanger	For 2" rings	8

SLATER MARLINE TYPE CABLE RINGS



No. 8232

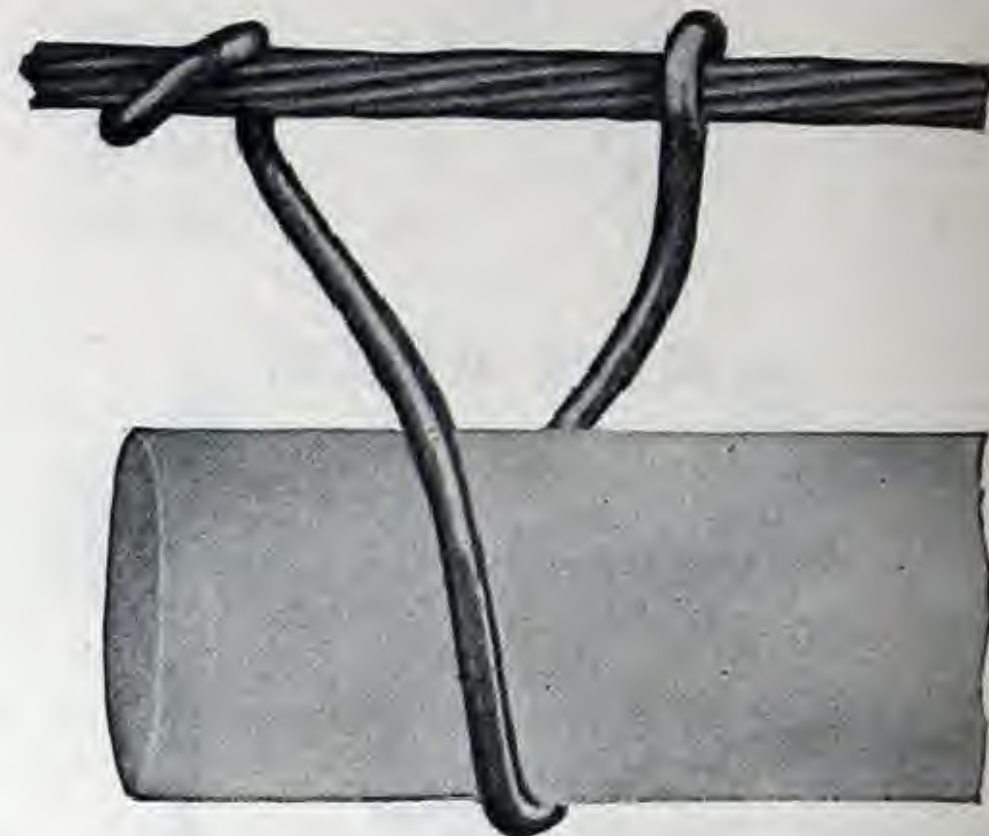
These hangers are made from the best grade of three-ply Marline, the knot carefully tied with knot ends at least $\frac{1}{2}$ -inch long and the loops are accurate in length.

The hooks are made from No. 7 gauge steel wire, or can be made from No. 7 gauge Copperweld wire.

List No.	Size	Length of Loop, Inches	Material	Approx. Shipping Wt., Lbs. 100 Pcs.
8229	25 pair	9	3-Ply Houseline	3.5
8231	50 pair	11	3-Ply Houseline	3.7
8232	75 pair	12	3-Ply Houseline	3.8
8234	100 pair	14	3-Ply Houseline	4.0
8235	150 pair	15	3-Ply Houseline	4.2
8236	200 pair	16	3-Ply Houseline	4.5

SLATER NATIONAL CABLE RINGS

Slater National Cable Rings are made of a high carbon spring steel wire, hot galvanized after forming. A flattened tread is provided, which has no sharp edges of any kind to abrade the cable. They are easily and rapidly attached to the messenger by hand. Slater National Cable Rings are self locking. The spring tension of the wire holds them in position. They positively will not creep.



A new feature of the Slater National Cable Ring is the longer hook which now completely encircles the wire.

Slater National Cable Rings are also made of genuine Copperweld wire in all the standard sizes.

The extra long cable ring, is used to suspend a second cable below the original cable on an existing messenger strand.

Both the standard and the extra long cable rings are also available in the flat ribbon wire.

SLATER NATIONAL CABLE RINGS

List No.	Size	Weight, lbs. Per Thousand	Stand. Pkg. Contains	Strand Size
2161 $\frac{1}{2}$	$1\frac{1}{2}$ "	55	2000	Made in al
2162	2"	80	1000	Strand Size
2162 $\frac{1}{2}$	$2\frac{1}{2}$ "	98	1000	
2163	3"	120	500	Specify Siz
2163 $\frac{1}{2}$	$3\frac{1}{2}$ "	135	500	Desired

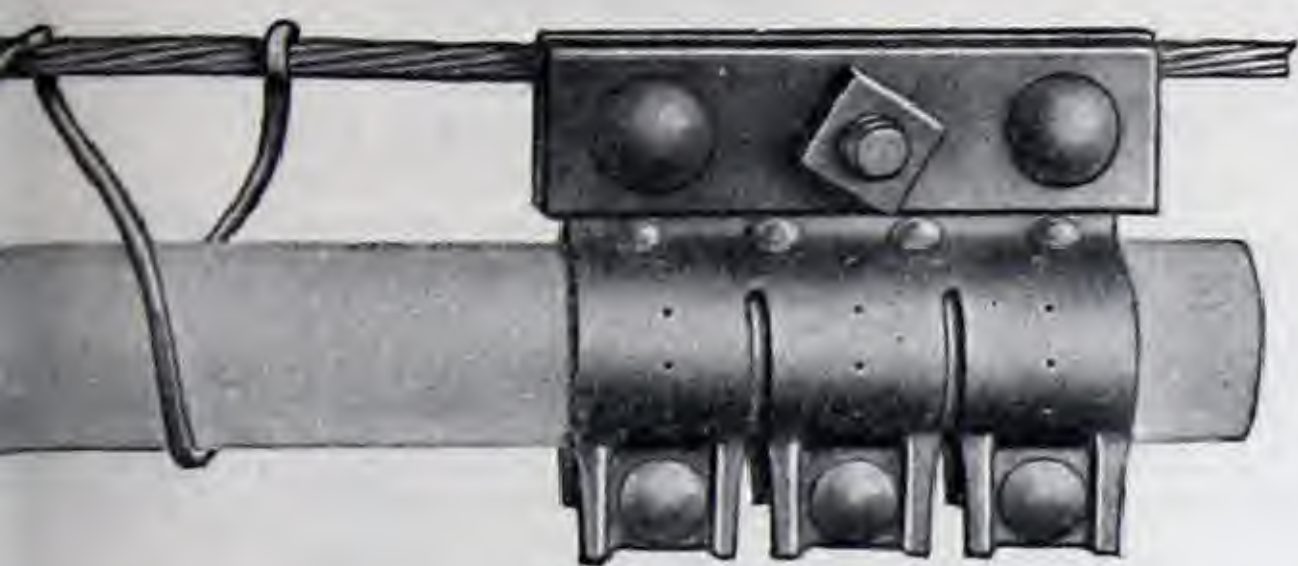
SLATER NATIONAL COPPERWELD CABLE RINGS

List No.	Size	Weight, lbs. Per Thousand	Stand. Pkg. Contains	Strand Size
2171 $\frac{1}{2}$	$1\frac{1}{2}$ "	50	1000	Made in al
2172	2"	84	1000	Strand Size
2172 $\frac{1}{2}$	$2\frac{1}{2}$ "	94	1000	
2173	3"	112	1000	Specify Siz
2173 $\frac{1}{2}$	$3\frac{1}{2}$ "	122	1000	Desired

SLATER NATIONAL EXTRA LONG CABLE RINGS

List No.	Size	Weight, lbs., Per Thousand	Standard Pkg. Contains	Length, under Strand	Strand Size
2181 $\frac{1}{2}$	$1\frac{1}{2}$ "	110	500	$4\frac{3}{4}$ "	Made in a
2182	2"	155	500	$5\frac{1}{4}$ "	Strand
2182 $\frac{1}{2}$	$2\frac{1}{2}$ "	200	250	$6\frac{3}{4}$ "	Sizes.
2183	3"	230	250	$7\frac{1}{2}$ "	Specify Si
2183 $\frac{1}{2}$	$3\frac{1}{2}$ "	250	250	8"	Desired

GRADE CLAMPS



Water Grade Clamp No. 2094 Shown in Use with a 2 1/2" National Cable Ring on a 2" Overhead Cable.

It is often necessary to run overhead cables up inclines or hills. In order to prevent the creeping of the cable through the cable rings, in such cases, these Grade Clamps are clamped around the cable and the messenger strand. The Grade Clamp thus prevents the motion of the cable relative to the messenger strand.

These Grade Clamps are made of pressed steel and are used in conjunction with a heavy duty (No. 7461) Guy Clamp, which grips the messenger strand, as illustrated.

These Grade Clamps are available in three sizes, and are selected according to cable diameter.

Item	Cable Diameter	Weight Lbs. per 100 pcs.
Grade Clamp	1 1/2"	100
Grade Clamp	1 11/16"	100
Grade Clamp	1 13/16"	100

Note—The list number does not include the Guy Clamp.

SLATER-NATIONAL

NI-CO-PRESS SPLICING SLEEVE

Name explained—

Ni for Nichrome, a particularly hard metal alloy that bites into sleeve and conductor making the joint absolutely air and moisture-proof.

Co for copper, of which the sleeve is made assuring high conductivity.

ESS Press for pressure which gives to the splice the necessary holding power.

The Ni-co-press sleeve is made exactly to size, from the best grade of seamless copper tubing, thoroughly annealed, and coated on the inside with nichrome, an especially hard metal alloy which is blown into the sleeve in a molten state, and under pressure and in cooling takes the form of a coating of molecular crystals, considerably harder than the sleeve or conductor.

By a pressing operation, with the tool, the Nichrome is pressed into both the sleeve and conductor, so tightly that the splice cannot possibly pull out and air and moisture cannot enter. This assures not only perfectly tight joints but also prevents corrosion and any possibility of high resistance. Actual tests have proven that the conductivity is actually improved.

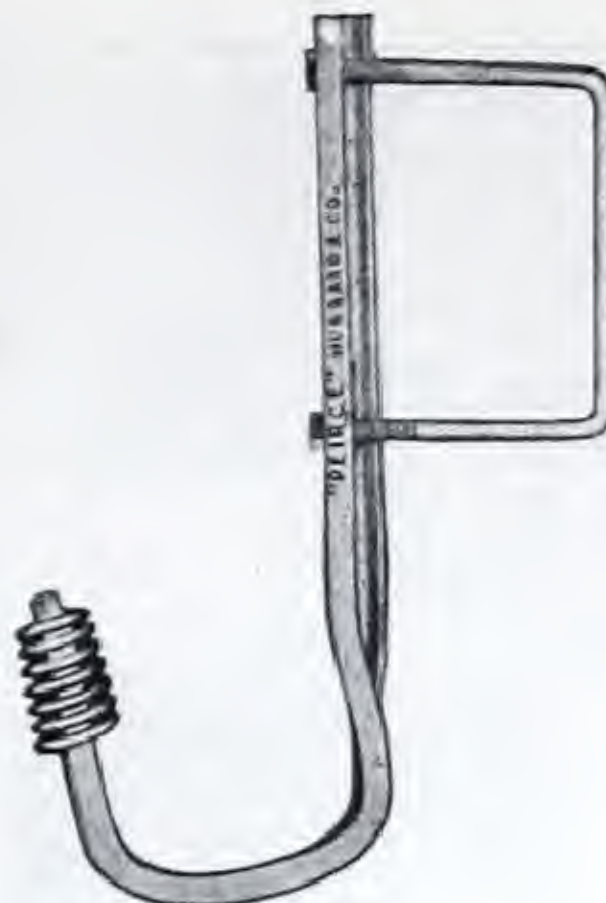
The complete splice is smooth on the surface and there is no snag in pulling over cross-arm, etc.

The splice is made by the use of a simple tool, easily handled by the lineman on the ground or at the top of the pole.

The Ni-co-press splicing tool is the result of long experimentation and tests. It meets not only all technical requirements but is simple and practical in use.

SLATER TRANSPOSITION BRACKETS

Hot Galvanized



No. 111

The bracket method of transposing wires originated in the Slater line, and also the idea of bolting brackets around instead of through the arm.

Bracket No. 111 is adjustable for cross-arms 3 1/4 x 4 1/4 to 4 x 5.

No. 111 is for long spans and heavy work.

All brackets are threaded for insulators having a standard 1-inch pin hole.

List No.	Dimensions in Inches Channel	U Bolt	Standard Bundle	Wt., Lbs. per 100
111	1	3/8	25	144

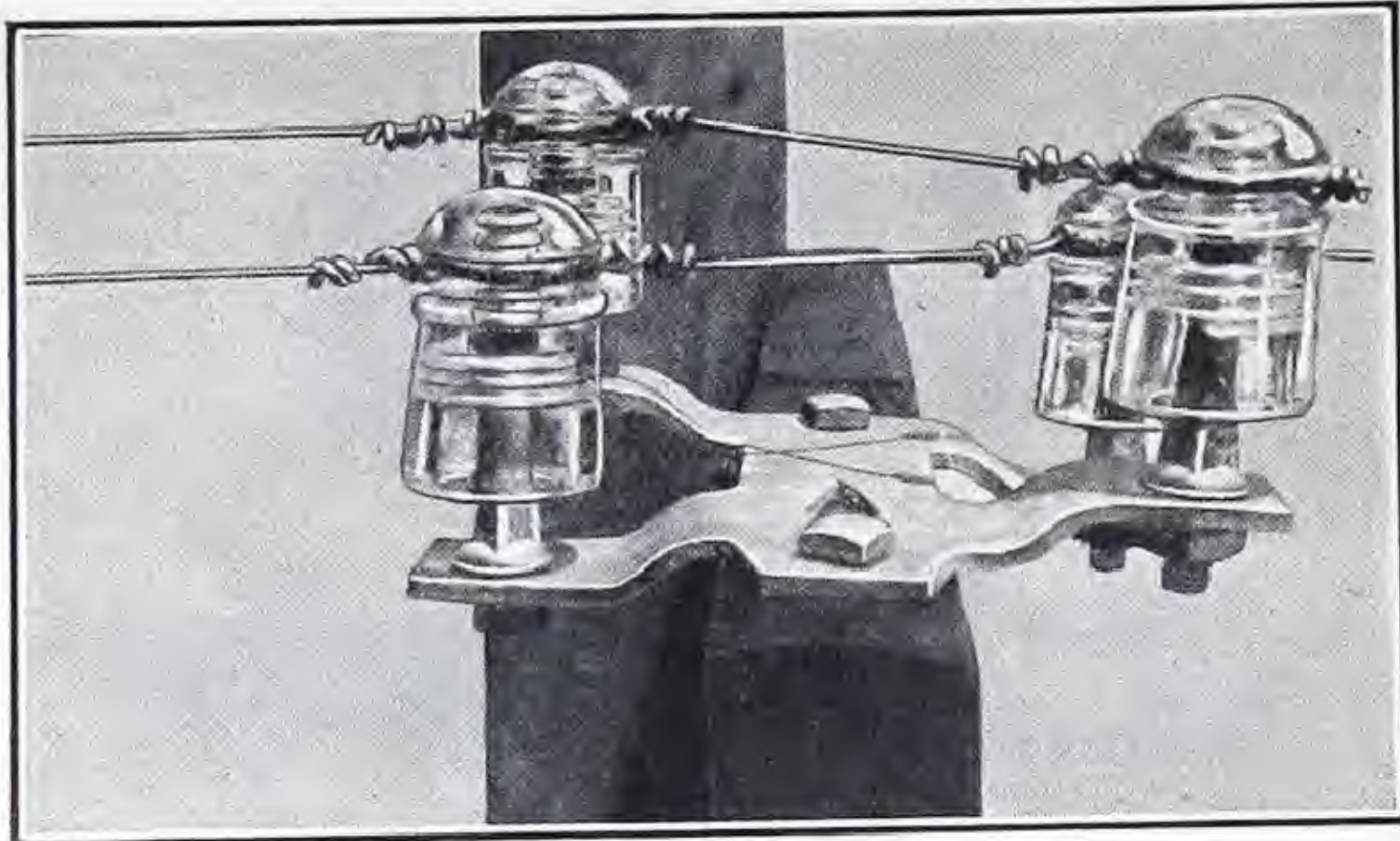
EVERYTHING

For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—
"A national electrical service."

TRANSPOSITION BRACKETS

Hot Galvanized



"Pointside" Transposition Bracket No. 2065
(Patented), made of one piece of formed steel sheet and uses
4 pins of equal length.

Due to the effect of mutual electro-magnetic induction, an alternating current flowing in one circuit will induce a voltage, and therefore a current, in any parallel circuit, even though there is no metallic connection between the two circuits. It is possible, however, by properly transposing suitable alternate lengths of the wires forming the two sides of each of the parallel circuits, to neutralize these effects. The more frequent the transpositions the more thoroughly are the effects—due to inequality in the spacing of wires and poles—eliminated. Transpositions cannot be made effective in eliminating inductive effects when either circuit is grounded, otherwise than at the neutral point.

The three transposition brackets described below are used for telephone circuits, and may be described as follows:

1. Pointside Bracket—A one-piece crossarm mounting bracket giving a 2-wire transposition. Wire spacing is $6\frac{1}{2}$ ".
2. Slater Transposition Bracket for crossarm mounting—a two-piece Transposition Bracket having wire spacing of $10\frac{1}{2}$ " or 12".
3. Boulian Type Transposition Bracket for pole mounting—wire spacing 34".

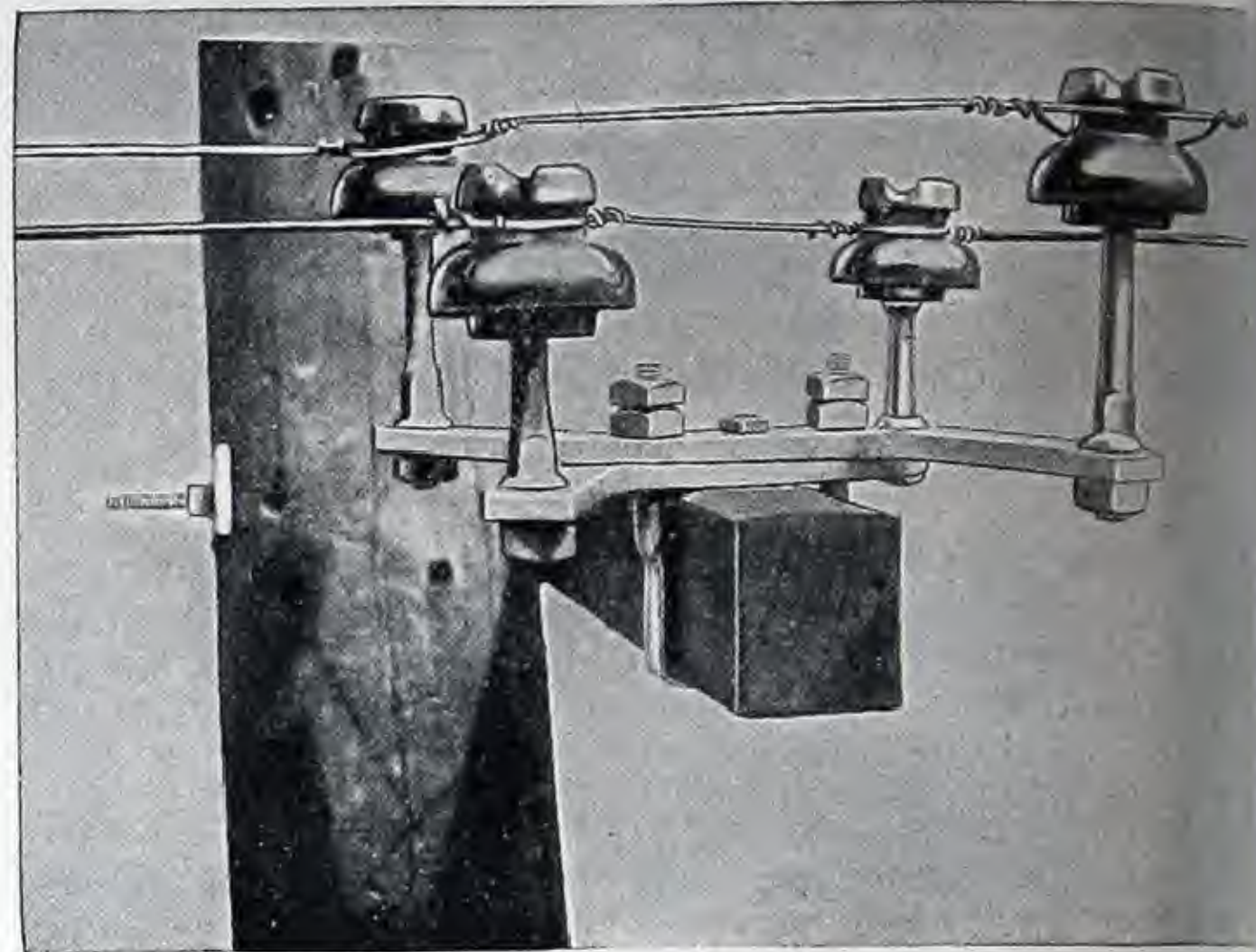
There is a Slater Transposition Bracket for every requirement in telephone or telegraph circuits. The Pointside Bracket has been used by the Telephone and Telegraph Companies for several years. This bracket is made in one piece and uses four standard steel pins with insulators. The two larger Brackets are more generally used by power companies whose telephone lines parallel their transmission lines. The Slater Transposition Bracket has been in use since 1928. This bracket consists of two S-shaped members held to the crossarm by a heavy U strap, and uses two lengths of standard forged steel pin, the difference in length being the crossarm clearance of the two wires.

The Boulian type Transmission Bracket is used on the wood pole of the Transmission line, and therefore requires greater wire spacing. The Bracket is sufficiently strong to

SLATER TRANSPOSITION BRACKETS

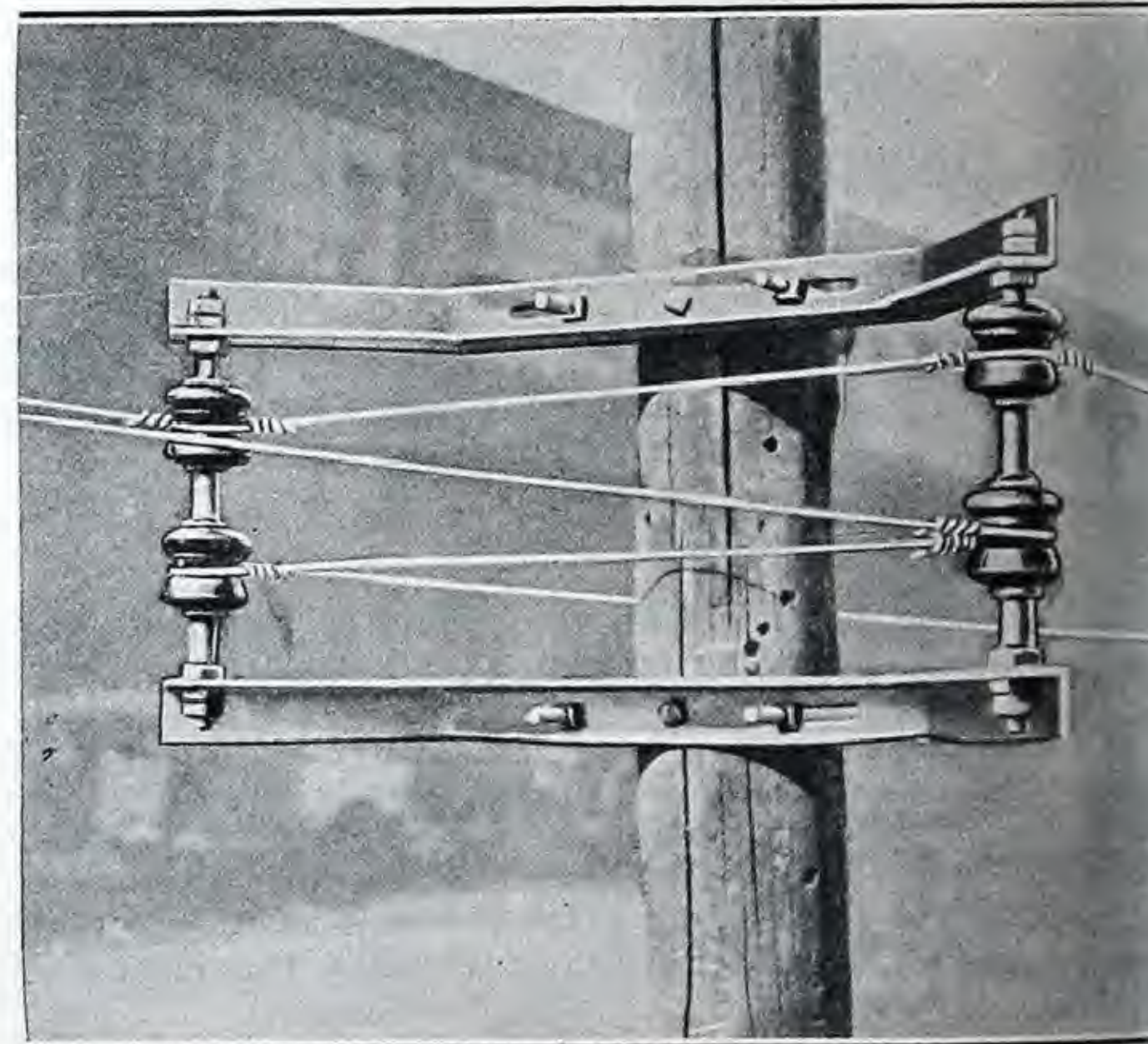
Hot Galvanized

(Continued)



Slater Transposition Bracket, No. 2077 (patented),
Wire Spacing $10\frac{1}{2}$ inches to 12 inches.

withstand the line strain under heavy loading conditions caused by the unbalanced load when one wire is broken. The spool type insulator is ideal for such a condition.



Slater Transposition Bracket, No. 2014 (Boulian Type)—
front view.

List No.	Trade Name	Wire Spacing	Weight in Pound Without Insulator
2065	Pointside	$6\frac{1}{2}$ "	9 lbs. each
2077	Slater Patent	$10\frac{1}{2}$ " or 12"	15 lbs. each
2014	Boulian Type	34"	45 lbs. each (use spool No. 16 weighing 190 lbs per hundred)

SLATER INSULATED FORKS

Hot Galvanized



By the addition of a standard $\frac{5}{8}$ -inch through bolt, lag screw or carriage bolt, the Insulated Forks illustrated may be converted into fork bolts.

Fork No. 8820 is made of $1\frac{1}{2} \times \frac{1}{2}$ -inch flat steel, formed so the head of the through bolt keeps it from turning. It is supplied with Insulator No. 357.

No. 641 is made of $1\frac{1}{4} \times \frac{1}{2}$ -inch channel steel and is provided with a square bolt hole, into which the square shoulders of a large bolt fit, preventing the fork from turning around on bolt. Insulator No. 357 is also furnished with this fork.

No. 561 Fork is made of $1\frac{1}{2}$ -inch channel and equipped with Insulator No. 355. A lag projecting out on each side of the bolt hole prevents the fork from turning.

Type	Kind of Bolt	Wt. Lbs. per 100
Flat Steel	$\frac{5}{8}$ -inch Through Bolt	118
Channel Steel	$\frac{5}{8}$ -inch Carriage Bolt	115
Channel Steel	$\frac{5}{8}$ -inch Through Bolt	240

Prices on application.

SLATER PORCELAIN INSULATOR FOR FORK BOLTS

Insulator No. 357 is made of dry process porcelain, brown glazed.

No.	Dimension in Inches	Wt. Lbs. per 100
357	Wire Groove Bolt Hole $\frac{11}{16}$ $\frac{3}{4}$	40

For wet process porcelain insulator see N.E. 9997.

Prices on application.



No. 357

SLATER PORCELAIN KNOBS FOR TELEPHONE BRACKETS



No. 9226 No. 9225

The Knobs illustrated are of dry process white glazed porcelain and are for use with the Telephone Brackets listed above.

Type	Dimensions in In. Diameter Bolt Hole Height	Wt. Lbs. per 100
Two-groove	$\frac{3}{8}$ $1\frac{1}{2}$	18
Four-groove	$\frac{1}{2}$ $2\frac{1}{4}$	33

Prices on application.

SLATER CORNER CONSTRUCTION BRACKETS

Hot Galvanized



No. 6727



No. 6725

These Brackets are used on lines equipped with suspension type insulators to give the desired clearance to the line wire on small angles.

A $\frac{1}{2}$ -inch link is sometimes used in the lower end of the bracket for attaching the insulator string and will be furnished when specified.

List No.	Size	Dimensions in Inches Spacing of Eyes Extension	Wt. Lbs. per 100
6727	$\frac{5}{8}$	12 12	353
6728	$\frac{3}{4}$	12 12	490

Prices on application.

$\frac{3}{4}$ -inch J Bolts for Corner Construction Brackets.

List No.	Length, Inches Inside of Hook to End of Bolt	Depth of Cross Arm	Wt. Lbs. per 100
6734	$6\frac{3}{4}$	4	125
6734 $\frac{1}{2}$	$7\frac{1}{4}$	$4\frac{1}{2}$	141
6735	$7\frac{3}{4}$	5	147
6736	$8\frac{3}{4}$	6	160

Prices on application.

This type of Bracket is used with metal cap suspension type insulators at angles or corners in lines using either suspension or pin type insulators on tangents. Two through bolts fasten the Bracket to the side of the pole, toward the "pull," and the string of insulators is attached to the $\frac{5}{8}$ -inch U Bolt shown.

The Bracket is made of $\frac{3}{8} \times 2$ -inch flat steel and extends 8 inches from the pole, with a bolt spacing of $14\frac{1}{8}$ inches.

List No.	Dimensions in Inches Size of Steel Hole Spacing	Wt. Lbs. per 100
6725	$\frac{3}{8} \times 2$ $14\frac{1}{8}$	700

Price on application.

SLATER REINFORCING LINK

Hot Galvanized



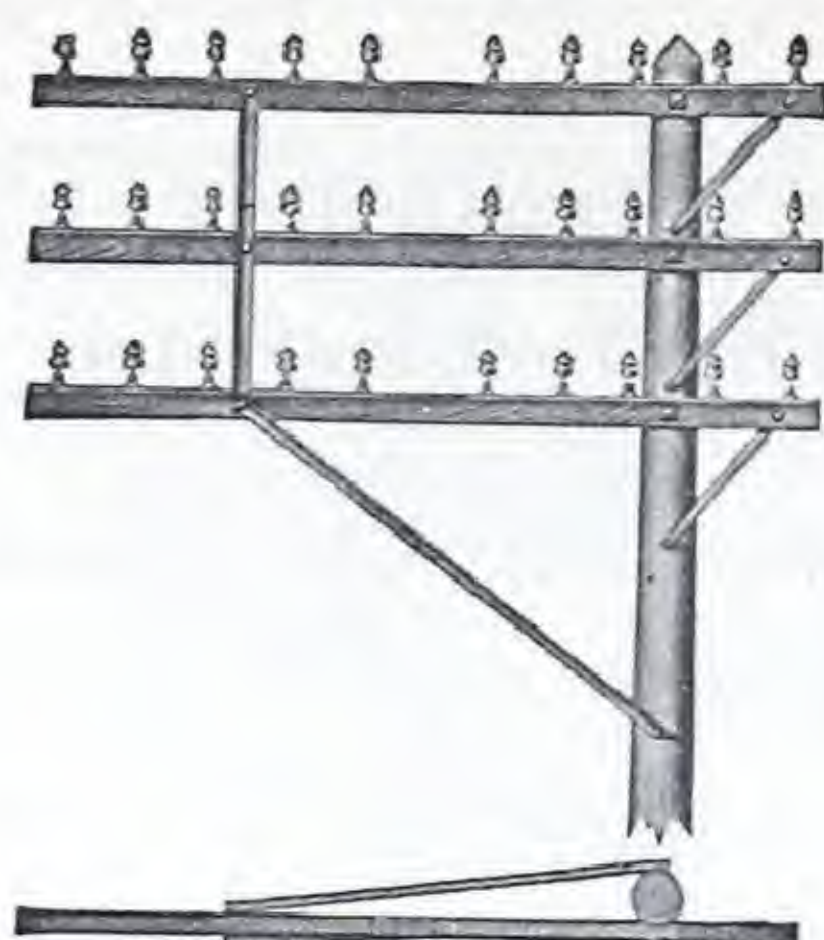
These links are used on each side of the cable suspension clamp to relieve side strains at corners in the line. They are bolted to the pole by $\frac{1}{2}$ -inch lag screws through the double eye after the links have been drawn tight against the messenger.

List No.	Dimensions in Inches Length Size of Steel	Wt., Lbs. Per 100
8929	$8\frac{3}{8}$ $\frac{1}{2}$	116

Price on application.

EXTENSION FIXTURES

Hot Galvanized



Where it is necessary to clear buildings or trees without the use of high poles, Extension Fixtures of the A.T. & T. Co. design furnish a very rigid and economical construction. They are designed for supporting either 6 or 10-pin arms.

The Vertical Brace is provided with holes for $\frac{1}{2}$ -inch bolts.

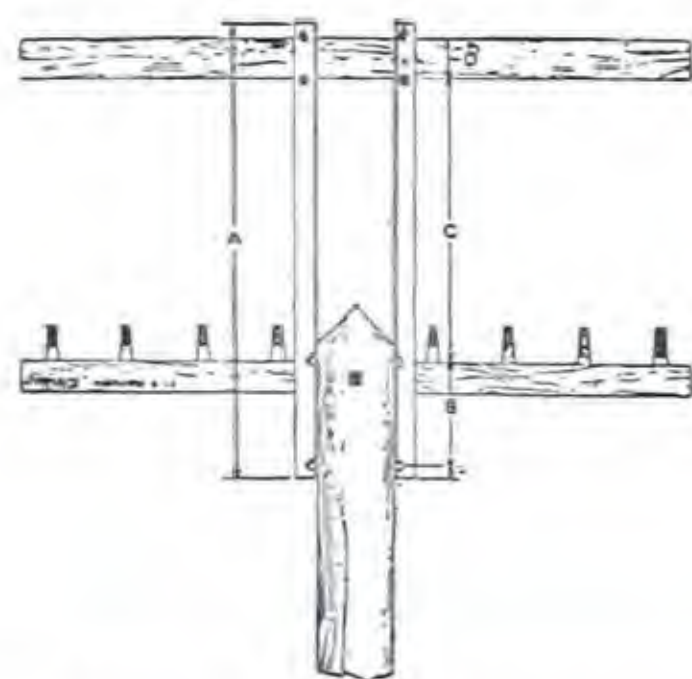
List No.	Description	Length Inches Overall	Size of Angle Inches	Wt., Lbs. Per 100
8050	Diagonal	83	2 x 2 x $\frac{3}{16}$	1750
8051	Back	54 $\frac{1}{2}$	2 x 2 x $\frac{1}{4}$	1350
8052	Back	66 $\frac{7}{16}$	2 x 2 x $\frac{1}{4}$	1665
8054	Vertical	30 $\frac{5}{8}$	1 $\frac{3}{4}$ x 1 $\frac{3}{4}$ x $\frac{1}{4}$	745

Prices on application.

*N. E. L. A. Standard.

SLATER POLE EXTENSIONS

Hot Galvanized



It is often desirable to attach electric light wires to telephone poles which do not have room for another cross arm.

Extension No. 2375 consists of two 3 x 3 x $\frac{1}{4}$ -inch angles, to which the electric light company's cross arm is clamped by two Slater cross arm straps.

The No. 2376 extension consists of two 3 x 3 x $\frac{1}{4}$ -inch angle steel legs and a cross arm of the same material, with four Slater No. 86 pins spaced, according to the National Electric Light Association specification, 30 inches between pole pins and 14 $\frac{1}{2}$ inches between side pins.

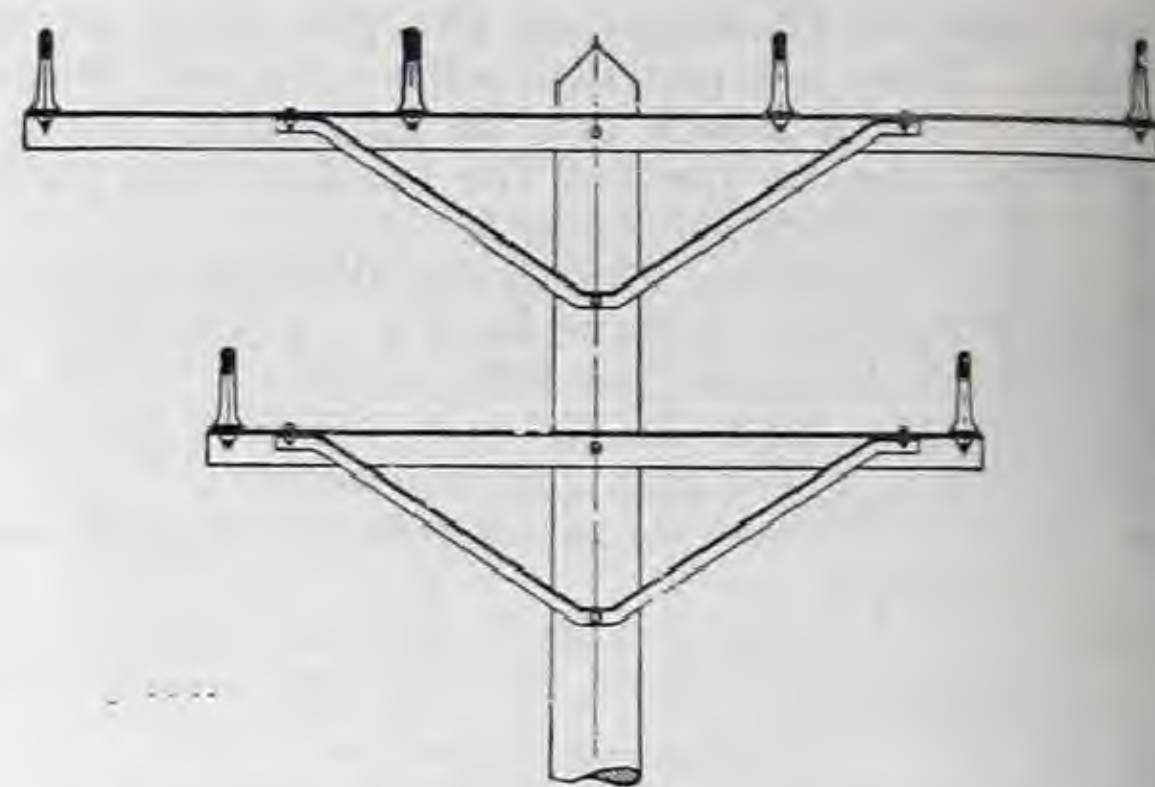
Both extensions have $\frac{11}{16}$ -inch holes for $\frac{5}{8}$ -inch through bolts, and one hole in each leg is slotted 1 $\frac{1}{2}$ inches long to provide for inaccuracy in boring holes in the pole tops. Neither through bolts, nor cross arm straps, are included in the prices of the extensions.

List No.	Description	Dimensions in Inches					Wt., Lbs. Each
		A	B	C	D	E	
2375	Angles only	70	24	37 $\frac{3}{4}$	4 $\frac{1}{4}$	2	57
2376	Complete	68	24	39	3	2	87

Prices on application.

SLATER ANGLE STEEL CROSS ARMS

Hot Galvanized



Angle Steel Cross Arms are made of new rolled open hearth steel and are uniform in strength. This uniform strength is retained throughout the life of the arm by a coating of pure zinc, put on by the double hot-dip galvanizing process.

Unless otherwise specified, holes will be of the following sizes: for through bolts, $\frac{11}{16}$ -inch; for brace bolts, $\frac{7}{16}$ -inch for flat braces and $\frac{9}{16}$ for angle braces; and for pins, $\frac{11}{16}$ -inch.

TELEPHONE ARMS

List No.	No. of Pins	Punched Length Inches	for Brace No.	Pin Spacing Pole Pins	Side Pins	Size Angle Inches	Wt. Lbs. Each
7602	2	20	8020	16	..	3x2x $\frac{3}{16}$	5
7604	4	40	8020	16	10	3x2x $\frac{3}{16}$	10
7606	6	60	8022	16	10	3x3x $\frac{1}{4}$	24
7608	8	80	8030	16	10	3x3x $\frac{1}{4}$	32
7610	10	100	8032	16	10	3x3x $\frac{1}{4}$	41

ELECTRIC LIGHT ARMS, N.E.L.A. PIN SPACING

List No.	No. of Pins	Length Inches	8120	30	Pin Spacing	Size Angle Inches	Wt. Lbs. Each
†7612	2	36	8120	30	...	3 x3 x $\frac{1}{4}$	14
†7614	4	65	8126	30	14 $\frac{1}{2}$	3 x3 x $\frac{1}{4}$	26
†7616	6	94	7940	30	14 $\frac{1}{2}$	3 $\frac{1}{2}$ x3 $\frac{1}{2}$ x $\frac{5}{16}$	56
†7620	8	117 $\frac{3}{4}$	7941	30	13 $\frac{5}{8}$	3 $\frac{1}{2}$ x3 $\frac{1}{2}$ x $\frac{5}{16}$	70

POWER TRANSMISSION ARMS

7622	2	28	8120	24	....	3	x3	x $\frac{1}{4}$	11
7632	2	40	8120	36	....	3	x3	x $\frac{1}{4}$	16
7642	2	52	8120	48	....	3	x3	x $\frac{1}{4}$	21
†7672	2	80	7940	74	....	3 $\frac{1}{2}$	x3 $\frac{1}{2}$	x $\frac{5}{16}$	48
7624	4	76	7950	24	24	3	x3	x $\frac{1}{4}$	31
†7634	4	116	7942	38	36	3 $\frac{1}{2}$	x3 $\frac{1}{2}$	x $\frac{5}{16}$	69

†N. E. L. A. Standard Pin Spacing.

SLATER CROSS ARM DISTRIBUTING BRACKETS

Hot Galvanized



No. 1116

The No. 1116 is used for transformer pole wiring and is attached to the cross arm by Slater drop forged cross arm straps, which are not included in the price. The long extension on this bracket keeps the primary leads clear of the cross arms.

List No.	Dimension in Inches	Standard Bundle	Wt. Lb. per 10
	Holes Channel Spacing		
1116	$\frac{9}{16}$ 1 $\frac{1}{4}$ 0	10	140

Prices on application.

SLATER TROLLEY POLE BANDS

For Attaching Span Wires to Tubular Poles. Made from $1\frac{1}{2} \times \frac{7}{16}$ inch Steel.



Two-Bolt Split Bands

Diameter of Pole, In.

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
324	4	4 $\frac{1}{2}$	205
324 $\frac{1}{2}$	4 $\frac{1}{2}$	5	220
325	5	5 $\frac{1}{2}$	235
326	6	6 $\frac{5}{8}$	255

Three-Bolt Split Bands

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
334	4	4 $\frac{1}{2}$	245
334 $\frac{1}{2}$	4 $\frac{1}{2}$	5	260
335	5	5 $\frac{1}{2}$	275
336	6	6 $\frac{5}{8}$	295



One-Bolt Solid Bands

Diameter of Pole, In.

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
214	4	4 $\frac{1}{2}$	160
214 $\frac{1}{2}$	4 $\frac{1}{2}$	5	172
215	5	5 $\frac{1}{2}$	185
216	6	6 $\frac{5}{8}$	210

Two-Bolt Solid Bands

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
224	4	4 $\frac{1}{2}$	200
224 $\frac{1}{2}$	4 $\frac{1}{2}$	5	212
225	5	5 $\frac{1}{2}$	225
226	6	6 $\frac{5}{8}$	250

SLATER INSULATED POLE BANDS



Insulated Pole Bands are in popular use for trolley work. They eliminate one splice on each attachment.

List Nos.	Nominal Diam. Pole Inches	Outside Diam. Pole Inches
7244	4	4 $\frac{1}{2}$
7244 $\frac{1}{2}$	4 $\frac{1}{2}$	5
7245	5	5 $\frac{1}{2}$
7246	6	6 $\frac{5}{8}$
7247	7	7 $\frac{5}{8}$
7248	8	8 $\frac{5}{8}$



SLATER POLE BANDS WITH PULL-OFF RODS

Hot Galvanized — $2 \times \frac{5}{16}$ -inch Steel

Slater Pole Band with pull-off rod eliminates the necessity for using an individual band for each guy.

List No.	Diam. of Pole Inches	Diam. of Band Inches	Dim. of Pull-Off Rod, Inches	Wt., Lbs. per 100
844	4	4 $\frac{1}{2}$	7 $\frac{1}{2}$	700
844 $\frac{1}{2}$	4 $\frac{1}{2}$	5	8	750
845	5	5 $\frac{1}{2}$	8 $\frac{1}{2}$	800
846	6	6 $\frac{5}{8}$	9 $\frac{5}{8}$	900
847	7	7 $\frac{5}{8}$	10 $\frac{5}{8}$	1000
848	8	8 $\frac{5}{8}$	11 $\frac{5}{8}$	1100

See application.

SLATER MAXAMP CONNECTORS For Copper Conductors



Fig. 1

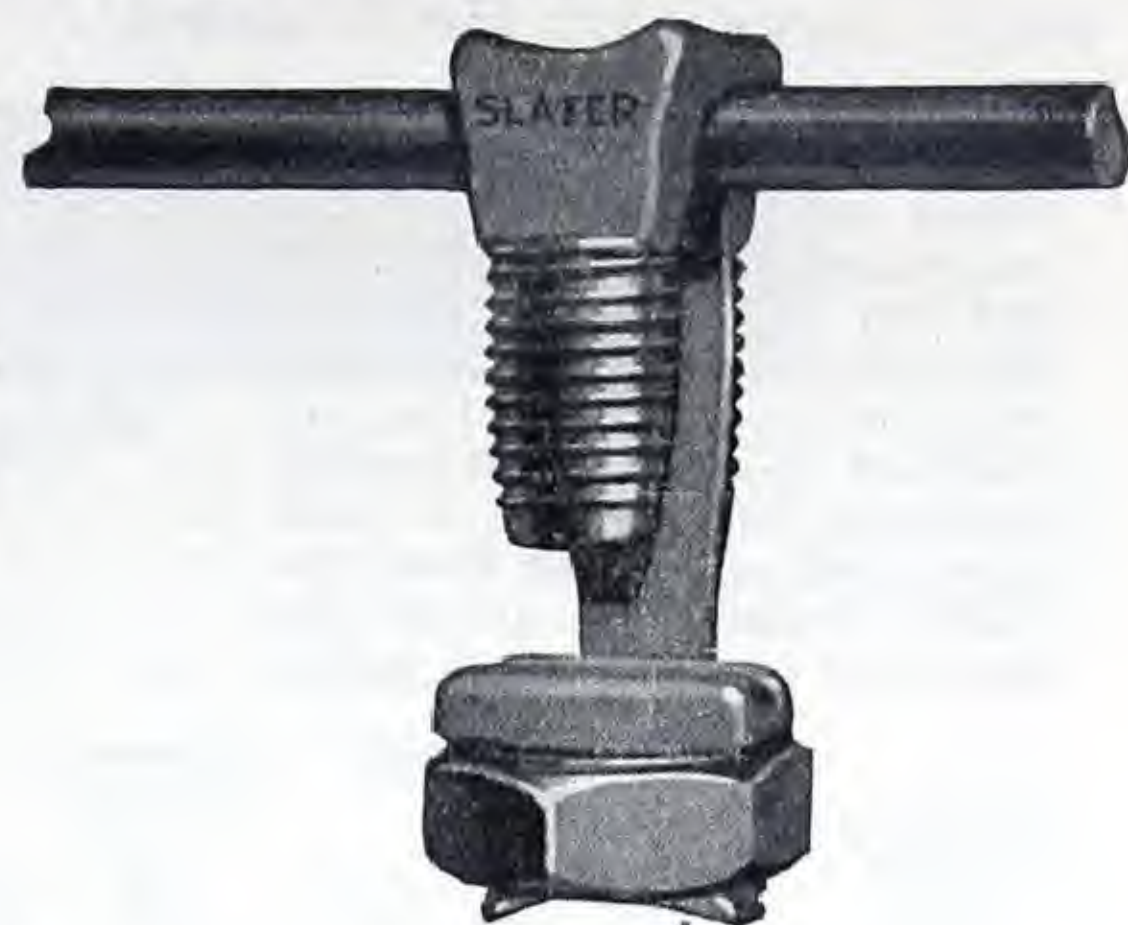


Fig. 2

The use of mechanical clamped joints in electrical apparatus is widespread—ranging from very small wires under a set screw—up to bolted bus joints carrying 20,000 amperes or over. The one common characteristic of all is the dependability of the clamp type joint—due to the simplicity of making a good joint with the connectors now available, and also to the ease of inspection. Incidental, but worth-while, are such advantages as convenience in opening the circuit and neat appearance.

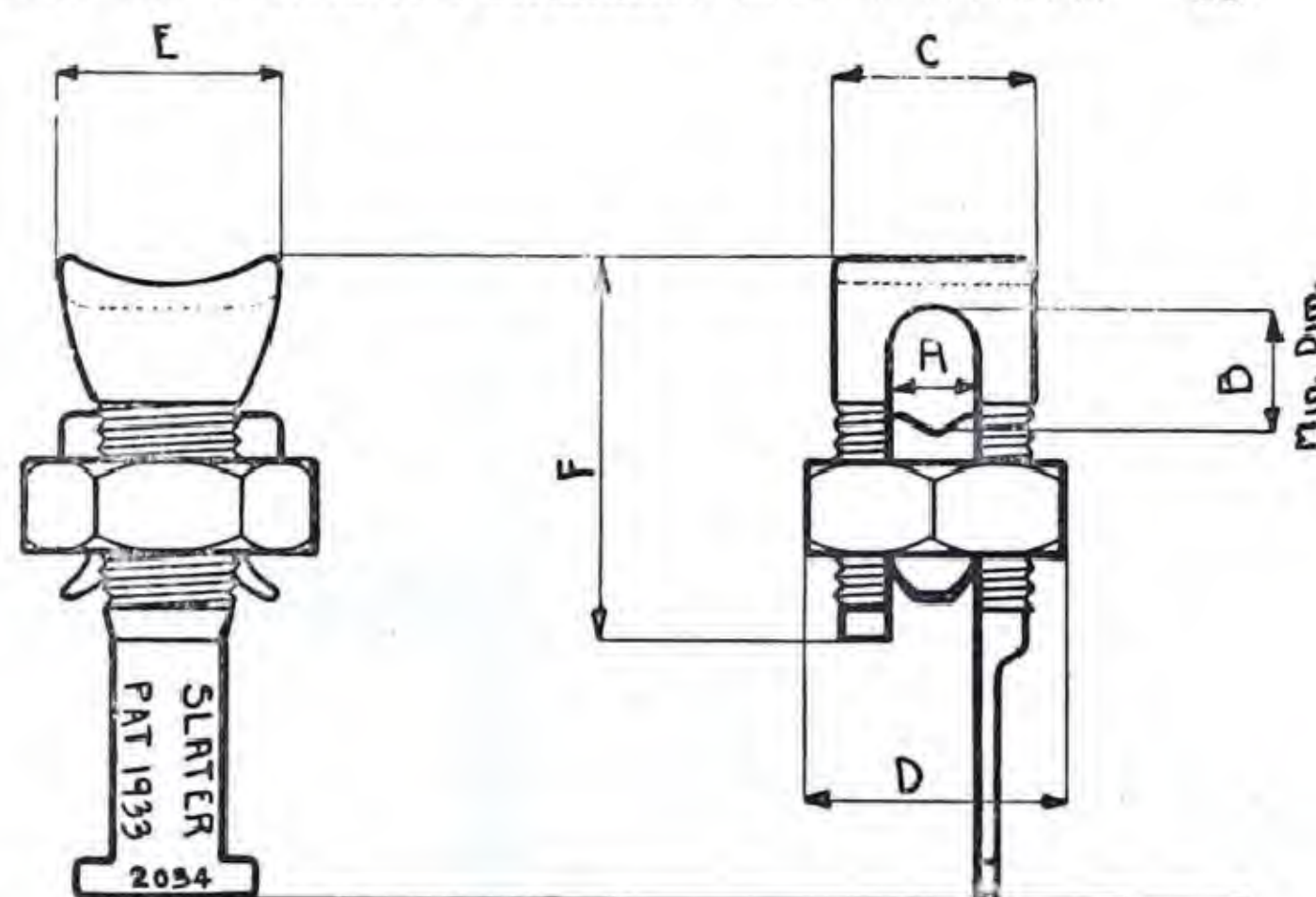
When opened to hook over the line wire, the "tail" prevents the nut from being dropped in the grass or snow. (Fig. 2).

Connector stays balanced until other wires are placed in groove.

Unthreaded ends assure starting the nut easily.

Wire Sizes taken by Slater MaxAmp Connectors

List No.	Takes Conductors Sizes	Wt., Lbs. Per 100
2031 (6)	6 to 8 solid and stranded.....	6
2032 (4)	4 to 6 solid and stranded.....	8 $\frac{1}{2}$
2034 (2)	1 solid; 2 to 4 solid and stranded.....	14
2035 (0)	0 solid or 0 stranded.....	25

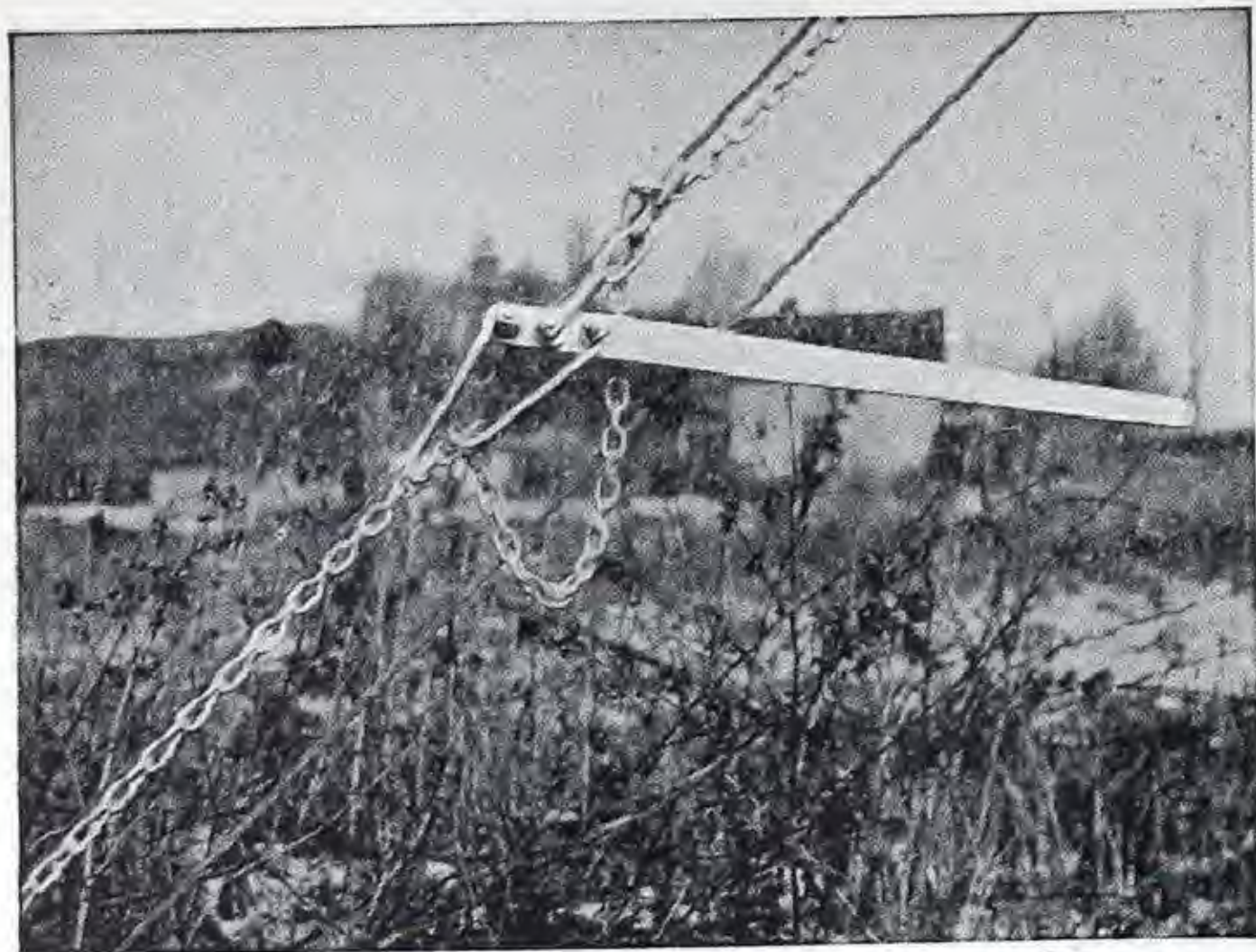


List No.	A	B	C	D	E	F
2031.....	.176	.255	$\frac{7}{16}$	$\frac{5}{8}$	$\frac{9}{16}$	1
2032.....	.210	.315	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{11}{16}$	1 $\frac{1}{8}$
2034.....	.300	.450	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	1 $\frac{5}{16}$
2035.....	.380	.570	.730	1	$\frac{15}{16}$	1 $\frac{15}{16}$



Wrench No. 2039 for MaxAmp Connectors
Fits all MaxAmp Connectors, also No. 7479 Eureka Dead-End Clamp

BOULIAN SLACK PULLER



Boulian Slack Puller—No. 2024, used in tightening $\frac{3}{8}$ " guy wire. The slack puller is holding a tension of approximately 1200 pounds while the guy clamp is being installed.

The Boulian Slack Puller is a general utility tool made for construction and maintenance line crews.

DESCRIPTION

The Slack Puller consists of a length of $\frac{1}{4}$ inch log chain with strong hooks at either end, totalling 10 feet in length over all. To this chain is attached the operating arm which operates two grab hooks. When leverage is applied these grab hooks alternately take up the slack and hold the tension.

The uses of the Slack Puller are listed:

1. Installation of guy wires.
2. Straightening and aligning poles.
3. Pulling up the slack in conductors.
4. Holding the strain of a long span while installing Strain Clamps.

This slack puller is an essential item of line truck equipment and in many other uses which arise almost daily in construction work.

CONVENIENCE

This convenient tool is used in place of a set of pulley blocks for any of the above applications. One lineman alone can easily make a complete guy installation as the slack puller holds its own line tension while the guy clamp is being put on the strand. The strain cannot be accidentally completely released with the slack-puller as is possible in the free-run of a set of pulley blocks. This prevents the sudden straining and possible breaking of a loaded pole.

TAKE-UP

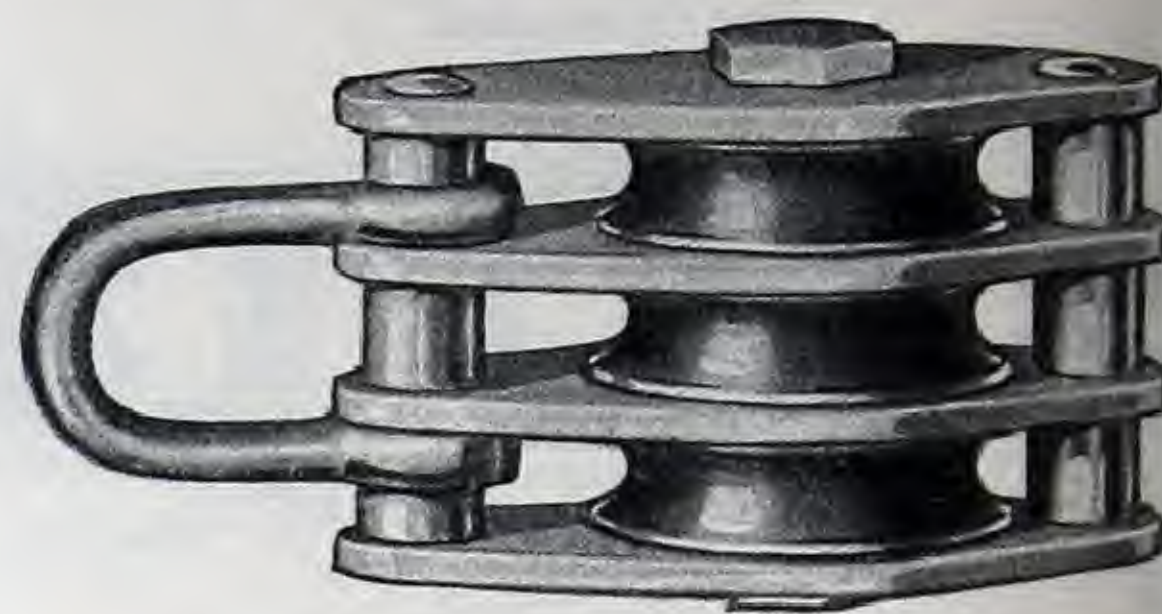
A take-up of at least 8 feet can be made without moving the come-along. This is far beyond the range of the ordinary type of Pulley Block. With a set of pulley blocks, the lineman must tie off the hand line end securely in order to do other work. The Slack-Puller will hold the load without special adjustment or accessories.

WEIGHT AND SIZE

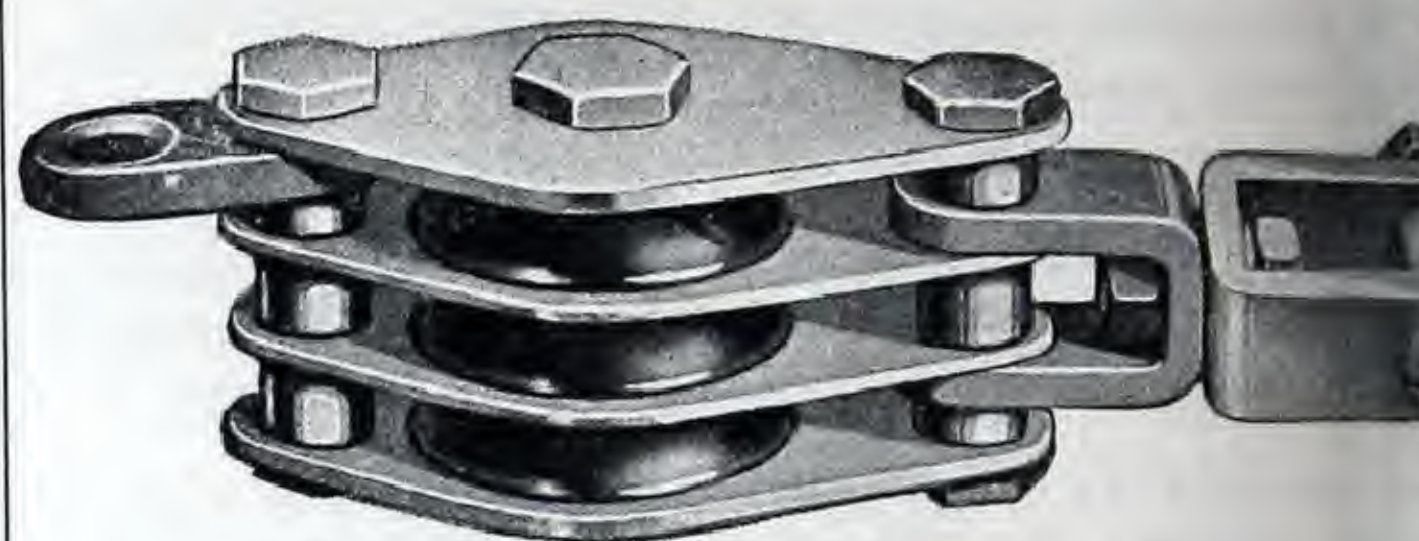
The Boulian Slack Puller is light and compact, in comparison with a set of Pulley Blocks, and yet all parts are made of high-grade forging steel. A total weight of less than 20 pounds makes the Slack Puller a desirable tool when cross-country patrolling is necessary. The Slack Puller is extremely simple and easy to operate, and makes "child's play" of that usually mean job of taking up the slack in long span conductors.

List No.	Description	Wt., lbs.
2024	Boulian Guy Slack Puller.....	19

SLATER PULLEY BLOCKS



Slater No. 2096 Pulley Block
(With Clevis)



Slater No. 2097 Pulley Block
(With Swivel)

A very light and compact set of pulley blocks for the graph or telephone patrolman. The triple sheave allows the lineman to pull up the wire slack even in the most awkward position at the top of the pole.

The blocks are made of steel throughout with the exception of the pulleys, which are oilless bronze. All steel parts are cadmium plated. A $\frac{3}{8}$ inch "sash-cord" rope is used, but not included with the set as the length required varies greatly.

List No.	Description	Wt. of Each
2096	Pulley Block with Clevis.....	20
2097	Pulley Block with swivel.....	23

UNDERGROUND CONDUIT USES

Underground Conduit is used quite generally for distribution and communication wires and cables under streets and along highways. There are many other places, however, where it can be used to equal advantage such as:

- Building Entrances
- Power Houses and Substations
- Bridges and Approaches
- Railway Yards and Signal Systems
- Subways, Tunnels and Viaducts
- Air Ports and Parks
- Canals and Harbors

SLATER TROLLEY POLE BANDS

Attaching Span Wires to Tubular Poles. Made from 1½ x ⅜-inch Steel.



Two-Bolt Split Bands

Diameter of Pole, In.

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
24	4	4½	205
24½	4½	5	220
25	5	5½	235
26	6	6⅝	255

Three-Bolt Split Bands

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
34	4	4½	245
34½	4½	5	260
35	5	5½	275
36	6	6⅝	295



One-Bolt Solid Bands

Diameter of Pole, In.

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
4	4	4½	160
4½	4½	5	172
5	5	5½	185
6	6	6⅝	210

Two-Bolt Solid Bands

List No.	Nominal	Actual Outside	Wt., Lbs. per 100
4	4	4½	200
4½	4½	5	212
5	5	5½	225
6	6	6⅝	250

SLATER INSULATED POLE BANDS



Insulated Pole Bands are in popular use for trolley work. Eliminate one splice on each attachment.

List Nos.	Nominal Diam. Pole Inches	Outside Diam. Pole Inches
7244	4	4½
7244½	4½	5
7245	5	5½
7246	6	6⅝
7247	7	7⅝
7248	8	8⅝



SLATER POLE BANDS WITH PULL-OFF RODS

Hot Galvanized — 2 x ⅝-inch Steel

Slater Pole Band with pull-off rod eliminates the need for using an individual band for each guy.

List No.	Diam. of Pole Inches	Diam. of Band Inches	Dim. of Pull-Off Rod, Inches	Wt., Lbs. per 100
44	4	4½	7½	700
44½	4½	5	8	750
45	5	5½	8½	800
46	6	6⅝	9⅝	900
47	7	7⅝	10⅝	1000
48	8	8⅝	11⅝	1100

See application.

SLATER MAXAMP CONNECTORS For Copper Conductors



Fig. 1



Fig. 2

The use of mechanical clamped joints in electrical apparatus is widespread—ranging from very small wires under a set screw—up to bolted bus joints carrying 20,000 amperes or over. The one common characteristic of all is the dependability of the clamp type joint—due to the simplicity of making a good joint with the connectors now available, and also to the ease of inspection. Incidental, but worth-while, are such advantages as convenience in opening the circuit and neat appearance.

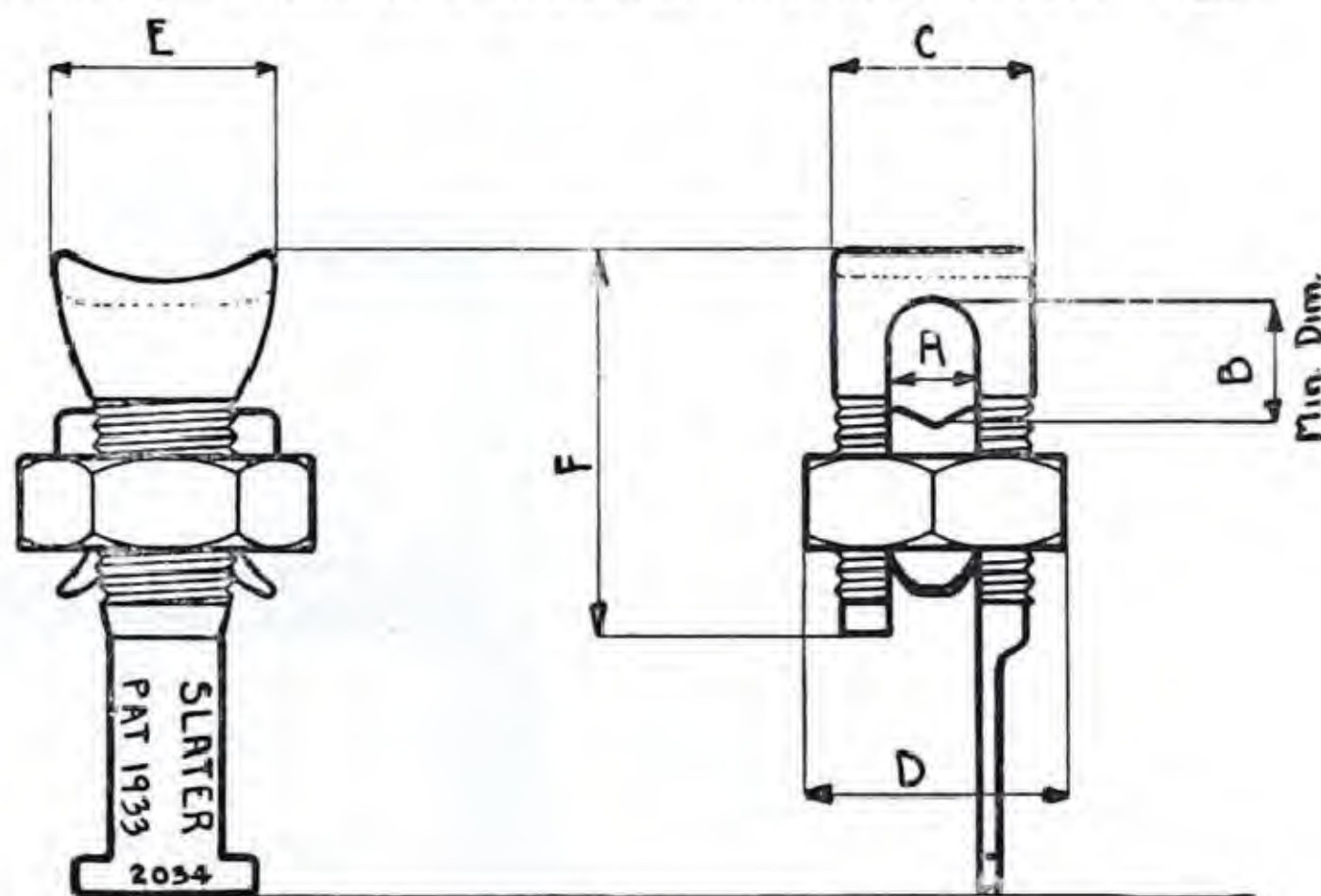
When opened to hook over the line wire, the "tail" prevents the nut from being dropped in the grass or snow. (Fig. 2).

Connector stays balanced until other wires are placed in groove.

Unthreaded ends assure starting the nut easily.

Wire Sizes taken by Slater MaxAmp Connectors

List No.	Takes Conductors Sizes	Wt., Lbs. Per 100
2031 (6)	6 to 8 solid and stranded.....	6
2032 (4)	4 to 6 solid and stranded.....	8½
2034 (2)	1 solid; 2 to 4 solid and stranded.....	14
2035 (0)	0 solid or 0 stranded.....	25



List No.	A	B	C	D	E	F
2031.....	.176	.255	⅞	⅝	⅞	1
2032.....	.210	.315	1½	¾	1½	1 ⅛
2034.....	.300	.450	⅝	⅞	¾	1 ⅝
2035.....	.380	.570	.730	1	1 ⅝	1 ⅝



Wrench No. 2039 for MaxAmp Connectors
Fits all MaxAmp Connectors, also No. 7479 Eureka Dead-End Clamp

SLATER PULLING-IN IRONS FOR MANHOLES

Hot Galvanized

Pulling-In Irons are set into the concrete or brick walls of street vaults opposite all duct entrances to provide convenient and strong attachments for the pulling-in blocks for installing or removing cables. They are made of $\frac{7}{8}$ -inch steel in accordance with the A. T. & T. Co.'s specifications, extend from the wall 8 inches, and are so designed as to straddle one brick.



List No.	Size of Steel Inches	Extension Inches	Wt. Lbs. Per 100
9119	$\frac{7}{8}$	9	500
9120	$\frac{7}{8}$	12	600

Prices on application.

DOWEL PINS FOR CLAY CONDUIT



Plain—No. 9145

In laying multiple duct clay conduit, these Dowel Pins are inserted in holes provided in the ends of the lengths and thus keep adjacent lengths in proper alignment and insure the smoothness of the ducts. They are made of $\frac{5}{16}$ -inch round steel, and are 3 inches long.

List No.	Size, Inches	Wt., Lbs., Per 100
9145	$\frac{5}{16} \times 3$	8

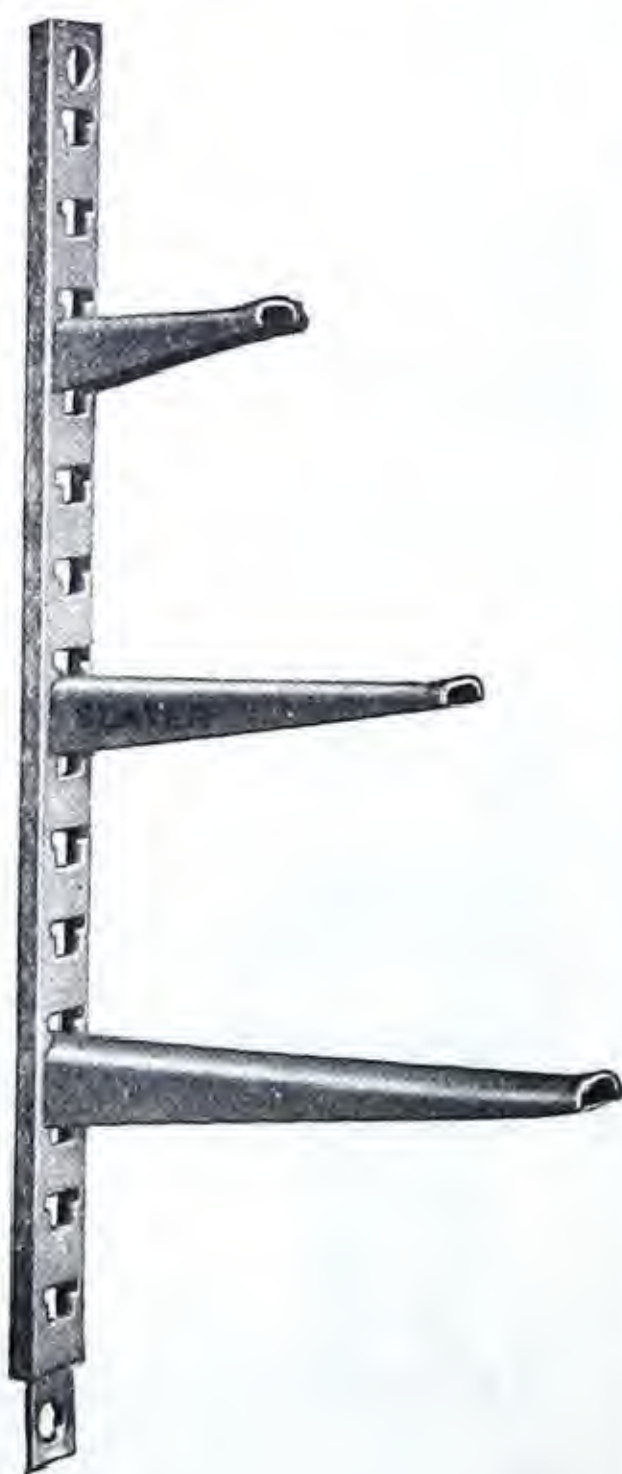
Price on application.

SLATER UNDERGROUND CABLE RACKS

Hot Galvanized

For manhole and interior cable work. The Rack Sections are made in two lengths which can be combined into almost any desired length. These sections are made from $1\frac{1}{2} \times \frac{9}{16} \times \frac{3}{16}$ -inch open hearth steel channel, amply strong to support the heaviest cables. They should be fastened to manhole walls with $\frac{1}{2} \times 4$ -inch Slater Expansion Bolts.

The Hooks are cut from open hearth steel "T" section and have a smooth, well rounded top surface $1\frac{1}{2}$ inches wide which will not injure the sheaths of cables.



RACKS

Dimensions in Inches

List No.	No. of Holes	Hook Hole Spacing	Length Over All	Bolt Hole Spacing	Wt., Lbs. Per
2124	8	$1\frac{1}{2}$	15	$13\frac{5}{8}$	100
2125	14	$1\frac{1}{2}$	24	$22\frac{1}{2}$	120
2126	18	$1\frac{1}{2}$	30	$28\frac{1}{2}$	260

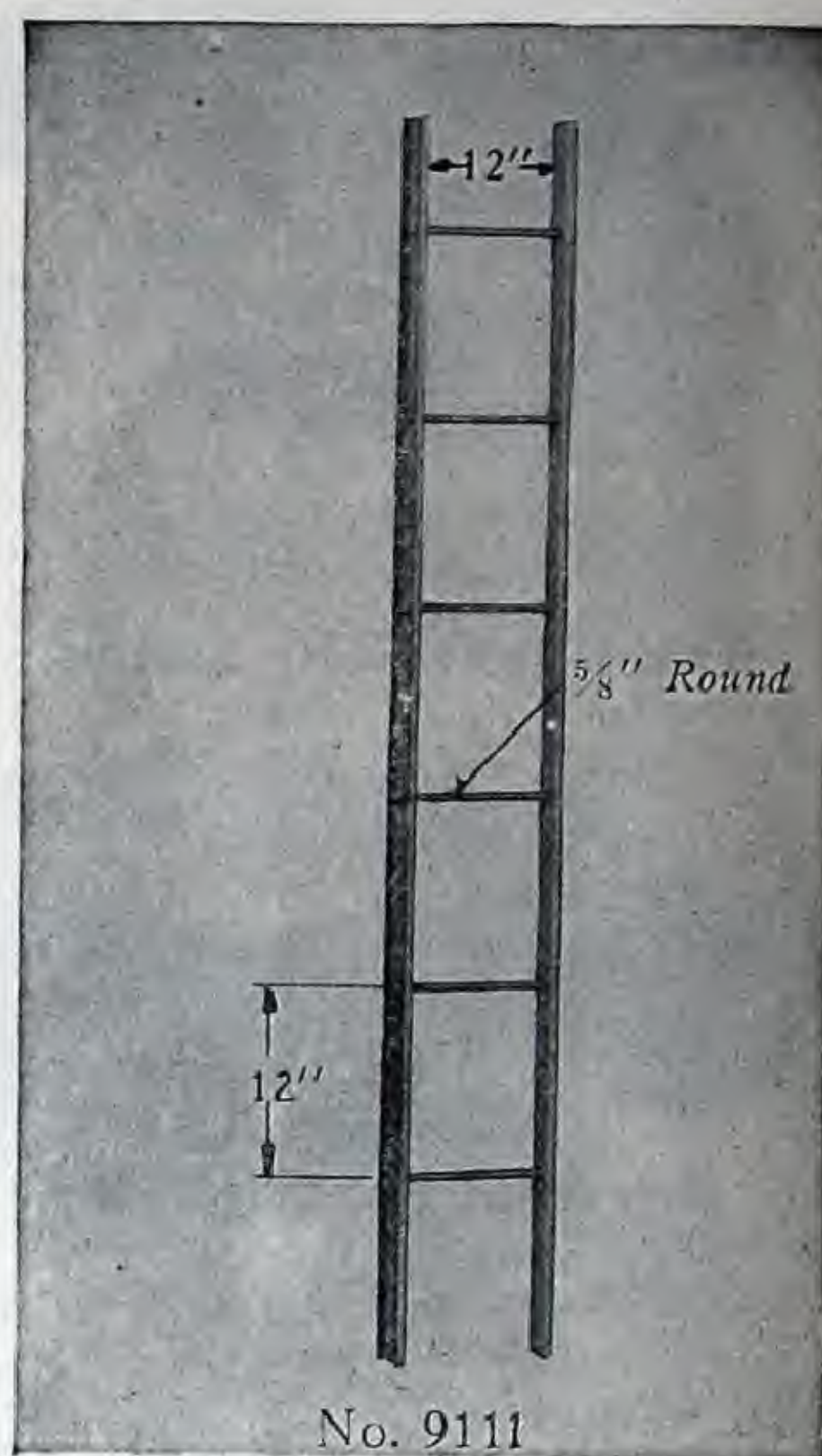
HOOKS

List No.	Extension from Face of Rack	Size of Steel	Wt., Lbs. Per 100
2131	4	$1\frac{1}{2} \times 1\frac{1}{16} \times \frac{3}{16}$	52
2132	$7\frac{1}{2}$	$1\frac{1}{2} \times 1\frac{1}{16} \times \frac{3}{16}$	104
2133	10	$1\frac{1}{2} \times 1\frac{1}{16} \times \frac{3}{16}$	126

Prices on applications.

SLATER MANHOLE LADDERS

Hot Galvanized



Slater Galvanized Steel Manhole Ladders are made to the specifications of the large telephone and central street companies. The $6\frac{1}{2}$, 8, 10, and 12 foot lengths have rungs of $1\frac{1}{2} \times \frac{9}{16} \times \frac{3}{16}$ -inch channel and rungs of $\frac{5}{8}$ -inch open hearth steel. The 14 foot ladder is made of $2\frac{1}{2} \times \frac{5}{8} \times \frac{3}{16}$ -inch sides. The rungs pass through the sides and are riveted over on the outside. They are 12 inches apart spaced from the bottom rung which is placed 12 inches from the bottom of the ladder.

List No.	Length Feet	No. of Rungs	Rung Spacing	Width Inside Inches	Ap Ship Lbs.,
9111	$6\frac{1}{2}$	6	12	12	
9112	8	7	12	12	
9113	10	9	12	12	
9115	12	11	12	12	
9117	14	13	12	12	

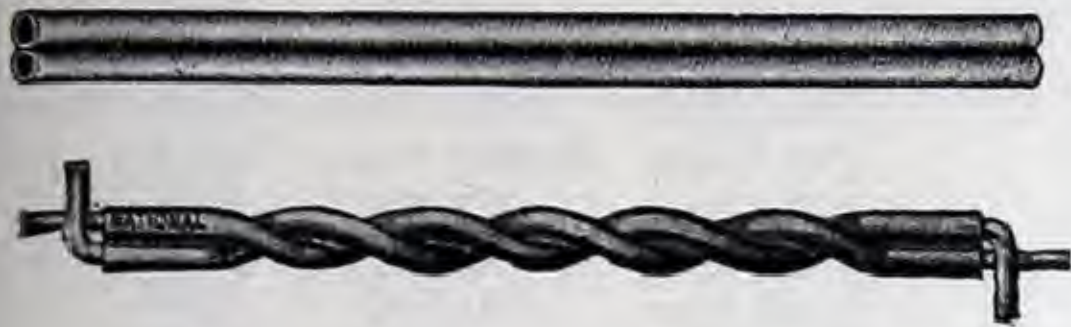
UNDERGROUND CONDUIT USES

Underground Conduit is used quite generally for the distribution and communication wires and cable under streets and along highways. There are many other places, however, where it can be used to equal advantage such as:

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- Power Houses and Substations
- Bridges and Approaches
- Railway Yards and Signal Systems
- Subways, Tunnels and Viaducts
- Air Ports and Parks
- Canals and Harbors

NATIONAL SLEEVES

DOUBLE TUBE



These sleeves are manufactured accurately to size from best grade of pure copper.

When twisted, National sleeves are drawn tightly around conductors and form practically a welded joint.

The danger of corrosion, due to air and moisture, is entirely eliminated; and instead of building up a high resistance, as in the case of the average hand splice, a joint of this type has a conductivity with the conductor of better than two to one.

Double Tube Copper Sleeves for Stranded Cable

List No.	Gauge No.	Diam. Wire In.	Length In.	Wt., Lbs. per 1000
200	0000 B&S	.530	20	1570
201	000 B&S	.470	20	1400
202	00 B&S	.420	18	1025
203	0 B&S	.375	16	675
204	1 B&S	.330	14	550
205	2 B&S	.291	12	350
206	3 B&S	.261	9 1/2	250
207	4 B&S	.231	8 3/4	190

Double Tube Copper Sleeves for Solid Wire

210	0000 B&S	.460	20	1400
211	000 B&S	.410	18	1025
212	00 B&S	.365	16	675
213	0 B&S	.325	14	550
214	1 B&S	.289	12	350
215	2 B&S	.258	9 1/2	250
216	3 B&S	.229	8 3/4	190
217	4 B&S	.204	6	130
218	4 B&S	.204	8	160
219	5 B&S	.182	6	115
220	6 B&S	.162	6	100
221	7 B&S	.144	5 3/4	85
222	8 B&S	.128	5 1/2	60
223	8 BWG	.165	6	100
224	9 B&S	.114	5 1/4	50
225	9 BWG	.148	5 3/4	85
226	10 B&S	.102	4 3/4	30
227	10 BWG	.134	5 1/2	60
228	11 BWG	.120	5 1/4	50
229	12 B&S	.081	4 1/2	23
230	12 BWG	.109	4 3/4	35
231	12 NBS	.104	4 3/4	30
232	14 B&S	.064	4	20
233	14 BWG	.083	4 1/2	23
234	14 NBS	.080	4 1/2	23
235	16 B&S	.051	4	18
236	16 BWG	.065	4	20
237	17 B&S	.045	4	15
238	18 B&S	.040	4	14

Double Tube Tinned Copper Sleeves

240	8 BWG	.165	6 3/4	110
241	9 BWG	.148	5 3/4	90
242	10 BWG	.134	5 1/2	65
243	12 BWG	.109	4 3/4	40
244	14 BWG	.083	4 1/2	30
245	16 BWG	.065	4	25

Double Tube Tinned Steel Sleeves

250	8 BWG	.165	6 3/4	90
251	9 BWG	.148	5 3/4	60
252	10 BWG	.134	5 1/2	55
253	12 BWG	.109	4 3/4	35
254	14 BWG	.083	4 1/2	30
255	16 BWG	.065	4	25

Prices on application.

NATIONAL SLEEVES

SPLIT TINNED AND BEVELLED COPPER
For Splicing Underground Power Transmission Cables

These sleeves are split their entire length to enable the hot solder to flow evenly around the cable and are covered with a coating of tin to permit easy soldering. The ends are beveled so that there will not be the possibility of the building up a high potential occasioned by sharp corners.

List No.	Size Cond.	Cable	Diameter, Inches Approx. Inside Sleeve	Lgth. in.	Ship Wt. Lbs. per 100
325	12 B&S Solid	.081	.086	1 1/2	1
326	10 B&S Solid	.102	.107	1 1/2	1 1/2
327	10 B&S Strand	.115	.120	1 1/2	2
328	8 B&S Solid	.128	.133	1 1/2	2
329	6 B&S Solid	.162	.167	1 1/2	3
330	6 B&S Strand	.184	.190	1 1/2	4 1/2
331	5 B&S Solid	.182	.188	1 1/2	4
332	5 B&S Strand	.206	.212	1 1/2	5
333	4 B&S Solid	.204	.210	1 1/2	5
334	4 B&S Strand	.234	.240	2	5 1/2
335	3 B&S Solid	.229	.235	2	5
336	3 B&S Strand	.263	.270	2	6
337	2 B&S Strand	.292	.299	2	6
338	1 B&S Strand	.332	.340	2	7
339	0 B&S Strand	.373	.381	2	8
340	00 B&S Strand	.420	.428	2	9
341	000 B&S Strand	.472	.482	2	12
342	0000 B&S Strand	.530	.540	2 1/2	15
343	200000 C. M.	.512	.522	2 1/2	14
344	250000 C. M.	.575	.585	2 1/2	24
345	300000 C. M.	.631	.642	2 1/2	28
346	350000 C. M.	.681	.693	2 1/2	33
347	400000 C. M.	.729	.741	3	38
348	450000 C. M.	.772	.785	3	43
349	500000 C. M.	.815	.828	3	48
350	550000 C. M.	.854	.867	3	50
351	600000 C. M.	.892	.907	3 1/2	57
352	650000 C. M.	.929	.944	3 1/2	60
353	700000 C. M.	.964	.981	3 1/2	65
354	750000 C. M.	.999	1.016	3 1/2	87
355	800000 C. M.	1.031	1.048	4	91
356	850000 C. M.	1.063	1.081	4	98
357	900000 C. M.	1.094	1.112	4	100
358	950000 C. M.	1.125	1.145	4	107
359	1000000 C. M.	1.152	1.175	4 1/2	118
360	1250000 C. M.	1.289	1.314	4 1/2	173
361	1500000 C. M.	1.412	1.437	5	205
362	1750000 C. M.	1.526	1.556	5 1/2	250
363	2000000 C. M.	1.630	1.665	6	310
364	2500000 C. M.	1.819	1.854	6 1/2	370

Prices on application.

SEAMLESS SINGLE TUBE COPPER SLEEVE

For Solid Copper Wires

Made in B. & S. wire gauge sizes 8 to 4/0 varying in length from 5 to 18 inches.

For Standard Stranded Copper Cables

Made in B. & S. wire gauge sizes 4 to 500,000 C.M. varying in length from 8 1/2 to 24 inches.

Prices on application.

NATIONAL TINNED COPPER CABLE SLEEVES

For Large Gauge Telephone Cable

List No.	Gauge B&S	Diam. Wire In.	Lgth In.	Wt., lbs. 1000	List No.	Gauge B&S	Diam. Wire In.	Lgth In.	Wt., lbs. 1000
260	10	.102	1 1/2	5	262	14	.064	1 1/2	4
261	13	.072	1 1/2	4	263	16	.051	1 1/2	3

Prices on application.

CORNWALL FIBRE CONDUIT



Tapered Sleeve Joint

"Cornwall" Fibre Conduit is manufactured in Canada at Cornwall, Ontario, exclusively from Canadian materials under the supervision of men who have obtained the greatest measure of success in fibre conduit production. It is the only fibre conduit made within the British Empire.

The conduit sections are built up into tubes consisting of wood fibres "matted" under pressure and then thoroughly impregnated with a preservative and water proofing compound. This compound saturates the fibres comprising the wall and fills the spaces between them and the entire conduit wall becomes a dense, homogeneous material, uniform in composition throughout.

It is light in weight and is made in lengths which experience has shown can be most conveniently and economically laid.

It is chemically inert, resistant to water and moisture, easy to handle, yet with ample mechanical strength to resist breakage.

It is the ideal cable protection from every standpoint; account ease of installation, permanence and freedom from maintenance as long as the duct is in use.

Its inner surface is smooth and non-abrasive and cable can be drawn through without injury and with less frictional resistance than any other type of conduit made.

"Cornwall" Fibre Conduit is not affected by climatic changes and may be stored in the open, winter and summer.

Joint

The standard joint on the "Cornwall" fibre conduit is of the tapered "sleeve" type. This joint has many advantages over socket or other types of joint. Some of these advantages follow:—

1. Tighter joints, more easily made.
2. Greater flexibility, making it possible to slightly change direction of straight runs and also to pass minor obstructions.
3. Less waste as slightly chipped ends are protected by the coupling, with no reduction in the tightness of the joint.

Fittings

Standard fittings such as bends, elbows, tees, etc., are manufactured by the same process as the straight conduit. Fittings to special dimensions can be secured at short notice.

Standard Specifications Cornwall Fibre Conduit.

1. It shall be thoroughly saturated with insulating and preserving compound.
2. The conduit shall not be affected by acids which might be present in the ground.
3. The bore shall be straight and inner surface shall be free from dents or other obstructions, as gauged by the ability to pass a mandrel thirty-six inches long through conduit, the mandrel to be $\frac{1}{4}$ inch less in diameter than the nominal size of conduit.
4. The inner surface shall be smooth and free of excess compound.
5. The structure of walls shall be homogeneous and shall not be affected nor separate when heated to 212° F.
6. The ends of conduit to be tapered; and couplings machined to fit the taper so that when the joint is made, the ends of the conduit will not butt together.
7. The length shall be 5 feet but short lengths can be furnished not exceeding 15% of any order.

Trade Practice

All our shipments are checked in four different ways before forwarding. Diagram showing number of feet by sections accompanies each carload shipment, and we urgently request that consignee check up each section before removing from car. We cannot consider any claims for discrepancy unless notified immediately, stating the number of feet claimed short in each section. We reserve the right to supply up to 15% of the order in 4' and 4½' lengths.

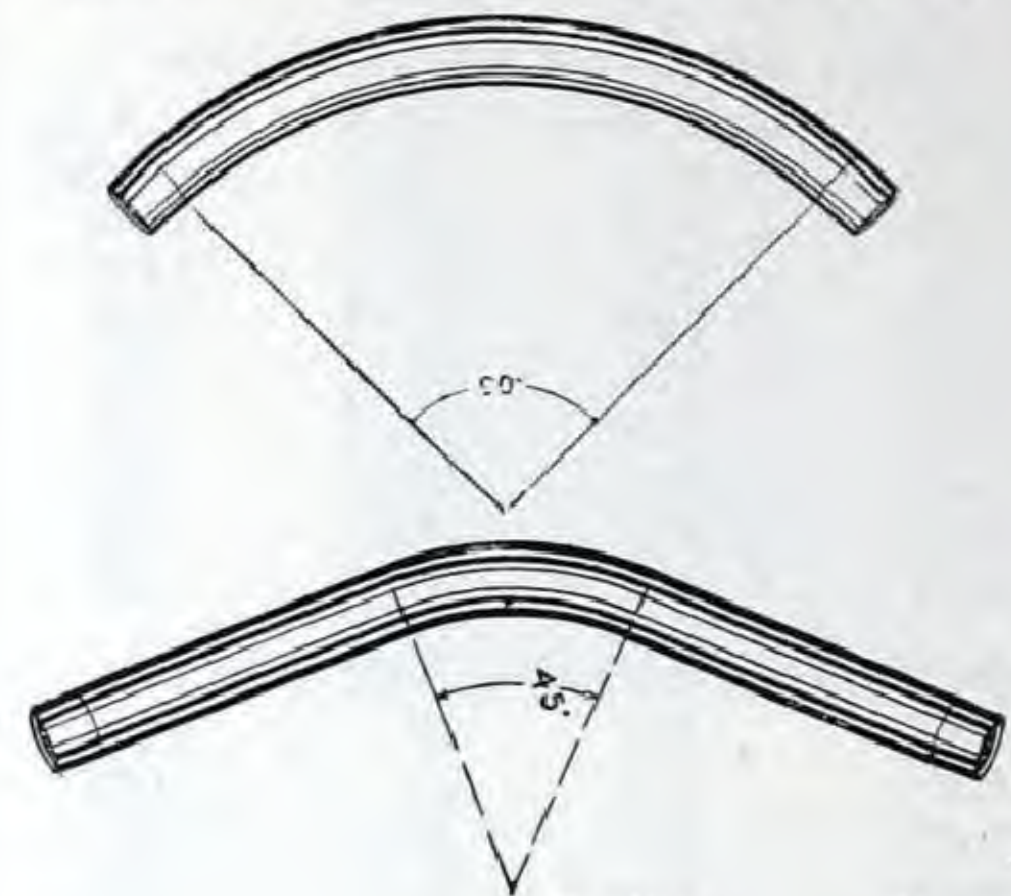
CORNWALL FIBRE CONDUIT

Straight Conduit

Sleeve Joint

(One coupling supplied with each length)

Inside Diameter	Approx. Net Wgt. Per Foot	Approx. Number Ft. (Min. Car 30,000 lbs.)	Std. Crate Contains	Approx. Crated Gross Wt. per Foot
2"	1.00 lbs.	30,000'	200'	1.4 lbs
2½"	1.20 lbs.	25,000'	200'	1.6 lbs
3"	1.45 lbs.	20,700'	150'	1.9 lbs
3½"	1.75 lbs.	17,200'	125'	2.4 lbs
4"	2.00 lbs.	15,000'	100'	2.8 lbs
4½"	2.45 lbs.	12,300'	80'	3.5 lbs
5"	2.90 lbs.	10,300'	60'	4.5 lbs
Inside Dia..	2" 2½" 3" 3½" 4" 4½" 5"			
List Price				
per 100'..	\$15.00 16.50 17.50 19.00 20.50 26.00 32.			
Extra Couplings per				
100'.....	\$10.00 10.50 11.00 12.00 13.00 16.00 20.			



Cornwall Bends

Standard
45° and 90°

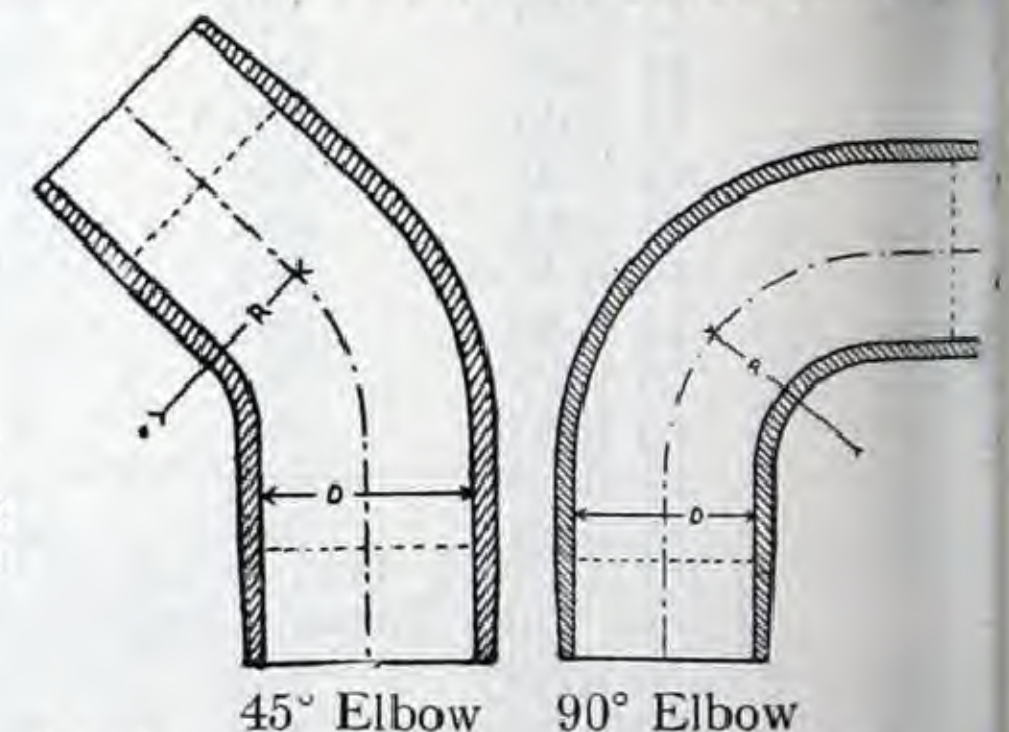
SLEEVE
JOINT TYPE
One coupl
supplied wi
each elbow.

Inside Diameter	Radius Standard 45° and 90° Bends	Approx. Gross Weight per Bend Crated	Standard Crate Ber Contains Pieces
2½"	24-36	12.4 lbs.	25
3"	36	14.7 lbs.	20
3½"	36	21.3 lbs.	15
4"	36	25.4 lbs.	12
4½"	36	28.8 lbs.	9
Inside Dia..	2" 2½" 3" 3½" 4" 4½" 5"		
Radius.....	18-24" 24-36" 36 36 36 36 36		
List Price,			
each.....	\$2.40 \$2.40 \$2.40 \$2.90 \$3.00 \$4.40 \$5		

Cornwall Elbows

Standard
45° and 90°

SLEEVE
JOINT TYPE
One coupling
supplied with
each elbow.



45° Elbow 90° Elbow

Inside Diameter	45° and 90° Elbows Standard Approx. Gross Wgt. Each Crated	Standard Crate Contains Pieces	Inside Diameter	45° and 90° Elbows Standard Approx. Gross Wgt. Each Crated	Standard Crate Contains Pieces
2½"	3.7	100	4"	7.5	50
3"	4.8	75	4½"	8.6	40
3½"	6.2	50			
Inside Dia..	2" 2½" 3" 3½" 4" 4½" 5"				
(D).....	4" 4" 5" 5" 6" 8" 10"				
Radius (R).....					
List Price,					
each.....	\$3.00 \$3.00 \$3.00 \$3.00 \$3.10 \$4.50 \$5				

NATCO UNDERGROUND CLAY CONDUIT

Natco Underground Clay Conduit is made of special high-grade clays found in only a few localities, finely ground, pressed, and vitrified into flint-like rock by over 2000 degrees of heat, then salt-glazed to provide a permanently smooth, glass-like surface.

A wide variety of shapes and sizes is available in both the single and multiple duct styles. The former provides two separate insulating walls between adjacent cables. Allows joints to be broken between individual ducts. Permits working around street obstructions. It is particularly adapted for low-tension power and lighting trunk lines, and low-tension telephones and laterals.

The Multiple Duct provides longer lengths, and so effects savings in installation costs. Positive alignment is secured by dowel pins (the dowel holes run full length, so sections can be aligned). This type is particularly adapted for low-tension telephone, telegraph, railway signal, and power and lighting service.

A variety of split sections is available, making repairs and replacements easy. Inner edges of ducts are beveled; cable pulling is easy and safe. Scarifications provide a firm anchor for joint and bedding mortar.

With Natco Underground Clay Conduit you have permanent and economical protection for your cables.

Single Duct
Square Bore with
Dowel Holes 18" long



Single Duct
Round Bore Split
18" long



Single Duct Slant
Round Bore Split

Single Duct Curve
and Bore Split

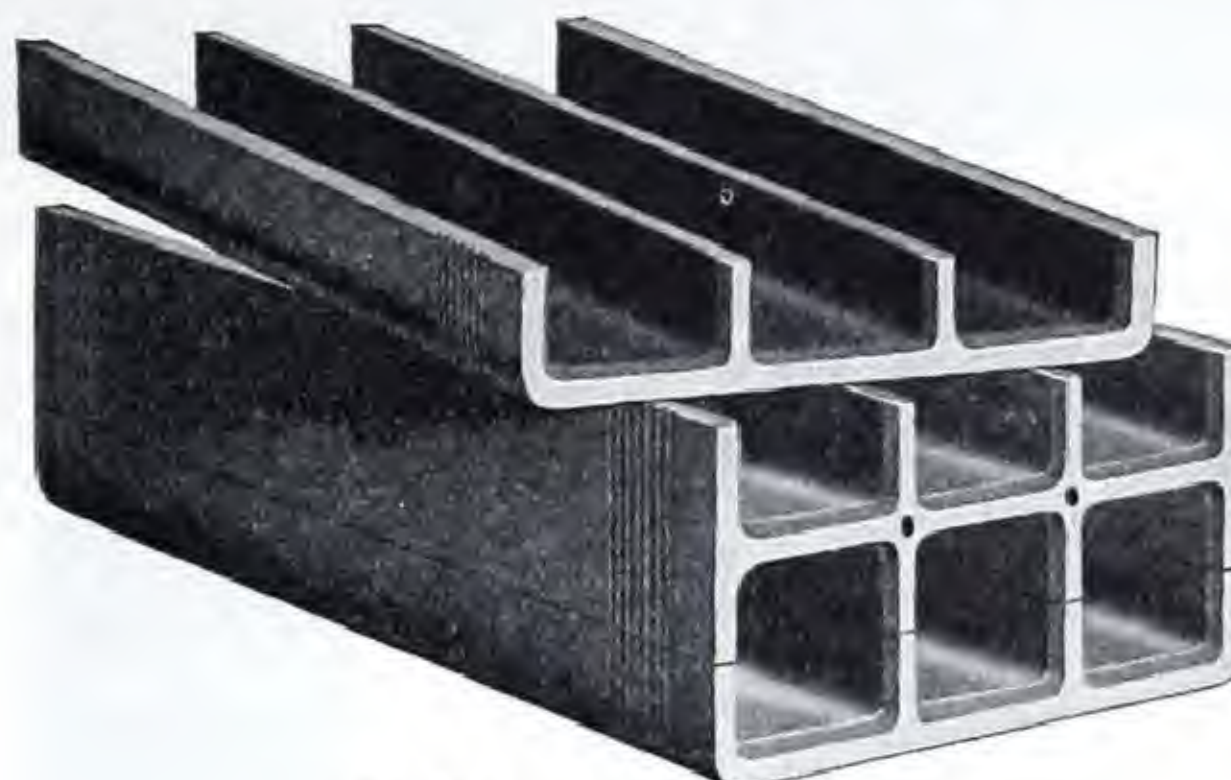


Multiple Duct
Standard 36 in. long

NATCO UNDERGROUND CLAY CONDUIT



Two Duct Standard 24" long



Six Duct Split 18" long

STANDARD SHAPES AND SIZE

	Standard Bore of Duct Hole Inches	Approximate Outside Dimension Inches	Standard Length Inches	Length of Short Lengths Inches	Minimum Carload duct feet
Single Duct	3¼ Round	4½ x 4½	18	3, 6, 9, 12	7800
Single Duct	3½ Round	4⅞ x 4⅞	18	3, 6, 9, 12	6900
Single Duct	4¼ Round	5⅝ x 5⅝	18	3, 6, 9, 12	5700
Single Duct	5¼ Round	6⅞ x 6⅞	24	3, 4, 6, 8, 12	4000
Single Duct	3¼ Square	4¾ x 4¾	18	3, 6, 9, 12	6100
Single Duct	3½ Square	5 x 5	18	3, 6, 9, 12	5700
Single Duct	4¼ Square	5⅞ x 5⅞	18	3, 6, 9, 12	4800

MULTIPLE DUCT

Two Duct	3 1/4	Square	4 3/4 x 8 3/4	24	6, 8, 12	7600
Three Duct	3 1/4	Square	4 3/4 x 12 3/4	24	6, 8, 12	7500
Four Duct	3 1/4	Square	8 3/4 x 8 3/4	36	6, 9, 12	8400
Six Duct	3 1/4	Square	8 3/4 x 12 3/4	36	6, 9, 12	9000
Nine Duct	3 1/4	Square	12 3/4 x 12 3/4	36	6, 9, 12	9000
Two Duct	3 1/2	Square	5 1/8 x 9 3/8	24	6, 8, 12	6400
Three Duct	3 1/2	Square	5 1/8 x 13 5/8	24	6, 8, 12	6900
Four Duct	3 1/2	Square	9 3/8 x 9 3/8	36	6, 9, 12	7500
Six Duct	3 1/2	Square	9 3/8 x 13 5/8	36	6, 9, 12	8100
Two Duct	4 1/4	Square	5 1/2 x 11	24	6, 8, 12	5200
Three Duct	4 1/4	Square	5 1/2 x 16 1/8	24	6, 8, 12	5400
Four Duct	4 1/4	Square	11 x 11	36	6, 9, 12	6000
Six Duct	4 1/4	Square	11 x 16 1/8	36	6, 9, 12	6300
Nine Duct	4 1/4	Square	16 1/8 x 16 1/8	24	6, 8, 12	6800

Round bore singles with socket joints are available in 3 1/2, 4, 4 1/2 and 5-inch bore in 24 inch lengths.

6, 8, and 12 inch short lengths.

SPLITS

		Std. Lgth. Ins.	Short Piece Lgths. Ins.
Single Duct	All Standard Bores.....	18	6-9-12
2 and 3 Duct	All Standard Bores.....	24	6-8-12
4 and 6 Duct	All Standard Bores.....	18	6-9-12
9 Duct	All Standard Bores.....	18	6-9-12

SINGLE DUCT BENDS

Standard Bore, Inches	Angle in deg's	Radius in Inches
3 1/4, 3 1/2, 4 1/4 Round or Square Bore	90	12-18-24
	45	12-18-24-36

Bends can be supplied either split or solid. Special angles or radius made to order. Special slants also made to order.
Dowel Pins.—5/16" x 3" special steel Dowel Pins with centre washer.

Wrapping Tape. 4" and 6" widths. 25 yard rolls. Adhesive waterproof coating on one side. Used for wrapping joints before mortaring.

Prices on application.

NATCO SLANT CONDUIT

A NEW CLAY CONDUIT FOR BUILDING CURVES



An intricate curve constructed of Natco Slant Conduit

"NATCO" Slant Conduit, in all Standard multiple duct forms and positions, has been recently developed to permit the construction of curves in lines of underground clay conduit, providing perfect curves, tight-fitting joints and ease in pulling cables.

The advantages are readily apparent:—

1. No need of manholes at turns or bends in underground lines means a big saving in manhole expense.

2. Provides easy and gradual separation of branch lines upon leaving main lines, all with tight and even fitting joints.

3. Adapted for construction of approaches to exchange buildings, from street or alley, thus eliminating manholes.

4. Intricate curves may be constructed, as needed on the job, to meet most any local condition and with little preliminary design or preparation.

5. Unusual contour lines may be closely followed in constructing underground lines, thus eliminating the necessity of deep trenches or heavy fills.

6. No special shapes, no wide variety of shapes, and no cutting, fitting or spacing of conduit.

7. "NATCO" Slant Conduit is a simple shape that readily fits into any curve shown in the accompanying table.

4-way
Natco Short ConduitSingle Duct
Natco Slant Conduit4-way
Natco Slant Conduit

Natco Slants or Mitered Conduit

Number of duct holes per piece	Std. bore	Length in.	Angle Nom. in radius deg's feet	Position
1.....	All	6x6 $\frac{3}{4}$	3 10	....
2, 4, 9.....	Std.	6x6 $\frac{3}{4}$	3 10	....
3, 6.....	bores	6x6 $\frac{3}{4}$	3 10	edge or flat

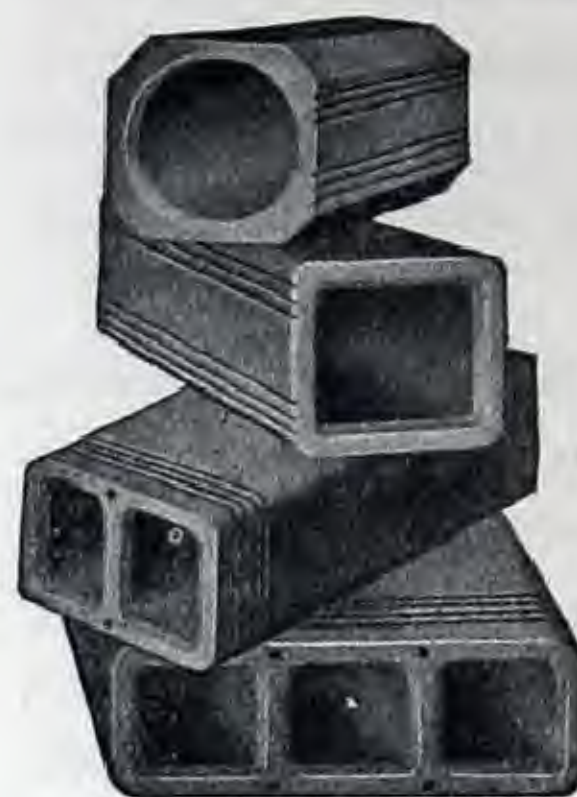
Note: Natco Branch Conduit and Natco Transposition Conduit also supplied in all standard shapes.

TABLE SHOWING NUMBER OF PIECES REQUIRED FOR
VARIOUS CURVES
RADIUS OF CURVE

Angle of Curve	10 ft. 3° 6"	15 ft. 3° 6"	20 ft. 3° 6"	25 ft. 3° 6"	30 ft. 3° 6"
3°	1 none	..	1 1	..	1 2
6°	2 "	2 1	2 2	2 3	2 4
12°	4 "	4 2	4 4	4 6	4 8
18°	6 "	6 3	6 6	6 9	6 12
24°	8 "	8 4	8 8	8 12	8 16
30°	10 "	10 5	10 10	10 15	10 20
36°	12 "	12 6	12 12	12 18	12 24
48°	16 "	16 8	16 16	16 24	16 32
60°	20 "	20 10	20 20	20 30	20 40
72°	24 "	24 12	24 24	24 36	24 48
90°	30 "	30 15	30 30	30 45	30 60

NATIONAL VITRIFIED CLAY CONDUITS

Made in Canada

Single Duct Butt Joint
3 $\frac{1}{4}$ -3 $\frac{1}{2}$ or 4 in. Round
Bore, 18 in. long.Single Duct Butt Joint
3 $\frac{1}{2}$ -4 in. Square Bore, 18
in. long.2 Duct Multiple
3 $\frac{1}{2}$ in. Square Bore, 24 in.
long.3 Duct Multiple
3 $\frac{1}{2}$ in. Square Bore, 24 in.
long.4 Duct Multiple
3 $\frac{1}{2}$ in. Square Bore, 36 in.
long.6 Duct Multiple
3 $\frac{1}{2}$ in. Square Bore, 36 in.
long.9 Duct Multiple
(Made only to order if in
quantities) 3 $\frac{1}{4}$ -3 $\frac{1}{2}$ in. Squar
Bore, 36 in. long.

Prices on application.

CABLE GRIPS

Kellems Junior Cable Grip



A recent development is a small cable grip Kellems Junior for pulling wire through branch-circuit conduits. This grip also pulls twisted telephone wire.

J0	$\frac{1}{4}$ x 6	One Wire No. 14, 12, 10 or 8.	\$1.6
J1	$\frac{3}{8}$ x 7	2 to 5 No. 14 Wires or equivalent.	1.7
J2	$\frac{1}{2}$ x 7	4 to 7 No. 14 Wires or equivalent.	1.8
J3	$\frac{5}{8}$ x 9	4 to 5 No. 8 Wires or equivalent.	2.2
J4	$\frac{3}{4}$ x 10	3 No. 6 or 3 No. 4 Wires or equivalent	2.5
J5	$\frac{7}{8}$ x 12	3 No. 2 Wires or equivalent.	2.7
J6	1 x 13	3 No. 1/0 Wires or equivalent.	3.0

UNDERGROUND CONDUIT USES

Underground Conduit is used quite generally for distribution and communication wires and cables under streets and along highways. There are many other places, however, where it can be used to equal advantage such as:

- Building Entrances
- Power Houses and Substations
- Bridges and Approaches
- Railway Yards and Signal Systems
- Subways, Tunnels and Viaducts
- Air Ports and Parks
- Canals and Harbors

CABLE GRIPS

KELLEMS PATENTED CABLE GRIP



Designed for attaching the pulling line to the end of a cable. Kellem's patented protection over the shoulder, making collar unnecessary, also patented endless weave which fits it to fit smoothly over the cable, and eliminates twisted ends.

Size Inches	List Price Each	List No.	Size Inches	List Price Each
1 x24	\$4.60	E110	2 1/2 x36	\$7.60
1 1/2 x24	5.10	E111	3 x36	8.10
2 x24	5.60	E112	3 1/2 x36	8.60
2 1/2 x24	6.10	E113	1 x48	7.60
3 x24	6.60	E114	1 1/2 x48	8.10
3 1/2 x24	7.10	E115	2 x48	8.60
1 x36	6.10	E116	2 1/2 x48	9.10
1 1/2 x36	6.60	E117	3 x48	9.60
2 x36	7.10	E118	3 1/2 x48	10.10

*CLOSED CABLE GRIPS



Closed cable grip is designed for pulling slack or recovering old cable.

1 x18	\$3.75	7	1 x24	\$4.75
1 1/2 x18	4.25	8	1 1/2 x24	5.25
2 x18	4.75	9	2 x24	5.75
2 1/2 x18	5.25	10	2 1/2 x24	6.25
3 x18	5.75	11	3 x24	6.75
3 1/2 x18	6.25	12	3 1/2 x24	7.25

*SPLIT CABLE GRIPS



Designed for use on a working cable. It can be attached at any point on a cable without cutting it.

1 x18	\$4.00	31	1 x24	\$5.00
1 1/2 x18	4.60	32	1 1/2 x24	5.60
2 x18	5.20	33	2 x24	6.20
2 1/2 x18	5.80	34	2 1/2 x24	6.80
3 x18	6.40	35	3 x24	7.40
3 1/2 x18	7.00	36	3 1/2 x24	8.00

New design, single eye closed and split cable grips is patented. This design is far superior to the old type double eye. The eye is placed flat against the cable thereby overcoming any tendency to mar the lead sheath.

Double eye grips are still supplied in the closed and split and the price is the same as for the new type single eye. If double eye grips are desired please so state in the order.

*UNIVERSAL SINGLE EYE CABLE GRIPS



Universal type pulling grip, made either single or double weave. Double eye grips are not endless protected.

1 x24	\$3.00	210	2 1/2 x36	\$4.75
1 1/2 x24	3.25	211	3 x36	5.00
2 x24	3.50	212	3 1/2 x36	5.25
2 1/2 x24	3.75	213	1 x48	5.00
3 x24	4.00	214	1 1/2 x48	5.25
3 1/2 x24	4.25	215	2 x48	5.50
1 x36	4.00	216	2 1/2 x48	5.75
1 1/2 x36	4.25	217	3 x48	6.00
2 x36	4.50	218	3 1/2 x48	6.25

Prices listed for closed, split, and Universal single eye grips are for double weave. If single weave is desired, add 50 cents from the prices listed.

SIMPLEX MANHOLE SHEAVE



No. 220 Manhole Sheave

The No. 220 Simplex Manhole Sheave is designed for pulling cable or carrying the winch line at right angles.

Suitable for any size cable up to 3 inch diameter or any size winch line.

It can be used on the end of a truck or over the top of a manhole in connection with a snatch block in the manhole eliminating the use of long heavy manhole skids.

Pulleys are fitted close so that winch line cannot catch between pulleys and side frame.

Edge of the side frame is rounded and finished smooth so that there is no danger of damaging winch line.

Frame is of malleable iron. Pulleys are of malleable iron with bronze bushings.

Furnished with a 1/4 inch chain 24 inches long, with special hook as shown for anchoring when winch line is released suddenly.

Diameter Small Sheave	4 3/4 in.
Width Small Sheave	3 in.
Diameter Large Sheave	7 3/4 in.
Width Large Sheave	3 in.
Weight	96 lbs.
List Price	\$40.00

MASSON CONDUIT RODS

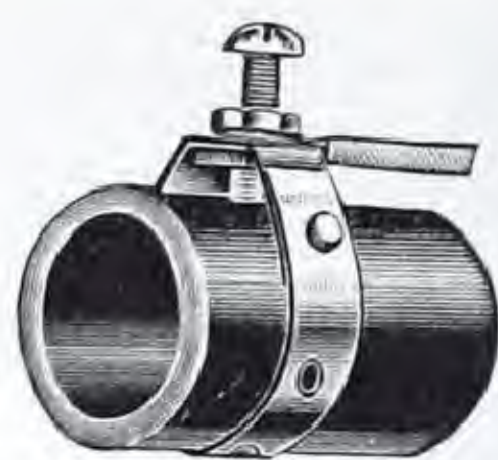


Masson Rods are the result of years of experience, gained through the actual use of various conduit rods. Both ends are the same, and all couplings being interchangeable, it is never necessary to watch ends or look for the proper coupling.

The castings are the best malleable iron obtainable. The sticks are hickory, or, in plain words, the best materials suitable to make a perfect rod.

List Price Each	\$1.50
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BLACKBURN GROUND CLAMPS



Type A-1

They are simple in construction, being composed of a flexible perforated copper band to encircle the pipe, and a removable copper lug, with a boss raised on the flat end that fits into perforations in the band, and through which is threaded the tightening screw with lock-nut.

The lug is drilled for a No. 4 ground wire, ready for soldering while the flat end with boss is milled to give a clean, smooth contact surface on which to clamp the band.

Lugs furnished on Nos. 3, 4, 5 and 6 only.

For Telephone and Radio Circuits

List No.	List Price per 100
0.....	\$12.00
A-1.....	14.00
2.....	16.00

No. 0 fits 1/2-inch ground rods.

No. A-1 fits 3/8, 1/2, 3/4, 1 and 1 1/4-inch pipe.

No. 2 fits 1 1/2, 2, 2 1/2, and 3-inch pipe.

PARAGON GROUNDS



Cone

Made of one continuous piece of No. 22 pure sheet copper from bottom of ground to point of connection with leading-in wire above surface of the earth. Five feet of No. 4 soft copper connecting wire copper welded to each ground. Gives permanent protection to electrical equipment from lightning and other excess potential and high tension crossed.

Made in two hollow shapes, cones and cylinders, one-foot length and two-foot length, as the capacity demanded may require. The cones are perforated to give ample discharge points and filled with charcoal to give uniform filling and attract and hold moisture in the earth around the cone. The cylinders are not

perforated and are furnished either filled with charcoal or open at both ends, with no charcoal filling, as conditions may require.



Cylinder

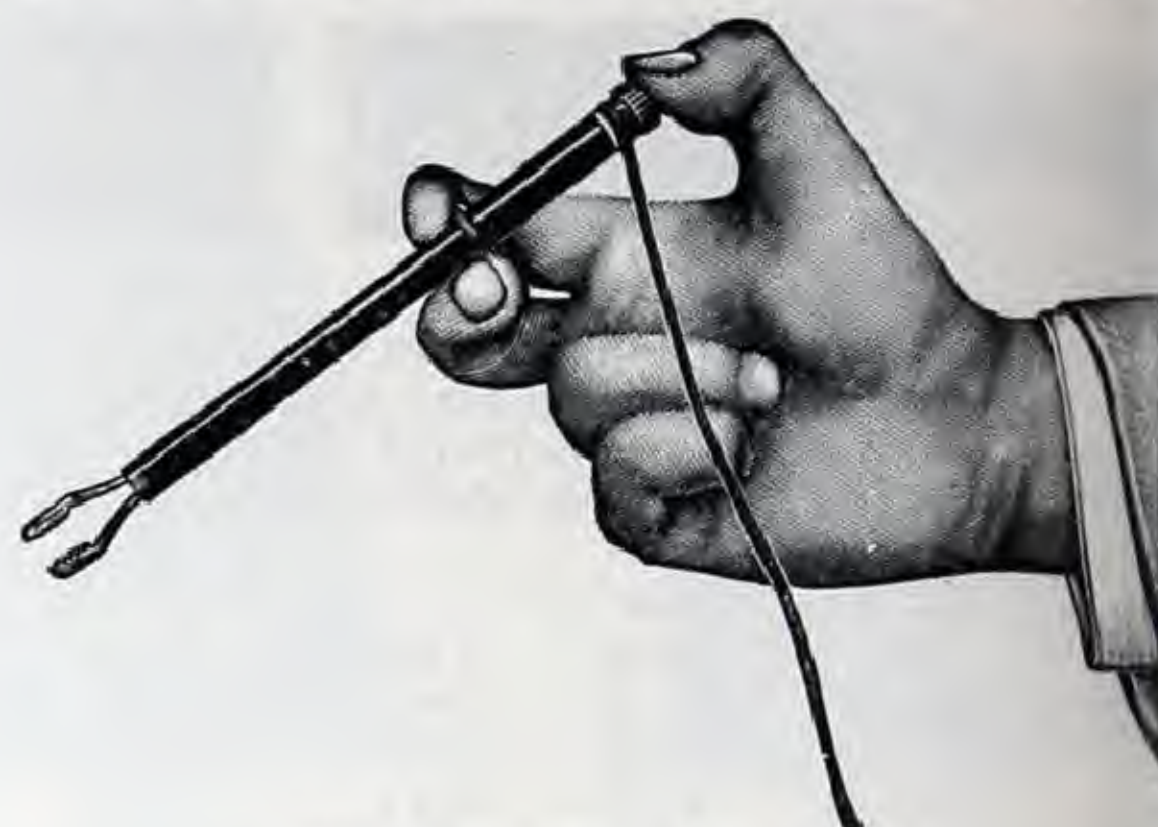
A dependable and durable ground on the market at a moderate price for electric light, power, telephone, telegraph and trolley installations; accurately designed and correctly constructed.

Shape	Length Feet	List Price Each
No. 1 Cylinder (Solid).....	1	\$5.00
No. 2 Cylinder (Solid).....	2	6.25
No. 3 Cone (Perforated).....	1	5.00
No. 4 Cone (Perforated).....	2	6.25

All No. 22 Gauge Copper.

THE SNAPPER

A new kind of test clip. A "Triple Threat" radio t



The Snapper. No. 83

The long tube is of insulating material and is fitted with spring contact jaws on the far end. The jaws are operated by a push of the thumb on the near end.

Wire is quickly and easily connected under the insulating knob binding post on the near end.

It May Be Used As:

1. A "Deep Sea" Electric Test Clip—Test contacts may be made with ease, deep in the recesses of a radio chassis with no danger of short circuits. You can reach spots never thought of reaching before without tearing down the whole chassis.
2. An Electric Contact Prod—The clip jaws may be used to make quick prod contacts. Or better still—clip The Snapper on the ground circuit and prod with another.
3. A Retriever—Use the Snapper to start small screws, nuts or pick up odds and ends that may accidentally be dropped into inaccessible places.

Also used by central stations for meter testing.

Packing

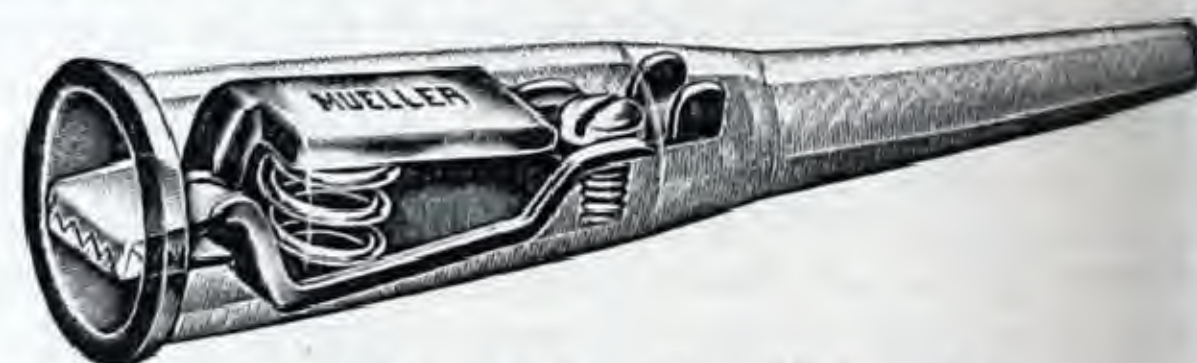
Snappers are packed two in a box—one red and one black. Jobbers should order in counter display cartons containing 100 Snappers. Shipping weight, 6 lbs. per 100 Snappers.

RUBBER INSULATORS

For use with Universal Clips

RED AND BLACK INSULATORS TO FIT EVERY MUELLER CLIP

They are a convenient protection against electric shock and prevent clips from shorting on each other.



No. 27 Clip with a No. 29 Insulator

Packed half red and half black—10 to a box—10 boxes to a standard carton.

Insulators are listed below according to size—from smallest to the largest.

List No.	For Use with Clip No.	Ship. Wgt. Lbs. per 100	Price Each
87	85 Alligator Clip.....	1	\$0
47	45 Pee-Wee; 45-OS Solid Copper.....	1 3/4	
49	48-B; 48-C Solid Copper; 82 Needle Clip.....	4	
74	48-B-OS—For 7mm Ignition Cable.....	4	
29	27; 27-C Solid Copper.....	5	
26	24-A; 24 Solid Copper.....	9	
23	21-A; 21 Solid Copper.....	16	
13	11-A; 11 Solid Copper.....	24	
35	33 Solid Copper.....	30	1

UNIVERSAL CLIPS

crew or lug connections—no solder required—strong metal-construction throughout. Polarity indications + for positive, plain for negative.



No. 45

No. 45 Pee Wee, Steel, Cadmium Plated, $1\frac{1}{2}$ " Long
No. 45—5 ampere capacity. A small test clip for radio, ion, meter and similar work. Jaws have meshing teeth. Locking necks. 7 lb. spring insures good contact. Jaw spread, $\frac{1}{2}$ ".
Price, each.....\$0.07½



No. 48-B

No. 48-B, Steel, Cadmium Plated, 2" Long
No. 48-B—10 ampere capacity. A small test and battery for radio use and general testing purposes. Also used as standard equipment on ignition test sets, soldering irons, roplating racks, etc. Jaws have meshing teeth. 10 lb. spring. Jaw spread, $\frac{9}{16}$ ".
Price, each.....\$0.10



No. 27

No. 27, Steel, Cadmium Plated, $2\frac{5}{16}$ " Long
No. 27—10 ampere capacity. Suggested for use with test with voltmeters, on shop testing devices, by telephone men, by meter departments, by railway signal inspectors, college and commercial laboratories, and in radio work. Teeth on all three sides of both jaws. A high grade test clip. 10 lb. spring. Jaw spread $\frac{1}{16}$ ".
Price, each.....\$0.20



No. 24-A

No. 24-A, Steel, Lead Plated, $2\frac{1}{2}$ " Long
No. 24-A—25 ampere capacity. A medium sized clip for radio storage batteries. Teeth on one jaw and notch on other, so that it will stand erect on a round battery post without lopping over. 17 lb. spring. Jaw spread, 1".
Price, each.....\$0.15



No. 21-A, Steel, Lead Coated, $3\frac{7}{8}$ " Long

No. 21-A—50 ampere capacity. For battery service station. Equally suitable for Constant Potential or Series charging. In radio work, recommended on portable and A.C. for the ground connection. 33 lb. spring protected by a lead coated copper shunt. Jaw spread, $1\frac{1}{2}$ ".
Price, each.....\$0.30



No. 11-A, Steel, Lead Coated, $5\frac{11}{16}$ " Long

No. 11-A—100 ampere capacity, but will carry several hundred amperes on short tests. For battery discharge test and general testing purposes. Equipped with lead-coated copper lug for attachment of cable. 38 lb. spring. Jaw spread, 1".
Price, each.....\$0.85

SOLID COPPER CLIPS

High Grade Current Carrying Clip for General Testing Purposes

Same size as No. 48-B Steel Clip. A small clip with good jaw spread. Well suited for testing high capacity automobile generators. 10 lb. spring. Jaw spread $\frac{9}{16}$ ".

No. 48-C—Solid Copper

10 Ampere Capacity—2" Long. List Price, each.. \$0.16

No. 24—Solid Copper

Same size as No. 21-A Clip, except that it is equipped with copper lug for attachment of cable. For general testing. 33 lb. spring. Jaw spread $1\frac{1}{2}$ ".

25 Ampere Capacity— $2\frac{1}{2}$ " Long. List Price, each.. \$0.24

No. 21—Solid Copper

Same size as No. 24-A Clip. For general test work. 17 lb. spring. Jaw spread 1".

50 Ampere Capacity— $4\frac{1}{2}$ " Long. List Price, each.. \$1.00

No. 11—Solid Copper

Same size as No. 11-A Clip. Equipped with copper lug for attachment of cable. For general testing. Will carry several hundred amperes on short tests. 38 lb. spring. Jaw spread $1\frac{1}{4}$ ".

100 Ampere Capacity— $5\frac{7}{8}$ " Long. List Price, each \$1.40

No. 33—Solid Copper

The largest test clip made. Equipped with copper lug for attachment of cable. For general testing. Used to ground gasoline tank cars and trucks, on thawing machines and to ground welding apparatus. 52 lb. spring. Jaw spread 2".

200 Ampere Capacity— $7\frac{1}{4}$ " Long. List Price, each \$2.20

SOLID COPPER RADIO FREQUENCY CLIPS

No. 45-OS—Solid Copper

With Phosphor Bronze Spring and Brass Screw

ENTIRELY NON-FERROUS

Equipped with phosphor bronze springs and brass screws.

Ideal for high frequency test work. These clips will not heat up because the hysteresis effect is absent.

Popular with radio servicemen and amateurs.

No. 45-OS Solid Copper. 10 ampere capacity, $1\frac{1}{2}$ " long. Jaw spread $\frac{3}{8}$ ". A small clip for use on coils and helices.

List Price, each.....\$0.16

No. 27-C Solid Copper, same size as No. 27 Clip. 10 ampere capacity. $2\frac{1}{4}$ " long. Jaw spread $\frac{1}{2}$ ". Teeth on three sides of jaws. A high grade test clip for general high frequency use. List Price, each.....\$0.29

NEEDLE CLIP



No. 82 Steel, Cadmium Plated, 2" Long

For Telephone and Signal Work

To make quick, temporary electrical connections by piercing insulated wires.

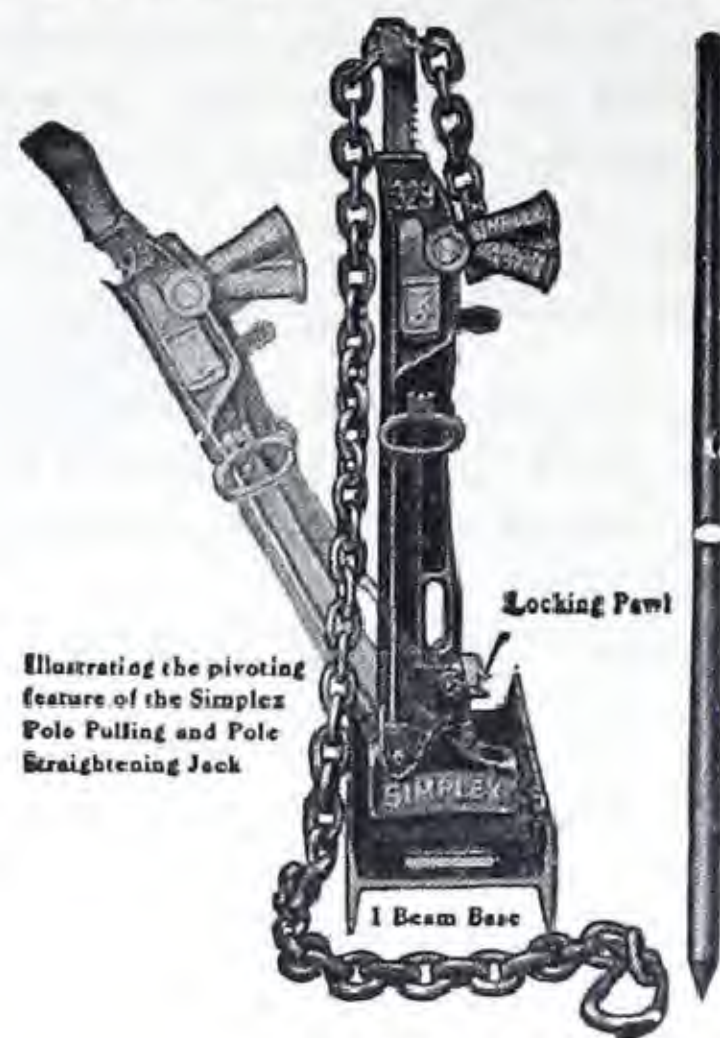
No. 82—10 ampere capacity. Ample jaw spread for any telephone wire or fuse terminal. Screw connection. 10 lb. spring. Has no awkward projecting parts. The needle is set to one side so it is easy to locate on a wire and so that jaws will grasp a terminal if needle is not used.

List Price, each.....\$0.16

SIMPLEX POLE JACK

Capacity 15 Tons

Single Acting—Automatic Lowering



No. 329



The No. 329 Simplex Pole Pulling Jack was designed for pulling, straightening and moving heavier poles, and has accomplished remarkable records in reducing maintenance costs.

It is the standard pole pulling jack of the Bell Telephone Systems, and is listed in "The Book of Approved Standard Tools" issued by the American Telephone and Telegraph Company, and also that of the Western Union Telegraph Co. Thousands of other well known telephone, electric railway and power companies in this country and abroad have endorsed and approved its merit.

The No. 329 Simplex will pay for itself in less than fifty hours.

- 1—By pulling or straightening or moving poles.
- 2—By reducing pole line maintenance or construction costs.
- 3—By conserving men and their strength.

The power and leverage of the No. 329 makes it possible for one or two men to pull or straighten poles regardless of size or depth in ground without digging.

Pulling pole stumps or moving loaded poles without interference to the overhead wires is a simple job with the No. 329 Simplex. The mechanism and construction of this jack insures continual service under the most severe conditions.

The No. 329 is automatic in raising and lowering, and cannot be tripped. It is furnished with the following equipment: 8-ft. steel chain, 5-ft. steel pinch bar and 10" x 24" I-beam base with hand hole punched.

Specifications

Capacity, 15 tons; height, 37½ inches; lift, 21 inches; weight (without equipment), 96 lbs.; (with equipment), 193 lbs.

List Price.....\$75.00

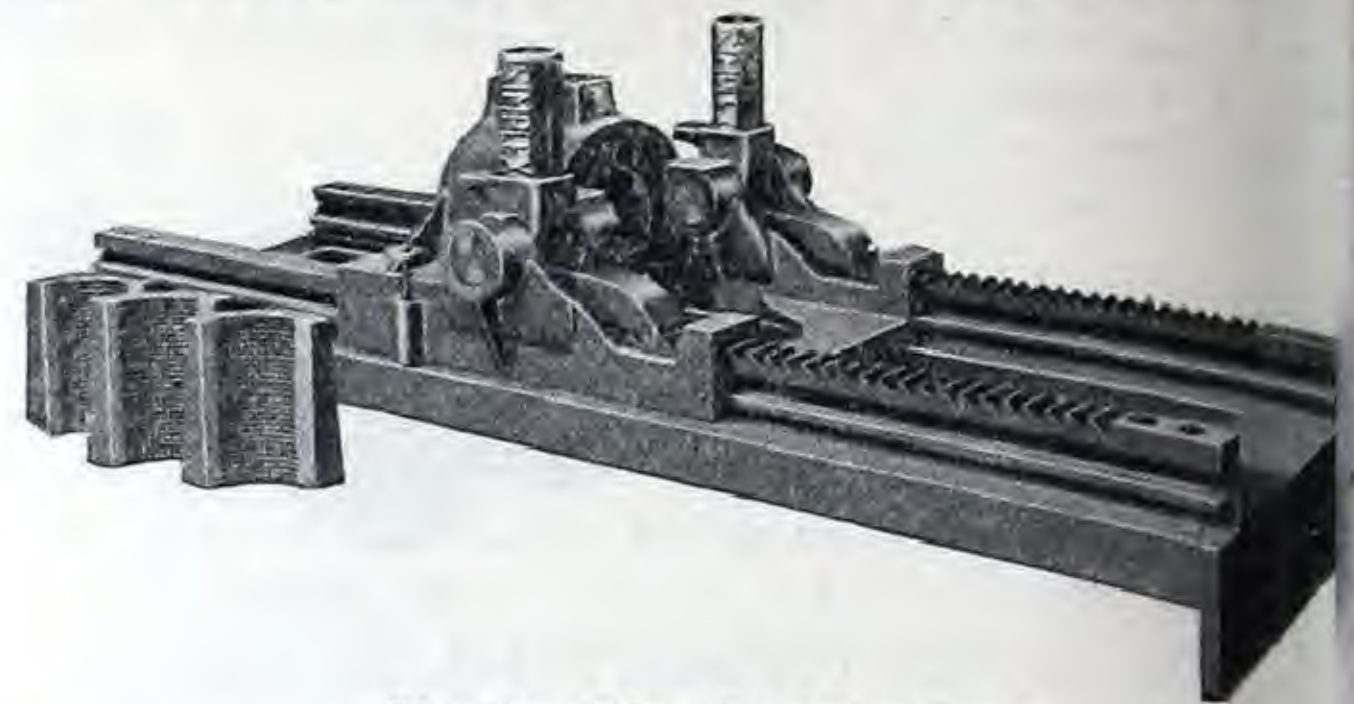
No. 325 SIMPLEX POLE JACK

A combination pushing and pulling jack. It is light and sturdy, a one-man, 5-ton capacity maintenance jack and is furnished with pike pole, steel chains, detachable base, and steel lever pole.

Capacity—tons.....
Height—inches.....
Lift—inches.....
Weight without equipment—lbs.....
Weight with equipment—lbs.....
Price.....\$45



SIMPLEX PIPE-PUSHING JACK



Simplex Pipe-Pushing Jacks

No. 332 and 334 pipe-pushing jacks are designed for pushing pipe through the most unfavorable soil conditions with crushing or distorting the pipe. May be operated by two or four men without interruption to traffic, switches, signals, drainage. Each size of pipe requires set of tapered jaws in order that the pipe will not be crushed and that the full pushing power of the jacks can be utilized.

No. 332—Simplex Pipe-Pushing Jack, complete with set of tapered jaws, two 1¼" x 42" steel lever bars and 2" x 5 ft. steel pipes for extending lever bars. The No. handles pipe ¾", 1", 1¼", 1½", 2" in diameter. Specify the size tapered jaws required.

List price complete.....\$110
Extra tapered jaws—per set.....12
Weight of Jack complete.....195
Weight of Jack without equipment.....140

Equipment consists of set of tapered jaws, steel lever bars and extension pipes.

No. 334—Simplex Pipe-Pushing Jack, complete with set of tapered jaws, two 1¼" x 42" steel lever bars and 2" x 7 ft. steel pipes for extending lever bars. The No. handles pipe 2", 2½", 3", 4" in diameter. Specify the tapered jaws required.

List price complete.....\$150
Extra tapered jaws—per set.....15
Weight of Jack complete.....298
Weight of Jack without equipment.....210

Equipment consists of set of tapered jaws, steel lever bars and extension pipes.

SIMPLEX CABLE REEL JACKS



No. 320

Designed to handle reels from 20" to 60" in diameter. Mounted on an oak base 1 3/4" thick by 8 1/2" wide by 20" long and fitted with special cast steel auxiliary shoe, having 3 points of lift. Readily adapted for inside warehouse service.

No.	320
Capacity	5 tons
Height	11 inches
Total height, cap when down	21 1/2 "
Total height, cap when raised	31 1/2 "
Total height, lower shoe when down	10 "
Total height, lower shoe when raised	20 "
Weight	46 pounds
No. 320, List Price, each	\$35.00



No. 321

Designed to handle reels from 20" to 96" in diameter. Mounted on an oak base 1 3/4" thick by 9 1/4" wide by 28 1/2" long, and fitted with special cast steel auxiliary shoe having 5 points of lift, also a large sized swivel cap giving five points of lift. On account of the straight base is more readily adaptable for inside service.

No.	321
Capacity	10 tons
Height	14 1/2 inches
Total height, cap when down	35 "
Total height, cap when raised	49 "
Total height, lower shoe when down	10 "
Total height, lower shoe when raised	24 "
Weight	108 pounds
No. 321, List Price, each	\$50.00

SIMPLEX SCREW TYPE CABLE REEL JACK

Nos. 1 and 2



The Simplex Screw Type Cable Reel Jacks are built to handle any standard weight reel and are quick acting with the use of the three-way nuts. To operate, place one of the jacks on each side of reel, lift the screws up so that the "U" shaped cap rests under the spindle that has been put through the reel, and spin the nuts down by hand. Lift the load by using a 3/4" lever bar inserted in the three-way nut. The No. 1 Screw Type Cable Reel Jack will handle reels from 42 to 60" diameter, while the No. 2 handles reels from 60 to 90" diameter.

Size of Screw 1 7/8" diameter.

Description	No. 1 Simplex Cable Reel Screw Jack	No. 2 Simplex Cable Reel Screw Jack
Min. height of bearing point in yoke	19 5/8 inches	29 3/4 inches
Max. height of bearing point in yoke	31 1/8 inches	46 1/4 inches
Lift	11 1/2 inches	16 1/2 inches
Length of base	26 inches	39 1/2 inches
Width of base	12 inches	15 1/2 inches
Weight per Jack	51 lbs.	89 lbs.
List Price, per pair	\$36.00	\$48.00

No. 322

Specially designed for cable reels of 36 to 84" diameter. Furnished in pairs, one right and one left, so that men operating jacks are working on the same side of reel and raising it uniformly. The practical use of steel bracing, right and left hand thread, allows for the continuous alignment of the jack and the oak base, under all conditions of wet and dry weather. Note rigid connections between braces and the oak base. Automatic double acting jack operating on the upward and downward stroke. Lifts 5/16-inch on each stroke, allowing for the practical leveling of any cable reel.

Base is of No. 1 kiln dried oak and standard is made of malleable iron. Lever socket is hardened steel casting. Rack bar and pawls are forgings, heat treated.

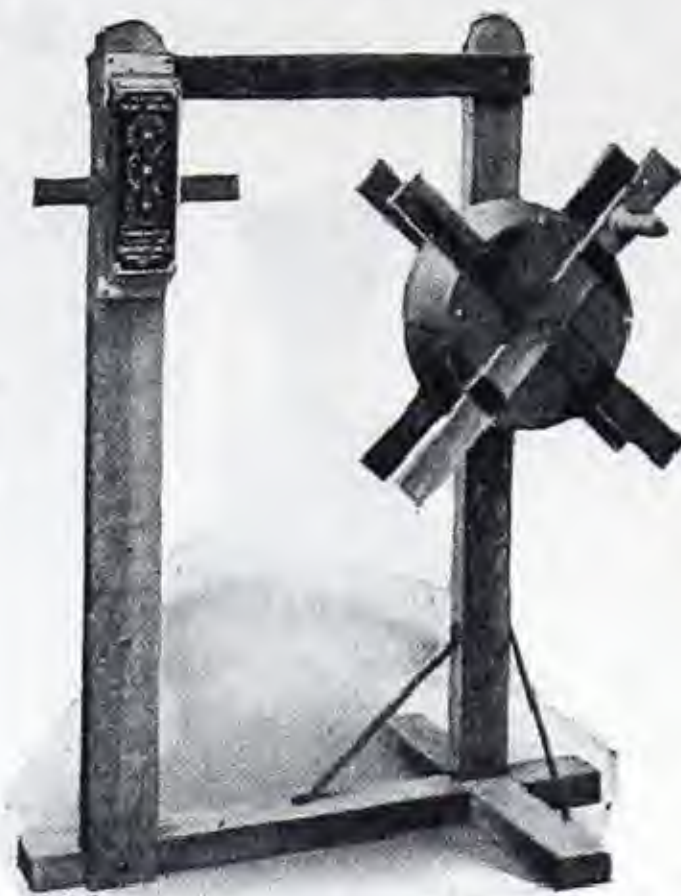


List No.	322
Capacity	10 tons
Lift	14 inches
Total height cap when down	29 "
Total height cap when raised	43 "
Total height shoe when down	17 "
Total height shoe when raised	31 "
Weight, without bar	104 lbs.
Weight, complete	118 "
List Price, each	\$65.00

WIRE REEL AND METERS



Counter Meter



Wire Reel Stand and Meter

The Wire Reel and Meter is a most desirable machine for measuring the various sizes of wire, cordage, etc., and should be in use by all dealers and contractors handling electric wire. It will save time and money and a short time will demonstrate its great value.

In the meter the wire passes between two self-adjusting rollers, which admit of wide range, and will measure accurately large or small sizes. The pointers are movable and readily adjusted to zero point.

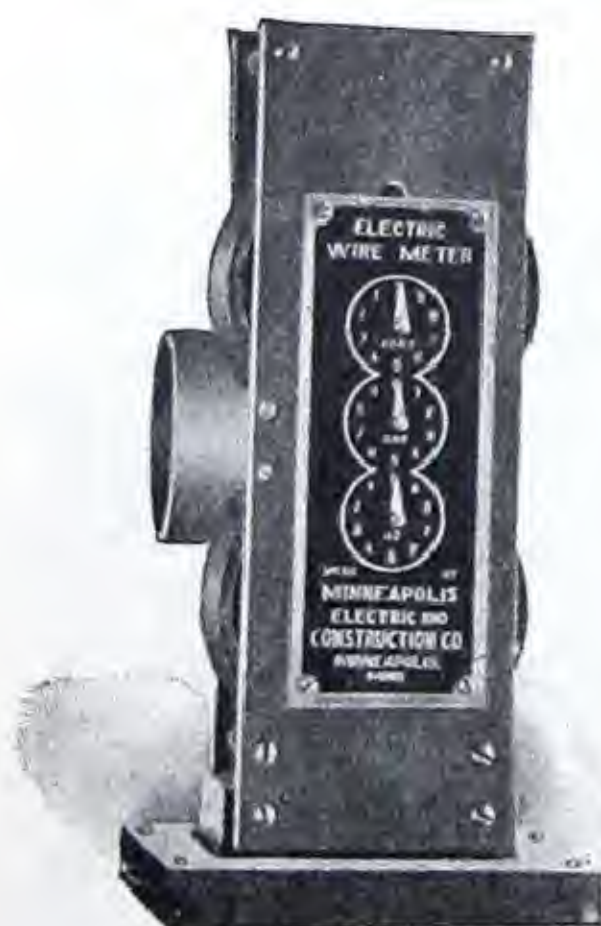
The reel is provided with removable cross bars, and the drum with grooves so the coil can be bound with tie wires and removed in compact form. The meter shows the number of feet in the coil and does away with measuring on the floor.

The reel and meter being movable, and occupying small space, can be placed where convenient for measuring and set aside when not in use.

The counter meter is intended to be fastened to a counter for use where the reel and frame are not desired. The cable meter will measure small sizes of wire as well as large cables, flexible conduit rope, etc.

The New Type R is a small reel winding a coil five inches in diameter attached to our counter type of meters.

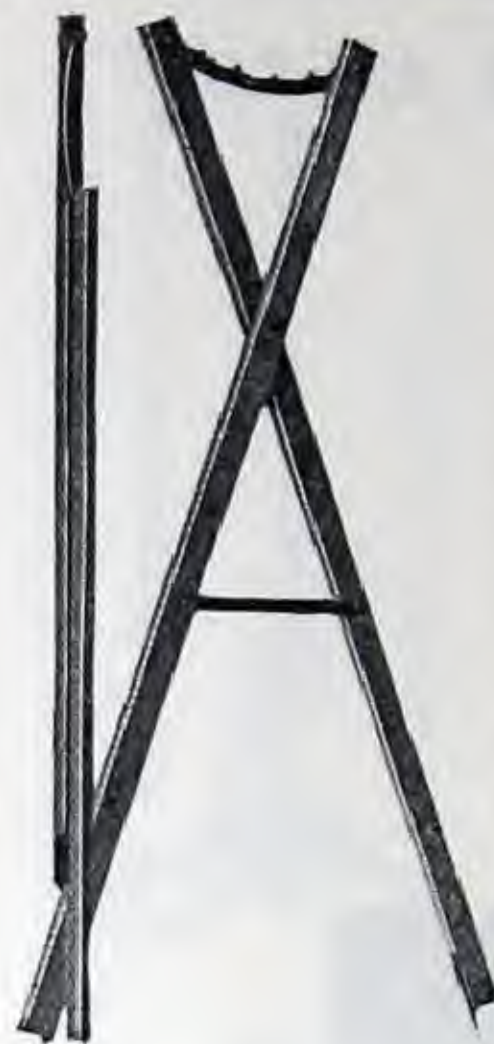
A very useful instrument in measuring radio aerial wire, bell wire, magnet wire or any small wire that is sold over the counter in small quantities.



Cable Meter



Description	List Price Each
Reel and Meter.....	\$43.75
Meter only.....	28.75
Counter Meter.....	30.00
Cable Meter.....	43.75
Counter Meter with Type R Reel.....	41.25
Small Reel only.....	12.00
Payout Reel.....	20.00



JENNEY PATTERN WOOD POLE SUPPORTS

Made of Washington fir with forged steel fork. Steel pikes are placed in the bottom to prevent it from slipping on hard ground. This support is collapsible and has steel bushed holes where there is any wear. An exceedingly light, strong, safe, pole support.

List No.	Size	Size of Wood	Wgt. Each	List Price Each
842.....	6'	1 3/4" x 3"	25 lbs.	\$18.25
843.....	7'	1 3/4" x 3 1/2"	30 lbs.	20.85
844.....	8'	1 3/4" x 3 1/2"	35 lbs.	22.85

BARROW REELS



Made of hard rock maple strongly reinforced with angle iron braces. Rests on long steel legs. Has a large diameter pivot and is made for heavy work.

List No.	Wgt. Each	List Price Each
900.....	80 lbs.	\$43.75
901 Extra Pins, per set of four.....	4 lbs.	5.10

COMMON PAY-OUT REELS



Made of hard rock maple, well constructed and reinforced throughout with steel.

List No.	Wgt. Each	List Price Each
902.....	40 lbs.	\$25.00

FOLDING TAKE-UP REELS



The reel part collapses and automatically throws off the coil at the same time and in an instant ready for another coil. The frame made of heavy hard wood, is strong and heavily reinforced throughout and folds up like a hinge.

It can be taken down in a moment by merely pulling the pin out of the shaft, throwing off the coil and folding up the frame.

List No.	Size of Coil	Wgt. Each	List Price Each
897.....	21"	42 lbs.	\$39.00

B. & S. WIRE GAUGE

American Standard

For Measuring	List
B. & S. Gauges	Price Each
0-36	\$3.00



B. & S. Gauge
Nos. 0 to 36

MICROMETER CALIPERS



English measure range 0 to 1/2 inch by thousandths of an inch or metric measure range 0 to 13 mm. by hundredths of a millimeter.

Description	List Price Each
4 Plain Micrometer.....	\$7.00
4 R S Ratchet Stop Micrometer	7.50
Other case for either of above.....	1.20

TELEPHONE COUNTER

This counter is used particularly on telephone switchboards and at desks where telephones are located, to keep track of the number of outgoing calls. It fits into a permanent socket flush with the desk. The counter may be inserted or removed at will. Each time the lever is depressed the counter registers one. Five figures on the dial give a record up to 100,000, then repeat.



Price, each.....	\$3.25
Socket Plate.....	2.45

HAND TALLY COUNTER

With Quick Reset



The Hand Tally No. AB2 is small; with rounded corners so as not to irritate the hand of the user, nor wear the pocket when carrying it. The finger-ring is so located that the counter may be held in either hand. There are four figure-wheels (registering up to 10,000). The set-back device returns the figures to zero by one turn of a knob.

List No. AB2 List Price, each \$6.50

HKP TREE TRIMMERS



No. 1

HKP No. 1 FORESTER

20 inches long; capacity, 1 3/8 inches; weight, 2 lbs., 10 oz.

A small pruner only 20 inches long, especially designed for the fruit grower and with a capacity up to 1 3/8 inches in green wood. It operates easily, is handy because of its small size, and has the very desirable quality of cutting close to the trunk. Because of the design of the blades, both of which are sharp, it cuts clean and without damage to the bark. This tool is also recommended for pruning young stands of pine. The clean, close cutting features largely eliminate danger of pitch pockets and bark bruises which so frequently detract from the value of forest pruning programs. The No. 1 Forester is handy for the home gardener, too, for light shrub cutting, root cutting, and any general clearing up to the capacity of the tool. It will appeal to the woman gardener because of its handy size and comparatively high power.

List Price, each..... \$4.25

HKP No. 2 FORESTER

27 inches long; capacity, 1 1/2 inches; weight, 4 lbs., 10 oz.

This tool is 27 inches long and has a capacity up to 1 1/2 inches in green wood. It does everything that the No. 1 size will do, and with its greater capacity is also suitable for forest pruning, brush and shrub cutting, and root cutting. It is especially recommended as a forestry tool where pine pruning and rust control programs are being carried out, and is easy to use at the maximum reach of tool and arms. The comparatively narrow spread of the handles when the blades are open makes it convenient in close growth. Ample in capacity for general clearing and brush cutting on the farm and in the forest, this sturdy tool will surprise the user by its ability to "stand the gaff." When the handles are extended the tool is straight loading. As the handles close, draw cutting (because of scientific blade design) produces a clean close cut free from bark bruises and conforming to best forestry practice.

List Price, each..... \$5.50

HKP No. 3 FORESTER

34 inches long; capacity, 2 inches; weight, 7 lbs., 4 oz.

The HKP No. 3 Forester is an amazingly powerful tool, easily capable of cutting up to its rated capacity in any so-called hard wood such as oak, maple, and beech. Its wide use in emergency conservation work is the result of careful tests which proved conclusively the efficiency and durability of the tool. We make no extravagant claims for this tool, but we know it is a distinct contribution to present forestry equipment. We list below a few of its more important uses:

- Clearing rights of way for power companies.
- General clearing for foresters and contractors.
- Clearing wood lots and pastures for the farmer.
- Road side stripping and root cutting in erosion work for highway departments.
- Root cutting in pipe trenches for water departments.
- Useful, too, for the telephone companies, tree surgeons, fire wardens, etc.

List Price, each..... \$7.00

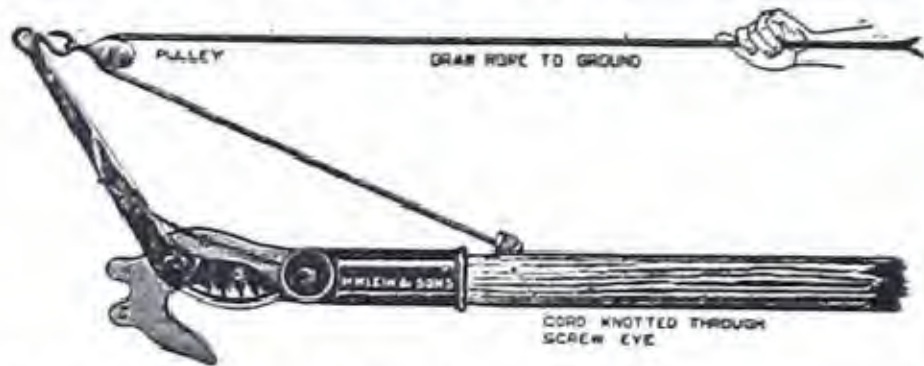
LEACH TREE TRIMMER



Made with a light steel head and a thin, high-grade saw steel knife, equipped with genuine old-growth yellow Washington fir handle $1\frac{1}{2}$ inches in diameter, made in three sections, connected with positive locking ferrules. This tree trimmer will easily cut a $1\frac{1}{2}$ -inch limb. It is light and works very easily. The section with the head attached measures 6 feet long and the extensions are each 7 feet long. Together they make a handle 20 feet long, which can be taken apart and bundled together into a 7-foot length.

List No.	Wgt. Each	List Price Each
915 Trimmer complete.....	13 lbs.	\$13.85

KLEIN'S FAVORITE TREE TRIMMER



The head is constructed of malleable iron, and comprises the hook portion with which the knife operates and the socket into which the handle is inserted. This socket is perfectly straight, eliminating the necessity of tapering the end of the handle. The knife is forged from crucible steel and is integral with the lever and the cutting edge is carefully tempered and ground, making it very effective. This trimmer will sever a 1-inch branch. The knife is held open by a flat steel spring and is operated by rope attached to the end of the lever.

Two threaded holes are provided for attaching a saw.

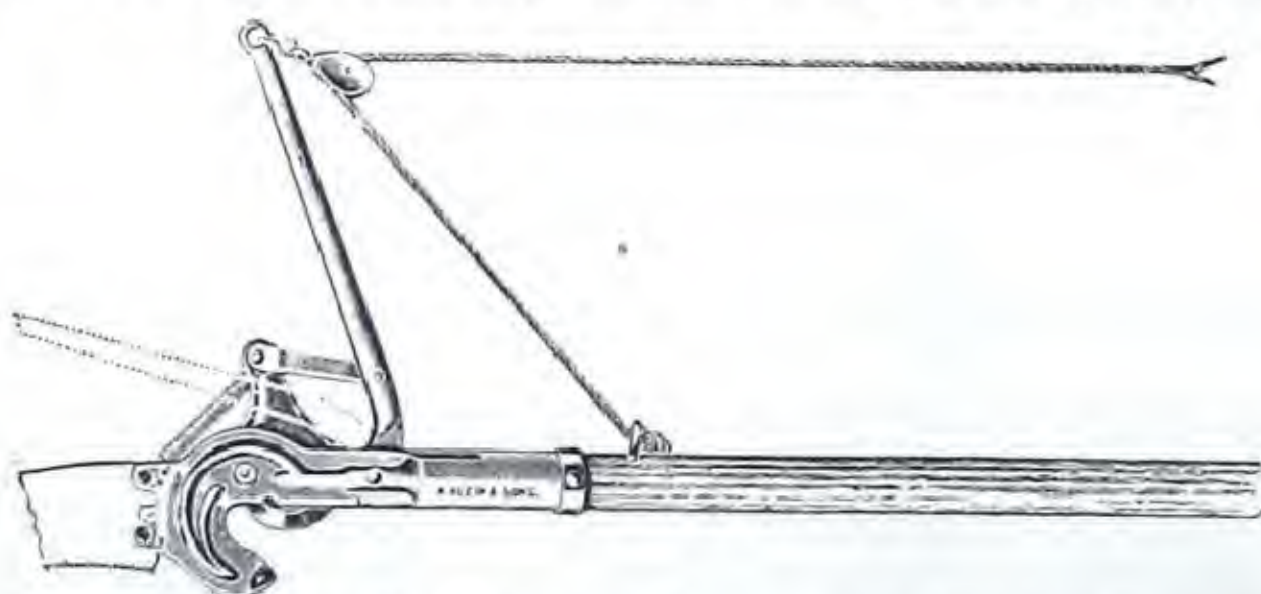
List No.	Size	Wgt. Each	List Price Each
3600-20	19" over all (without saw)...	$3\frac{1}{2}$ lbs.	\$ 8.40
3600-21	21" over all (with saw).....	4 lbs.	11.00

HANDLES FOR TREE TRIMMERS

3601-9	Two-piece (9 ft. each) 18 ft., per set.....	\$7.47
3601-6	Three-piece (6 ft. each) 18 ft., per set.....	8.86

These handles are made from straight grained lumber and are jointed with heavy brass ferrules.

No. 3628 (Patented) KLEIN TREE TRIMMER



This tool is entirely different from any other on the market. The entire head comprising hook and socket into which handle fits is sturdily constructed of pressed steel. The knife, made of tempered tool steel, is round in shape and arranged to rotate slightly with each cut thus providing the entire circumference of the blade for cutting and giving an edge more than three times the length of that on the ordinary blade.

The leverage makes this trimmer cut easily, limbs up to $1\frac{1}{4}$ inches, both green and dry. So arranged that knife may readily be removed for sharpening or renewal. Two threaded holes are provided for attaching saw.

List No.	Size	Wgt. Each	List Price Each
3628	$12\frac{1}{2}$ inches over all.....	$3\frac{1}{2}$ lbs.	\$8.40

KLEIN TREE-TRIMMER SAW

No. 913-15



Teeth set to cut an up and down stroke. Readily attached to tree trimmer. The curved blade makes this a very efficient and easy cutting saw even for large limbs.

List No.	Size	Wgt. Each	List Price Each
913-15.....	15"	$\frac{1}{2}$ lb.	\$2

KLEIN SAW GRASP

No. 913-G



When a hand saw is required the regular tree-trimmer can be set in this grasp in a few seconds and is held secure with a single thumb screw. Makes an efficient hand saw cutting heavy branches.

List No.	Wgt. Each	List Price Each
913-G.....	$\frac{1}{2}$ lb.	\$2

SHOVELS

STANDARD ROUND POINT SHOVEL



Equipped with high carbon steel blades and select north white ash handles. Handle bent to the proper angle for most efficient work.

List No.	Size Feet	Wgt. Lbs. Each	List Price Each	Extra Handle List No.	Wgt. Lbs. Each	List Price Each
1090R.....	$4\frac{1}{2}$	5	\$2.70	1091	2	\$0

STANDARD D HANDLE ROUND POINT SHOVEL



Equipped with high carbon steel blades and select north white ash handles. Handle bent to the proper angle for most efficient work.

List No.	Wgt. Lbs. Each	List Price Each	Extra Handle List No.	Wgt. Lbs. Each	List Price Each
1092R.....	4	\$2.55	1093	2	\$0

POST HOLE SPOONS



Eastern Pattern



Western Pattern

Made with high carbon steel blades, with 22-inch straps, and equipped with rock maple or northern white ash handle. Extra heavy handles furnished.

Maple Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
359E.....	7	9		\$5.90	993	4	\$2.70
360E.....	8	10		6.15	994	5	3.00
361E.....	9	11		6.40	995	6	3.30
362E.....	10	12		7.00	996	7	3.75

Ash Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
323E.....	7	9		\$6.35	1005	6	\$3.75
324E.....	8	10		6.95	1006	6	4.20
325E.....	9	11		7.45	1007	7	4.95
326E.....	10	12		8.00	1008	7	5.75
327E.....	12	14		9.00	1009	8	6.65



STANDARD CROOKED LONG HANDLE SHOVELS

Maple Handles

List No.	Size Feet	Strap	Wgt.		List Price Each	Extra Handles		List Price Each
			Lbs.	Each		List No.	Lbs.	
374....	7	22"	8		\$5.40	1000B	4	\$4.25
375....	8	22"	9		5.95	1000	5	4.90

Ash Handles

List No.	Size Feet	Strap	Wgt.		List Price Each	Extra Handles		List Price Each
			Lbs.	Each		List No.	Lbs.	
340....	7	22"	8		\$5.95	1014	6	\$3.25
341....	8	22"	9		6.50	1015	6	3.60
342....	9	22"	10		7.05	1016	7	4.20
343....	10	22"	11		7.35	1017	7	4.95

OSHKOSH LONG STRAIGHT HANDLE SHOVELS



These shovels are used for digging or loosening dirt and lining up the sides of post holes. The blade as well as the handle is straight from tip of blade to end of handle. This feature gives the shovel added stiffness and makes easier work. The blade is made of high-grade steel, and has 22-inch straps attached. The handle is furnished in either Northern Ash, hickory or hard rock maple and is extra heavy.

Maple Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
367.....	7	8		\$5.40	993	4	\$2.70
368.....	8	9		5.95	994	5	3.00
369.....	9	10		6.35	995	6	3.30
370.....	10	11		2.00	996	7	3.75

Hickory or Ash Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
332.....	7	8		\$5.95	1005	6	\$3.75
333.....	8	9		6.50	1006	6	4.20
334.....	9	10		7.05	1007	7	4.95
335.....	10	11		7.55	1008	7	5.75

For hickory handle, add letter H to List No.

OSHKOSH LIGHT TAMPING BARS



This tamping bar is made of rock maple with a 1/4" steel shoe riveted to the wood. Handle is 2" in diameter under head tapering to 1 1/2" at end. Tamping head is 1 3/4" x 4".

Extra Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
854.....	7	13		\$7.15	1002	7	\$5.50
855.....	8	14		8.10	1003	8	5.85
856.....	9	16		8.80	1003A	9	6.10

OSHKOSH HEAVY TAMPING BAR

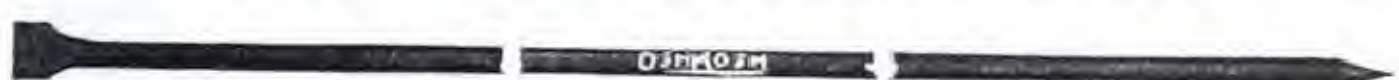


For those users who prefer a small heavy tamping head. It is made of rock maple with a 1/2" thick shoe riveted to the head. The handle measures 1 5/8" in diameter. The tamping surface measures 1 1/4" x 3 1/2". It is well balanced and very efficient.

Extra Handles

List No.	Size Feet	Wgt.		List Price Each	Extra Handles		List Price Each
		Lbs.	Each		List No.	Lbs.	
1054.....	7	13		\$6.50	2002	5	\$4.45
1055.....	8	15		7.20	2003	5	4.90
1056.....	9	17		8.10	2003A	6	6.00

CROW AND DIGGING BARS



Made of special octagon crucible steel, exceedingly tough and stiff.

List No.	Size	Wgt.		List Price Each
		Lbs.	Each	
1061.....	1 "x7'	20 lbs.		\$8.75
1062.....	1 "x8'	23 lbs.		9.25
1064.....	1 1/8 "x7'	26 lbs.		9.65
1065.....	1 1/8 "x8'	28 lbs.		10.90
1066.....	1 1/8 "x9'	31 lbs.		12.55

TAMPING AND DIGGING BARS



Made of special octagon crucible steel, exceedingly tough and stiff.

List No.	Size	Wgt.		List Price Each
		Lbs.	Each	
1071.....	1 "x7'	20 lbs.		\$9.20
1072.....	1 "x8'	23 lbs.		9.70
1074.....	1 1/8 "x7'	26 lbs.		10.20
1075.....	1 1/8 "x8'	30 lbs.		11.75

OSHKOSH DIGGING SPUDS



The blade measures 3 1/2" in width—just right for most efficient work.

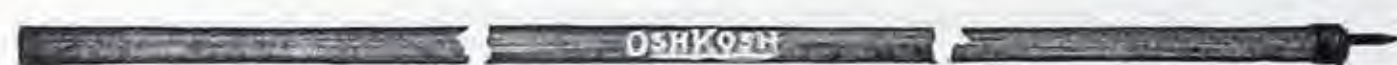
List No.	Size	Wgt.		List Price Each
		Lbs.	Each	
852.....	9'	20 lbs.		\$9.80

COGHLIN DIGGING SPUD



The Coghlin digging spud was designed especially for the Bell Telephone Company. It is made of octagon steel. Weighs 21 lbs. Price on application.

PLAIN PIKE POLES



Handles of old growth yellow fir, straight grained, and free from defects. Pike is of crucible steel with upset shoulder, which distributes the thrust on the entire top of the pole. The pike is driven in and fastened with a rivet running through ferrule, pike and pole.

Standard Small Size

Handle is 2" even diameter—no taper.

List No.	Size	Wgt. Each	List Price Each
805.....	2 "x10'	6 lbs.	\$4.90
806.....	2 "x12'	8 lbs.	5.40
807.....	2 "x14'	10 lbs.	6.10
808.....	2 "x16'	11 lbs.	7.30

Handle is 2½" in the middle and tapers to 2" at each end.

817.....	2½"x10'	12 lbs.	\$5.95
818.....	2½"x12'	13 lbs.	6.40
819.....	2½"x14'	14 lbs.	7.90
820.....	2½"x16'	15 lbs.	9.10
821.....	2½"x18'	18 lbs.	10.05
822.....	2½"x20'	20 lbs.	11.50

GUARDED PIKE POLES



Handles of soft, old growth yellow Washington fir, straight grained, and free from defects. The forks are malleable iron with the fork and socket cast in one piece.

832.....	2 "x10'	10 lbs.	\$6.90
833.....	2 "x12'	12 lbs.	7.55
834.....	2 "x14'	13 lbs.	8.75
795.....	2 "x16'	15 lbs.	10.30
796.....	2½"x12'	13 lbs.	10.55
797.....	2½"x14'	14 lbs.	11.40
835.....	2½"x16'	15 lbs.	12.05
836.....	2½"x18'	16 lbs.	12.50
837.....	2½"x20'	18 lbs.	13.20

MULE PATTERN WOOD POLE SUPPORTS



Made of fir tapering slightly at both ends. Forged steel fork and pick at each end with steel bands.

List No.	Size	Dia. at Center	Wgt. Each	List Price Each
845.....	6'	3½"	23 lbs.	\$18.15
846.....	7'	4 "	26 lbs.	21.00
847.....	8'	4½"	29 lbs.	23.25

STANDARD DEADMAN WOOD POLE SUPPORTS



Made of select rock maple. Heavy wrought steel fork and pike banded at both ends with steel.

List No.	Size	Size of Wood	Wgt. Each	List Price Each
848.....	8'	4"x2"	29 lbs.	\$26.50

CARRYING OR LUG HOOKS



For handling poles and heavy timbers. Made with crucible steel chisel point hooks, and malleable iron clasps and swivels. Handles of select hard rock maple.

Regular Pattern

295.....	2½"x4'	7 lbs.	\$5.75
296.....	2½"x4½'	8 lbs.	5.85
297.....	2½"x5'	8 lbs.	5.85

Extra Heavy, with Steel Swivels

298.....	3 "x5'	12 lbs.	\$9.45
299.....	3 "x6'	13 lbs.	10.25
300.....	3 "x7'	14 lbs.	11.15

MALLEABLE SOLID SOCKET PEAVIES



Light, strong, durable and evenly balanced. Socket is made from the best grade of malleable iron. The hook and pick are made of crucible steel, the pick and socket are set in oil, under screw pressure, not burnt or driven in. In adaptability to range of work or excellence of finish these peavies are unequalled.

Regular Maple Handles

121.....	2¼"x4'	7 lbs.	\$6.00
122.....	2¼"x4½'	7 lbs.	6.10
124.....	2½"x4'	9 lbs.	6.30
125.....	2½"x4½'	9 lbs.	6.40

Select Hickory Handles

134.....	2¼"x4'	8 lbs.	\$7.00
135.....	2¼"x4½'	8 lbs.	7.40
137.....	2½"x4'	9 lbs.	7.20
138.....	2½"x4½'	10 lbs.	7.50

OSHKOSH CANT HOOKS



These cant hooks are light, strong, durable and evenly balanced. Clasp and toe rings are made of certified malleable iron. Hooks are made to slim pattern for easy handling and are neatly finished. A stop is provided to prevent hook from falling back on to fingers and injuring them.

Maple Handles

List No.	Size Feet	Wgt. Lbs. Each	List Price Each	Extra Handles List No.	Wgt. Lbs. Each	List Price Each
188A.....	2¼"x4'	7	\$4.75	541	3	\$1.9
189A.....	2¼"x4½'	8	5.05	542	3	1.9
188.....	2½"x4'	8	4.95	544	3	1.9
189.....	2½"x4½'	8	5.05	545	4	2.0

Hickory Handles

199A.....	2¼"x4'	7	\$5.40	572	3	\$2.0
200A.....	2¼"x4½'	8	5.70	573	3	2.1
199.....	2½"x4'	8	5.40	575	4	2.1
200.....	2½"x4½'	9	5.75	576	4	2.3

KLEIN EASTERN CLIMBERS

Made in sizes 15, 15½, 16, 16½, 17, 17½ and 18 inches, measured from in-step to end of shank. Furnished without straps.

No. 1901 Punched strap loops, List Price, per pair..\$7.55

No. 1900 Riveted, List Price, per pair..... 6.70

No. 1903

Light weight pattern with riveted strap loops. One pair carton. Standard sizes up to 17 inches.

No. 1903 List Price, per pair.....\$4.90

No. 1907


Tree Climbers. Punched strap loop. Cliffs (or spurs) 5½ inches long measured on the outside and 3 inches long measured on the underside. They are set high in the leg iron so that points clear the ground. These are the standard tree climbers used by forest rangers, loggers, fire wardens, surveyors, etc. Made in all standard sizes.


No. 1907 List Price, per pair..... \$8.40

CLIMBER STRAPS AND PADS

STEVEN'S CLIMBER STRAPS

No. 70

Strap No. 70—22" 

Strap No. 70—26" 

Pad No. 71

Made from prime harness leather. Top strap made up 1 inch wide, 26 inches long, with wrought iron buckle. Bottom strap made up 1 inch wide, 22 inches long, with wrought iron buckle. Pads made from heavy harness leather, felt lined, with two leather loops hand rivetted on for strap and one loop rivetted for climber.

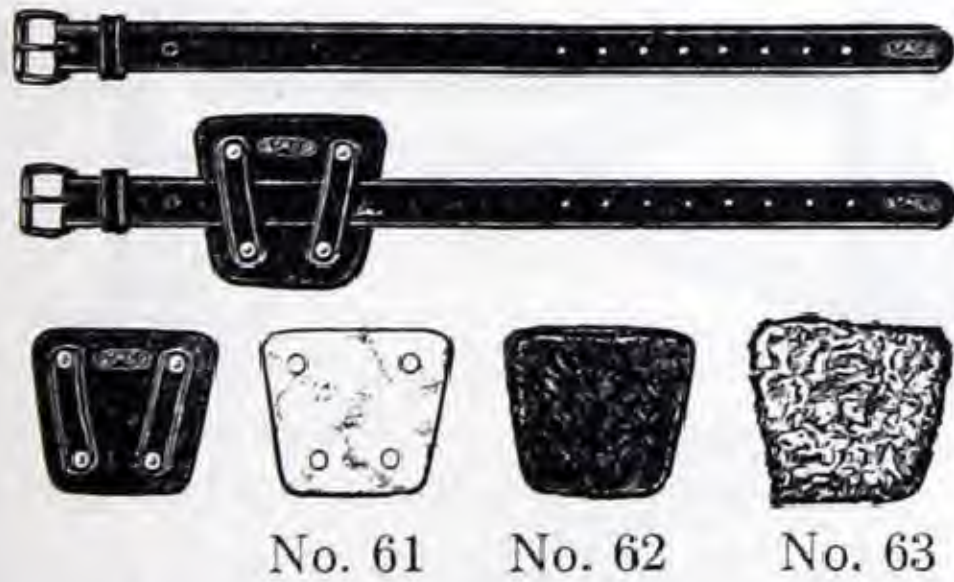
Set includes two short straps, two long straps and two pads.

List Price, per set..... \$3.00

List No. 70—Short straps, 22". List Price, per pair... 0.96

List No. 70—Long straps, 26". List Price, per pair... 1.20

List No. 71—Felt-lined pads. List Price, per pair.... 0.84



CLIMBER STRAPS

List No. 60—Eastern Climber Straps are made from prime harness leather. Made up 1¼" wide and 24" long, with wrought iron buckle, well stitched and rivetted. Price, per set of four..... \$2.40

List No. 61—Plain pad for Eastern Climber strap, made from heavy harness leather, with loops hand rivetted on. Price, per pair..... \$0.40

List No. 62—Felt-lined pad for Eastern Climber straps. Price, per pair..... \$0.55

List No. 63—Lamb's wool lined pads for Eastern Climber Straps. Price, per pair..... \$0.70

TREES (Staco) BELT AND SAFETY STRAP



No. 80—Safety Strap or Pole Belt



No. 82—Body Belt

No. 8280—LINEMAN'S BELT

Including No. 82 Body Belt and No. 80 Pole Belt

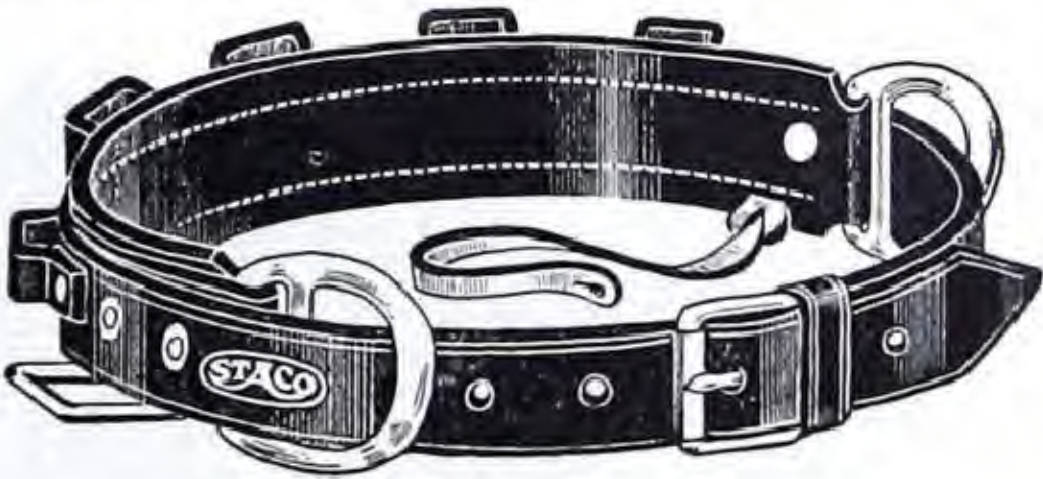
Made from select best quality union oak-tanned harness leather, cushion is 3" wide and the outer layer and billet is 2" wide. The tool rack is made from sole leather 1" wide, loops moulded. Plier holster is made of select harness leather in the form of an open bottom pocket, which is rivetted on the body belt. Pole belt or safety strap is made from extra heavy leather, 2" wide, and is adjustable to length with reef buckle. Leather is protected at return buckle with heavy galvanized iron clip. All rivets are solid copper hand set.

The dees and snaps are drop-forged steel. Buckles are wrought iron. Belts are made in the following sizes, and prices include both body belt and pole belt.

List No.	36"	38"	40"	42"	44"	46"
8280...	\$13.50	\$13.65	\$13.80	\$13.95	\$14.10	\$14.25

When sold separately from No. 82 body belt, list No. 80 safety strap or pole belt, list price, each is \$6.00.

When sold separately from No. 80 pole belt, the list price of the No. 82 body belt is \$7.50.



No. 53

No. 5380 LINEMAN'S BELT

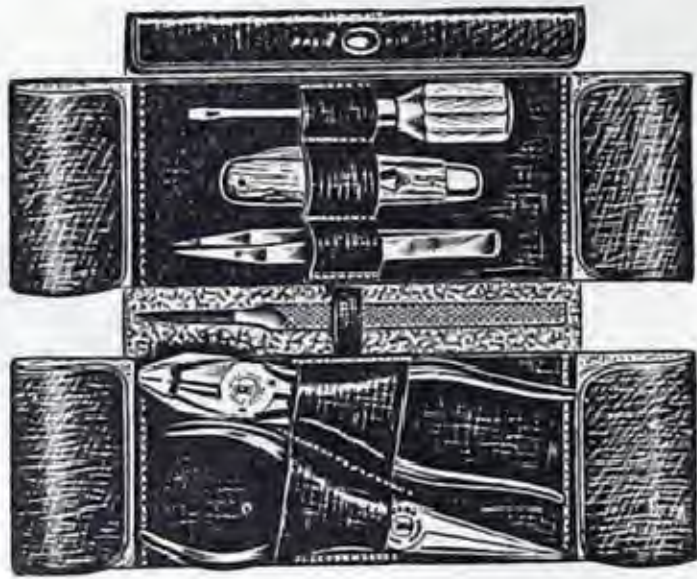
Including No. 53 Body Belt and No. 80 Pole Belt.

Made from select best quality union oak tanned harness leather, cushion is 3" wide and the outer layer and billet is 2" wide. The tool rack is 1" wide, loops moulded. Plier holster is made of heavy galvanized iron wire. The washer thong is cut from tough rawhide. Pole belt or safety strap is made from heavy harness leather 2" wide and is adjustable to length with return buckle. Leather is protected at return buckle with heavy galvanized iron clip. All rivets are solid copper, hand set. The dees and snaps are drop-forged steel.

List No.	36"	38"	40"	42"	44"	46"
5380...	\$12.00	\$12.15	\$12.30	\$12.45	\$12.60	\$12.75

KLEIN INSPECTOR'S POCKET TOOL KIT

Solid black leather folding case, strongly stitched, reinforced back. Fitted with one each of the following tools.



201-6 Side Cutting Plier, 301-5 Long Nose Plier, 1550-2 "Xela" Electrician's Knife, 1 pair Electrician's Tweezers, 1 Special File, 1 Special Screw-driver.

A very handy assortment to fit the pocket.

No. 1305-2, 1½ lbs., List Price, each..... \$16.10

LINEMEN'S CANVAS TOOL BAG, LEATHER BOTTOM

This bag is made of one piece of white duck reinforced all around the bottom, 3¼ inches up, with heavy bag-leather. The bottom is made of heavy leather outside and duck inside, lock stitched all around. Bottom and sides are joined together with lock-stitched leather welt seams. Has harness leather handles and two retaining straps with buckles.



List No.	Size	Wgt. of Each in lbs.	List Price Each
5102-12.....	12"	2⅝	\$10.95
5102-14.....	14"	3	11.90
5102-16.....	16"	3½	13.20
5102-18.....	18"	3¾	13.70
5102-20.....	20"	3⅞	15.05
5102-22.....	22"	4	16.55
5102-24.....	24"	4½	17.85

LINEMAN'S GAUNTLET

No. 250



All horsehide gauntlet, with reinforced palm and tab. Gunn cut pearl mule cuff. This is especially suitable for telephone linemen's work, unlined.

List Price, per pair..... \$2.15

RAILWAYMAN'S GAUNTLET

No. 552

Horsehide face, double thumb, double palm, large full-piece 5-finger gauntlet, Gunn cut, unlined.

List Price, per pair..... \$1.90

LINEMAN'S and INSPECTOR'S TOOL BAGS**LINEMAN'S TOOL BAG**

No. 5515

Made from selected black harness leather with stiff ends. Size 14" long, 8" deep, 8" wide at bottom, 5" wide at top.

List Price, each..... \$10.45

Bag same as above, only 16" long.

List Price, each..... \$11.20

**LINEMAN'S TOOL BAG**

No. 5505

Made from russet belting leather, with stiff ends, size 21" long, 11" deep, 3½" wide.

List Price, each..... \$11.85

**INSPECTOR'S TOOL BAG**

No. 5510

Made from russet smooth grain bag leather, with soft gusset, size 14" long, 14" deep, 3½" wide.

List Price, each..... \$ 6.90

KLEIN LONG FLAT NOSE PLIERS

Useful for
switchboard
phone and
graph work,



No. 305-6, Length 6 inches, List Price, each..... \$3.13

KLEIN LONG NOSE PLIERS, WITHOUT CUTTERS

Adapted for
stripping the
insulation
and for
work in con-
fined spaces.



No. 301-5, Length 5 inches, List Price, each..... \$2.13
No. 301-6, Length 6 inches, List Price, each..... 2.95

KLEIN LONG NOSE SIDE CUTTING PLIERS

Designed for
use in restrict-
ed spaces.
Equipped
with cutting
edges.



No. 203-5, Length 5 inches, List Price, each..... \$2.67
No. 203-6, Length 6 inches, List Price, each..... 2.70
No. 203-8, Length 8 inches, List Price, each..... 4.80

KLEIN'S LONG NOSE PLIER WITH SLEEVE OPENING

(Bell System Type)

This plier is
as No. 316
the addi-
tional sleeve
openings for
using No. 17
and S. and
other double tube copper sleeves.



No. 316-S, Length 6 inches, List Price, each..... \$3.35

KLEIN'S LONG NOSE CORD CRIMPING PLIERS

This plier is a
nose type
special op-
erating for crimp-
ing switchboard
cords to make them fit into the plugs more readily.

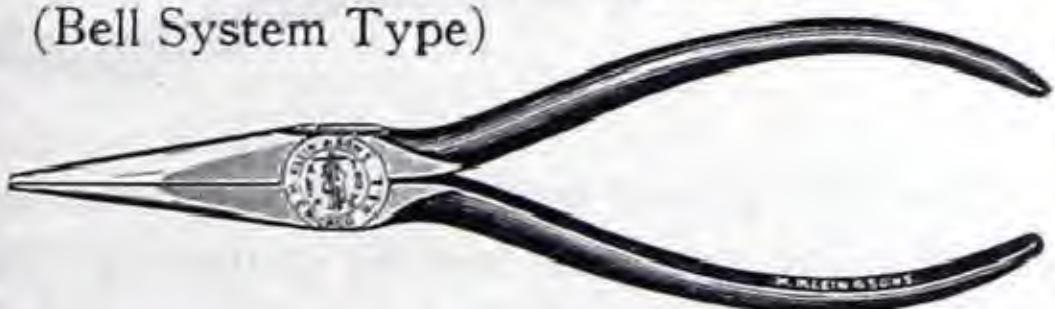


No. 301-C, Length 6 inches, List Price, each..... \$3.35

KLEIN'S LONG NOSE PLIERS

(Bell System Type)

Particularly
adapted for tele-
phone work. The
noses are 2" long
point $\frac{1}{16}$ ".
Handles with
texture to fit the hand are 4" long. Polished head and
handles temper blued.



No. 316-6, Length 6 inches, List Price, each..... \$2.95

KLEIN'S LONG FLAT NOSE SPRING ADJUSTING PLIERS

This plier is
low-ground
on the outside of
the nose to reach
between and
adjust springs
etc. It is large-
ly used by telephone men because it makes rapid and accur-
ate adjustments possible.



No. 311-5 1/2, 5 1/2 inches long, List Price, each..... \$3.15

KLEIN LONG FLAT NOSE SIDE CUTTING PLIERS

Useful for
work in confined
places. Made
with cutting
knives.



No. 206-6, Length 6 inches, List Price, each..... \$3.30

KLEIN LONG NEEDLE NOSE PLIERS

Useful for
work in central
offices on ac-
count of the thin
points.



No. 303-6, Length 6 inches, List Price, each..... \$2.40

KLEIN LONG CURVED NOSE PLIERS

Angle is ar-
ranged to give
full clearance
and prevent
skinning of
knuckles.



No. 302-6, Length 6 inches, List Price, each..... \$3.15

KLEIN LONG DUCK-BILL PLIERS

Intended for
general use. The
duck-bill jaws
are wider and
heavier than
those of the or-
dinary flat-nose plier.



In general use as a weaver's plier.
List No. Size Wgt. per Doz. List Price Ea.
304-6 6" 3 1/4 lbs. \$3.15

ALL KLEIN PLIERS HAVE POLISHED HEADS AND
HANDLES TEMPER BLUED

LINDSTROM SWEDISH PLIERS

Diagonal
Close Side Cutting
Box joints.
List No. 15x5 inch.
Black finish.



List Price, each..... \$1.75

Long Nose
Side Cutting
Box joints.
Specially service-
able in restricted
places.
Thin Points.
List No. 29x6 inch
Black Finish
List Price, each..... \$1.80



Side Cutting
Box joints.
Strong, service-
able tool.
List No. 98x6 inch.
Black Finish
List Price, each..... \$1.70



Side Cutting with
Splicing Clamp or
Sleeve Twister
Lap joints.
List No. 300x8 inch
Black Finish
List Price, each..... \$2.00



KLEIN PLIERS

KLEIN'S NARROW NOSED OBLIQUE PLIER
No. 202-5-A

No. 202-5-A

This plier has narrow hinge and pointed nose, enabling convenient use in confined space. The knives are perfectly matched for clean cutting. Much used in telephone and radio work.

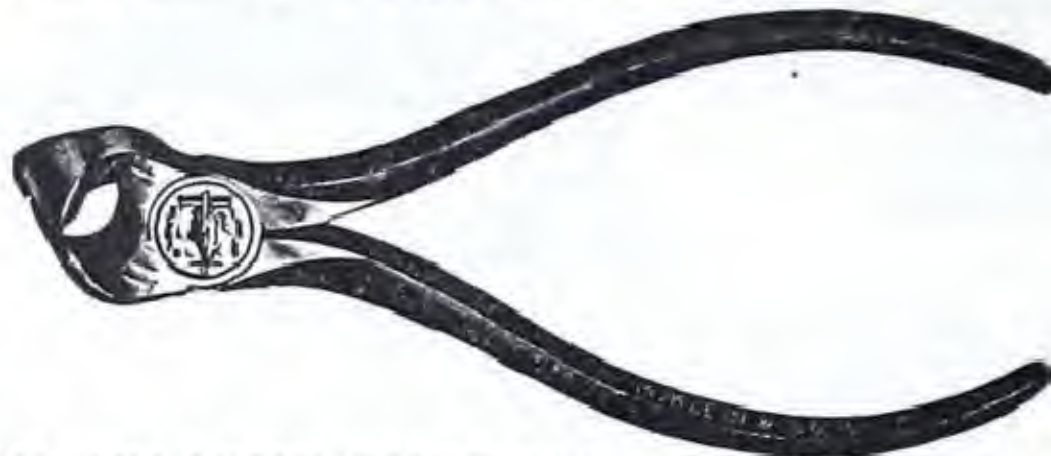
All Pliers, Polished Heads and Handles Temper Blued. Standard Package 6 in a box.

List No.	Size	Weight per doz.	List Price
202-5-A	5-inch.....	4 lbs.	\$3.00
202-6-A	6-inch.....	4 1/4 lbs.	3.35

KLEIN END CUTTING PLIERS

Stout jaws and broad cutting knives.

List No.	Price Each
232-5 1/2	\$4.95
232-7	4.60



KLEIN OBLIQUE CUTTING PLIERS

Cuts close, the narrow head permitting its use in confined places.

Knives are perfectly fitted. Lap joint type.

No.	Length, 5 Inches.	List Price, each
No. 202-5	5 Inches.....	\$2.40
" 202-6	6 " " " " " "	2.75
" 242-6	" " " (Heavy Type) " "	3.40



KLEIN DIAGONAL PLIERS

Has long cutting knives well matched, to permit close and clean cutting. Head is narrow.

No. 235-6, Size 6 In., List Price each... \$4.10



KLEIN BENT NOSE SLIP JOINT PLIER

A plier of the bent nose type. Specially designed for use in difficult places. An excellent general purpose tool that should have a place in every mechanic's kit.

List No.	Size	Wt. Per Doz.	List Price each
408-8	8-inch	8 lbs.	\$2.50

KLEIN SLIP JOINT PLIER

This tool fills the demand for a high grade slip joint plier. It embodies all the advantages of a tool of this type. Has a wire cutter and screw drive handle.

List No.	Size	Wt., Per Doz.	List Price Each
406-6 1/2	6 1/2-inch	7 lbs.	\$1.70



ALL KLEIN PLIERS HAVE POLISHED HEADS AND HANDLES TEMPER BLUED

KLEIN'S SIDE CUTTING PLIER



No. 201-6N.E.

A modification of the well known Klein Side Cutting Plier. For use on bare or insulated wire. The nose and all edges rounded and the sharp shoulder of head is entirely removed. The new shape of nose permits use in confined space not accessible to the regular pattern. These pliers have received a real welcome and preferred by many to the older pattern.

List No.	List Price
201-6N.E.....	\$3.73
201-7N.E.....	4.40
201-8N.E.....	4.46
201-9N.E.....	5.80

KLEIN'S SIDE CUTTING PLIER

With Sleeve-Joint Twister



No. 212

For use on bare and insulated wire.

For linemen and electricians. Specially designed for telegraph and telephone work.

This plier is the same as No. 201 series, but with open provided for twisting double sleeve joints.

*Sleeve opening in 6" plier for Nos. 14 and 17 N.B. & S. and No. 12 B. & S. .045.

*Sleeve opening in 7" plier for Nos. 14 and 17 N.B. & S. and No. 12 B. & S. .045.

*Sleeve opening in 8" pliers for No. 12 N.B. & S. and No. B. & S. .104.

List No.	Size	Weight Per Doz.	List Price
*212-6	6-inch.....	5 lbs.	\$3
*212-7	7-inch.....	7 1/2 lbs.	4
*212-8	8-inch.....	12 lbs.	4

KLEIN'S LONG NOSE CUTTING PLIER



No. 203-8

This new type, long, round nose cutting plier is made specially for use with heavier gauge insulated wire such as used on control boards for electric elevators, etc. The round nose is for forming loops and a flat space is provided above the knife for holding objects securely or for "cracking" insulation. The shape of handles is similar to that used on Klein Side Cutting Pliers—it affords maximum comfort and powerful leverage. A tool for which there is real demand.

List No. 203-8.....	List Price, each	\$4
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No. 203-8N

This plier is same as 203-8, described above, but is fitted with a stripping notch in the knife. The notch is regularly furnished to take No. 12 B. & S. insulated wire but can be varied for other sizes to order.

List No. 203-8N.....	List Price, each	\$4
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KLEIN SPLICING CLAMPS

Klein splicing clamps have polished heads and black handles.



For copper wire Nos. 8, 10, 12, 14, 16, B. & S. For iron wire Nos. 10, 12, 14, 16, 18, B.W.G. Length 8 inches.

102-1.....List Price, each \$5.80



For Nos. 4, 6, 8, 9, 10, 12, 14 B.W.G. iron wire; Nos. 2, 4, 10, 12 B. & S. copper wire. Length, 10 3/4 inches.

102-3.....List Price, each \$7.20



"Bell System" Type

For copper sleeves Nos. 6, 8, 10, 12, 14, 17, B. & S. For iron sleeves, Nos. 8, 10, 12, 14, 16, 19, B.W.G.

105-17, Size 10 3/4-inch.....List Price, each \$6.10



For copper sleeves, Nos. 8, 10, 12, 14, 17, B. & S. For iron sleeves, Nos. 10, 12, 14, 16, 19, B.W.G.

105-15, Size 8-inch.....List Price, each \$5.00



For Copper wire Nos. 6, 8, 10, 12, B. & S. For Iron wire Nos. 8, 10, 12, 14, B.W.G.

For Copper sleeves, Nos. 8, 10, 12, 14, 17, B. & S. For Iron sleeves, Nos. 10, 12, 14, 16, 19, B.W.G.

132-12, Size 9-inch.....List Price, each \$6.35



Hammer forged from high grade crucible tool steel. Designed for general telephone and telegraph work where a range of wires is used.

For Copper wire, Nos. 4, 6, 8, 10, 12, B. & S. For Iron wire, Nos. 6, 8, 10, 12, 14, B.W.G.

For Copper sleeves, Nos. 6, 8, 10, 12, 14, 17, B. & S. For Iron sleeves, Nos. 8, 10, 12, 14, 16, 19, B.W.G.

oval strand opening .437 x .624.

132-15, Size 11 1/4-inch.....List Price, each \$8.60



Another new sleeve twister for power and light work. Made with five openings for twisting single tube or oval (mco) copper sleeves. Nos. 2, 4, 6, 8 and No. .104, the range of sizes most generally used. The openings are a modified "figure 8" shape, necessary to give a secure hold and prevent "burning" the sleeve when twisting a joint. The swing provided is essential to overcome any spring in the handle which would otherwise develop in a hand tool of this type used on larger sleeves. A stop in the hinge prevents handles from opening beyond the point convenient for clamping on the sleeve.

List No. 132-46.....List Price, each \$11.80

LINDSTROM SLEEVE TWISTERS

TYPE "B"



Black handles and polished heads 10 5/8 in. long. Used for twisting copper

and tinned steel sleeves. For copper sleeves Nos. 8, 10, 12, 14, 16, 17, 18, NBS. For galvanized iron sleeves Nos. 10, 12, 14, BWG.

TYPE "C"

Black handles and polished heads. 8 1/4-in. long. Used for twisting copper

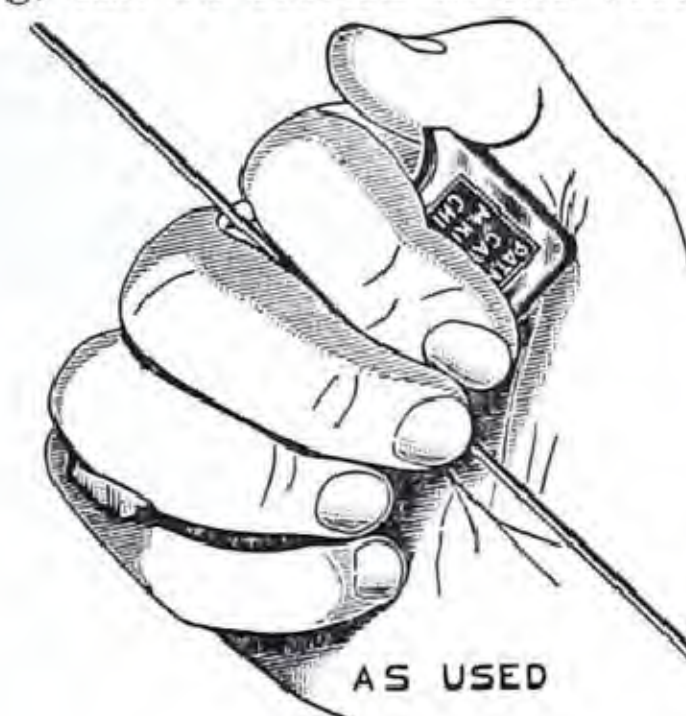


and tinned steel sleeves. For copper sleeves Nos. 12, 14, 16, 17, 18, NBS. For galvanized sleeves Nos. 12, 14, BWG.

Prices on application.

KLEIN'S FISH TAPE PULLER

A simple husky come-along for standard size Fish Tape or Snake. Gives a positive hold that does not injure the wire—never slips. Light weight, strong, can be carried in the vest pocket. Fills a long-felt want.



AS USED

List No.	Description	Wgt.	List Price Each
1629	Fish Tape Puller.....	3 1/2 ozs.	\$2.73

KLEIN'S HOWES WIRE TOOL



The strap is harness leather 1 1/4 inches wide and 7 feet long. At one end a forged steel swivel hook is provided with opening to permit anchoring round insulating pin. The forward end has a locking device to hold the load at any distance and is so arranged that a wire grip can be readily attached. The metal parts are galvanized.

List No.	Description	Wgt. Lbs.	List Price Per Set
1702-20	Single Purchase..... Strap 1 1/4" x 7 ft.	2	\$9.45

KLEIN COMBINATION STEEL LAG SCREW WRENCHES



This wrench is forged from select bar steel. The slot is formed in a cross shape and will fit machine bolts, nuts or lag screws from 3/8 inch to 5/8 inch. The small end of the wrench is arranged for 5/16-inch machine bolts or lag screws. The round hole allows the end of a bolt to come through as the nut is run on.

The jaw is wider at its lower portion than at the entrance and when this wrench is put on a nut or bolt the tendency is to draw the bolthead or nut into the wrench and prevent slipping off, a most desirable advantage original with this wrench and a real safety feature.

Nos. 3109-20, Length 13 1/2 inches, List Price, each.. \$5.40

KLEIN TOOLS

HAND LINE WITH DROP FORGED SNAP HOOK



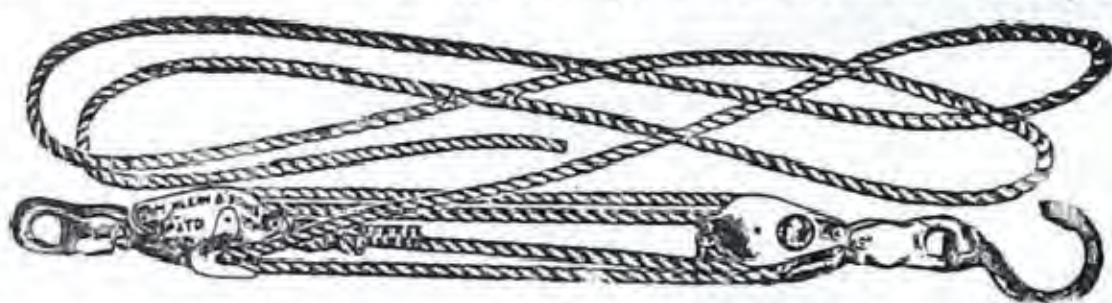
These lines are designed for maximum safety and service. The rope is best quality and does not twist. It will far outlast cheaper material. Spliced to eye of snap hook with galvanized steel thimble. The snap hook is drop forged and similar to those used on safety straps except that it has round eye.

Can be furnished with any different length of rope to order.

List No.	Weight Each	List Price
1803-60 With 75 ft. $\frac{3}{8}$ " best quality "Waterflex" Manila rope, 4 strand	3 lbs.	\$23.07
1803-120 As above with 120 ft. of rope.	5 $\frac{1}{4}$ lbs.	12.00

TROUBLEMEN'S SELF-LOCKING BLOCKS

For use with Chicago Grips and Haven's Grips



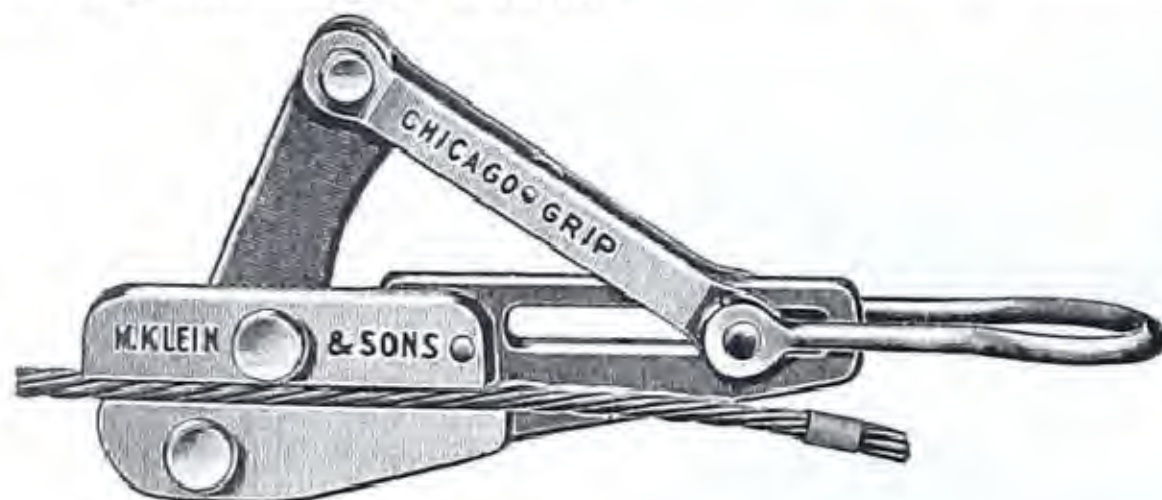
No. 1802-30 furnished with 25 feet $\frac{3}{8}$ -inch manila rope, 2 $\frac{1}{2}$ lbs. consists of light steel shell blocks galvanized, fitted with snubbing hook to lock load in any position. To lock the load, pull the luff rope under the hook. To release, simply pull the rope. The blocks are arranged with spring guard snap hooks. When pulling up wire to make a splice, it may be used with two grips attached to the snaps or with the drop-forged hook to anchor to an insulator-pin or other convenient anchorage.

List No.	Description	Wt. Lbs.	List Price per set
1802-30 Galv., with 25 ft. $\frac{3}{8}$ -inch rope.		2 $\frac{1}{2}$	\$6.90

CHICAGO STRAND PULLERS

Main body piece and lever are forged steel. Draw parts are of wrought steel. Gripping jaws are machined smooth. Rivets are machine turned and workmanship throughout is first class.

Specially designed to accommodate the heavy tensions used in stringing messenger strand.



List No.	Weight Each	Max. Opening	List Price Each
1628-6 For bare wire No. 0000 and smaller and for 6M. messenger strand.....	8 $\frac{1}{2}$ lbs.	$\frac{13}{32}$ "	\$21.20
1628-16 For 10M and 16M messenger strand.....	14 lbs.	$\frac{11}{16}$ "	42.00

"CHICAGO" GRIP

For Anaconda Hollow Core Conductor and other large diameter Conductors

This grip is stocked in blank and finished to fit any diameter conductor up to 1 $\frac{1}{2}$ in. The jaws are "lipped" out to avoid excess weight.

Forged from alloy steel, heat treated, for maximum strength. Jaws are bronze lined.

List No.	Max. Safe Load	Weight Each	List Price
1628-30B For conductors up to 1 $\frac{1}{2}$ in. diameter.....	20,000 lbs.	23 $\frac{1}{2}$ lbs.	\$140.00

KLEIN CHICAGO GRIPS FOR BARE WIRE



Main body piece and lever are forged steel. Draw parts are wrought steel. Gripping jaws are machined smooth. Rivets are machine turned and workmanship throughout is first class.

The harder the pull, the tighter the hold. It pulls straight without leaving kinks in the wire. It is handy to put on and holds itself in place by means of a spring acting on the compressing lever.

List No.	For Wire No.	Max. Op'n'g	Wgt. Lbs. Each	List Price Each
1613-30	6 Wire and smaller...	$\frac{7}{32}$ "	1 $\frac{1}{2}$	\$3.80
1613-40	0 Wire and smaller...	$\frac{5}{16}$ "	2 $\frac{5}{8}$	6.75
1613-50	0000 Wire and smaller...	$\frac{1}{2}$ "	7 $\frac{1}{2}$	14.53

KLEIN CHICAGO GRIPS FOR INSULATED WIRE

Main body piece and lever are forged steel. Drawn parts are wrought steel. Rivets are machine turned.



The upper jaw has a series of transverse shallow grooves into which, on applying strain, the insulation is tightly compressed but not injured.

List No.	For Wire No.	Max. Op'n'g	Wgt. Lbs. Each	List Price Each
1611-20	4 Wire and smaller...	$\frac{1}{2}$ "	2 $\frac{5}{16}$	\$6.35
1611-30	00 Wire and smaller...	$\frac{9}{16}$ "	3 $\frac{3}{4}$	8.10
1611-40	0000 Wire and smaller...	$\frac{3}{4}$ "	7 $\frac{1}{4}$	12.75

KLEIN HAVEN'S STEEL GRIPS



Almost automatic in action. Handle and eccentric allow instantaneous hold. A shake of the rope on the tackle disengages the grip.

No. 1604-10 for No. 4 Wire and finer, List Price, each..\$3.75
No. 1604-20 for $\frac{1}{2}$ -inch Wire and finer, List Price, each 5.50

KLEIN IMPROVED HAVEN'S GRIPS

For plain or stranded wire No. 6 to $\frac{3}{4}$ -inch diameter. Made with swing latch which engages stud on lower jaw.



List No. 1625-20, List Price, each.....\$12.50

KLEIN "CHICAGO" GRIP FOR ALUMINUM CABLE



Same construction as No. 1611-40, but both gripping jaws are smooth and cannot injure the strands of the cable. The grip is used by many concerns. It is not an experiment.

Grips for smaller size aluminum cable can be made to order. We can furnish grips for use on other sizes aluminum cable to order.

List No.	For Aluminum Cable	Max. Op'n'g	Wgt. Lbs. Each	List Price Each
1626-39	250,000 C.M.....	$\frac{3}{4}$ "	7 $\frac{3}{4}$ lbs.	\$16.80
1626-40	500,000 C.M.....	$\frac{15}{16}$ "	7 $\frac{3}{4}$ lbs.	16.80

BUFFALO GRIPS



No. 1 Buffalo Grip with Pulley



No. 1 Buffalo Grip with Loop



No. 4 Buffalo Grip (Locked Open)

The Buffalo Grip leads all others for gripping wire in the section of telephone and electric power lines. It is recognized as the standard wire-stringing tool of the principal telephone and electric light companies, and has proven its efficiency and dependability for a period of more than thirty years of acting service.

The Buffalo Grip can be locked open by swinging the loop open. It then can easily be placed on the wire and closed by swinging the loop back to normal position, all with the use of only one hand. This feature adds greatly to the lineman's efficiency and also provides increased safety when reaching into an inconvenient place to attach the grip.

The Buffalo Grip is normally held closed by spring tension, so that after placing the grip on the wire it clings tightly and will not fall off while arranging the tackle for the final pull.

The Buffalo Grip is made in three sizes with flat jaws for bare wire and in three sizes with longitudinally-grooved jaws for insulated wire. Each size can be supplied with a loop or a pulley shackle, as desired.

The Buffalo Grip has a gripping power which increases with load and is many times the pull applied to it, making it an absolutely reliable tool that will not slip, no matter how severe the strain.

The Buffalo Grip will not bend the wire because the line of pull is practically in line with the jaws. It will not mar the wire because the gripping pressure is distributed over long, smooth jaw surfaces. It will not injure the softest wire nor the most delicate insulated wire.

The Buffalo Grip is simple in design and will give long and satisfactory service. It is carefully proportioned for maximum strength without undue weight, and the entire surface is nickel-plated over a plating of copper.

No. 1 has flat jaws for bare wire from smallest to No. 6 incl. When equipped with pulley, use $\frac{5}{16}$ " rope.

No. 2 has flat jaws for bare wire from smallest to No. 0 incl. When equipped with pulley, use $\frac{3}{8}$ " rope.

No. 3 has flat jaws for bare wire from smallest to No. 4/0 incl. When equipped with pulley, use $\frac{1}{2}$ " rope.

No. 4 has grooved jaws for weatherproof wire No. 6 to No. 0 incl. When equipped with pulley, use $\frac{3}{8}$ " rope.

No. 5 has grooved jaws for weatherproof wire No. 2 to No. 0 incl. When equipped with pulley, use $\frac{1}{2}$ " rope.

No. 6 has grooved jaws for weatherproof wire No. 14 to No. 0 incl. When equipped with pulley, use $\frac{5}{16}$ " rope.

List No.	Extreme Opening	List Price without Pulleys	List Price with Pulleys
1	.22"	\$2.70	\$3.30
2	.35"	4.32	5.10
3	.48"	6.48	7.50
4	.52"	4.32	5.10
5	.78"	5.40	6.30
6	.29"	2.70	3.30

BUFFALO GRIPS

Buffalo Grips for Aluminum Cable

with copper faced grooved jaws

Size and Type	Max. Opening	Will hold Aluminum Cable (Not Reinforced)	Will hold Aluminum Cable, Steel Reinforced	Price less pulley	Each with pulley
No. 1CG	$\frac{1}{4}$ "	Nos. 8 to 4	Nos. 8 to 5	\$2.00	\$2.20
No. 2CG	$\frac{3}{8}$ "	Nos. 3 to 1	Nos. 4 to 2	2.65	2.90
No. 3CG	$\frac{9}{16}$ "	Nos. 1/0 to 3/0	Nos. 1 to 2/0	3.50	3.85
No. 5CG	$\frac{3}{4}$ "	Nos. 4/0 to 336,400 C.M.	Nos. 3/0 to 266,800 C.M.	8.50	

When No. 1CG Grip is equipped with pulley, use $\frac{5}{16}$ " rope.

"	No. 2CG	"	"	"	$\frac{3}{8}$ "	"
"	No. 3CG	"	"	"	$\frac{1}{2}$ "	"



Lineman's Tool with Strap and Hook

Buffalo Lineman's Tools

The Buffalo Lineman's Tool combines the advantages of the Buffalo Grip with those of a specially-designed tackle assembly. It is an extremely convenient and desirable hand tool, having increased power for taking up slack in line and guy wires. The strap or operating member passes over freely-turning rolls to reduce friction, and can instantly be locked against release when proper tension of the wire is secured. A freely-swiveling hook, large enough to be placed around an insulator pin or other anchorage of equal size, adds greatly to the efficiency of the whole tool. No lineman can afford to be without this tool.

No. 1—Has flat jaws for bare wire from smallest to No. 6 incl. Equipped with swivel hook and 80" strap.

No. 2—Has flat jaws for bare wire from smallest to No. 0 incl. Equipped with swivel hook and 80" strap.

No. 4—Has grooved jaws for weatherproof wire No. 6 to No. 1 incl. Equipped with swivel hook and 80" strap.

No. 6—Has grooved jaws for weatherproof wire No. 14 to No. 8 incl. Equipped with swivel hook and 80" strap.

List No.	Extreme Opening, Inches	List Price (With Strap)	List Price (Without Strap)
1	.22	\$6.90	\$4.50
2	.35	9.00	6.60
4	.52	9.00	6.60
6	.29	6.90	4.50

KLEIN'S TOOLS

KLEIN'S CABLE SHEATH SPLITTING KNIFE

Heavy Duty Type



Blade tempered and ground to keen edge. Has strong leather handle, securely riveted. Temper blued finish. A sturdy knife that will stand up to hard usage.

List No.	Weight Per Doz.	List Price
1515-1.....	12 lbs.	\$6.10

KLEIN'S SKINNING KNIFE



No. 1560-3

Here's a knife linemen have been looking for. The "half hard" rubber handle is molded on securely and provides adequate insulation as well as a good generous grip. Shouldered out at the blade to prevent accidental cutting of glove or finger. The shape of the blade brings the point below the curve—a real safety feature. Back of blade ground flat for scraping. The hole in the handle is through the solid rubber. Forged from first quality cutlery steel individually tempered.

List No. 1560-3	List Price, each	\$3.35
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KLEIN'S KNIFE POCKET



No. 5163

This harness leather pouch is made specially for the No. 1560-3 Skinning Knife shown above. It can be carried in the hip pocket or riveted to belt as preferred. Lock stitched with genuine hot waxed linen thread. An opening at bottom of the pouch prevents accumulation of water or dirt. This pouch provides a safe method for carrying a useful knife.

List No. 5163.....	List Price, each	\$1.45
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KLEIN RUBBER GLOVE POUCH

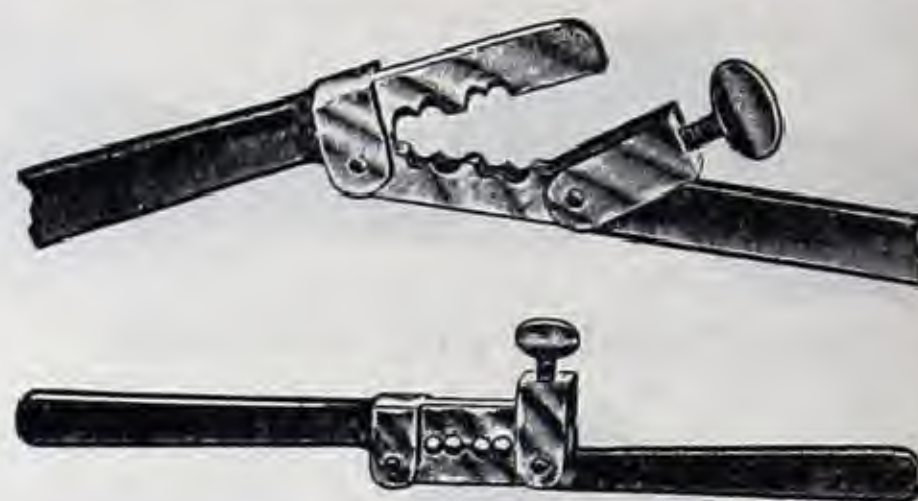


No. 5120-9

Scotch chrome leather pocket for carrying rubber gloves (folded). Comes equipped with snap and "D" ring, ready to attach to body belt.

List No.	Size	Weight Per Doz.	List Price Each
5120-9	7½ in. x 9 in. deep.....	4½ lbs.	\$5.30
	Same as above but larger to accommodate gloves without folding.		
5120-15	7½ in. x 15 in. deep.....	6½ lbs.	\$6.40

KLEIN "DI-STOCK" SLEEVE TWISTER



Has ample leverage for use on heavy wires beyond the capacity of standard splicing clamps or connectors. Can be made for twisting sleeves or bare wire, as desired.

Forged from high grade crucible steel. Has swing latch provided with thumb nut to fit over reverse jaw to hold both jaws securely in place.

Made to order only.

List No.	Wgt. Each	List Price
107-2 (For sleeves).....	4 lbs.	\$27.75

KLEIN'S LINEMAN'S WRENCH

(Bell System Type)

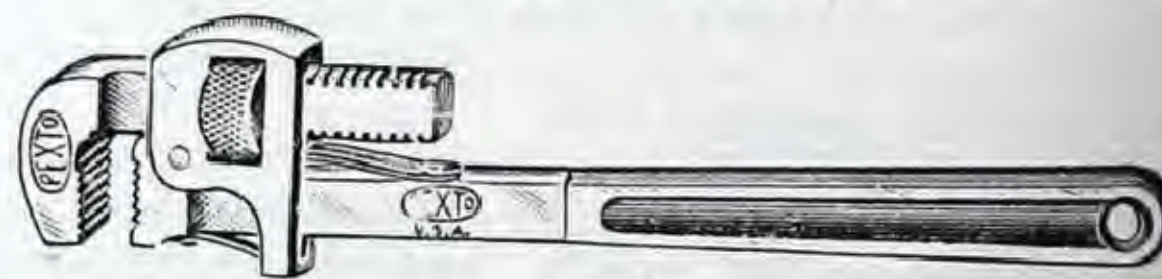
No. 3146 and 3146-A



These wrenches are forged from selected bar steel and are of the open end type with two openings of different size at each end. A hole is also provided for turning in pole steps, etc., etc.

List No.		Wgt. lbs. per doz.	List Price Each
3146	For 5/8" Hardware.....	21	\$5.40
3146-A	For 3/4" Hardware.....	21	5.40

PIPE WRENCHES



No. 11, Steel Handles 6 to 48 inches Inc.

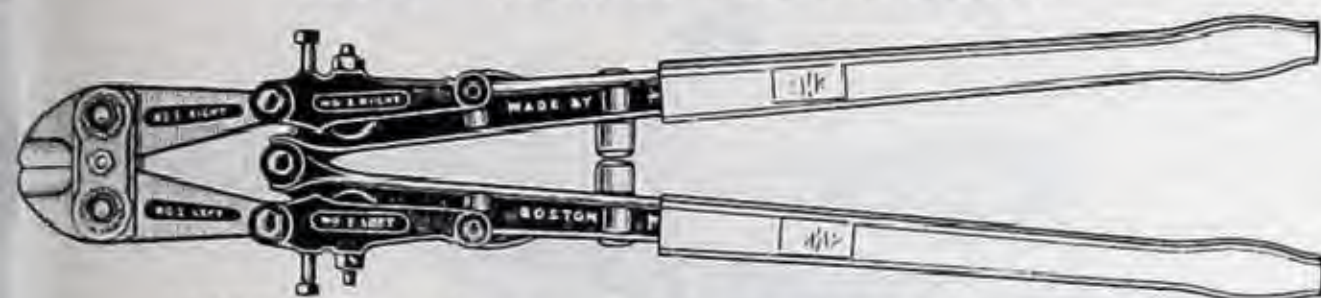
These wrenches are made from high grade material and great pains have been taken in their manufacture.

Sizes 6 to 14 inches will be furnished with wood handle unless otherwise specified.

Size 18 inches will be furnished with steel handle unless otherwise specified.

Inches.....	6	8	10	14
Capacity, inches.....	1/8- 1/2	1/8- 3/4	1/8-1	1/4-1 1/2
Weight, lbs. doz.....	4	8	17	33
List Price, each.....	\$2.00	\$2.25	\$2.50	\$3.50
Inches.....	18	24	36	48
Capacity, Inches.....	1/4-2	1/4-2 1/2	1/2-3 1/2	1-5
Weight, lbs. doz.....	55	96	180	300
List Price, each.....	5.00	7.25	13.50	20.00

HKP WIRE CUTTERS

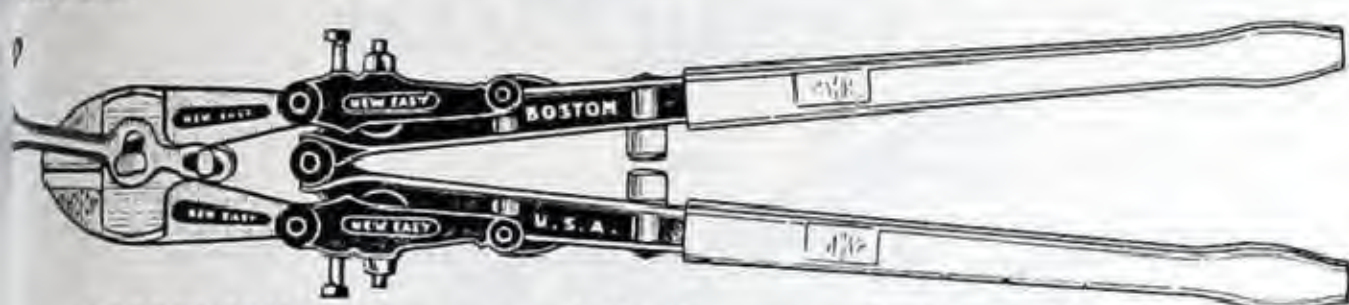


HKP Wire Cutter with Insulated Handles

These are standard tools with many telephone, telegraph and power companies and with street railways.

Their cutting range begins where the one-hand cutting stops as, for example, a No. 1 Porter Cutter will easily cut 3/8-inch bare copper wire. Such wire is frequently heavily insulated so that a jaw opening has been provided to accommodate insulation up to 3/4" diameter. No. 2 has jaw opening 1 1/8". No. 3 has jaw opening of 1 1/4".

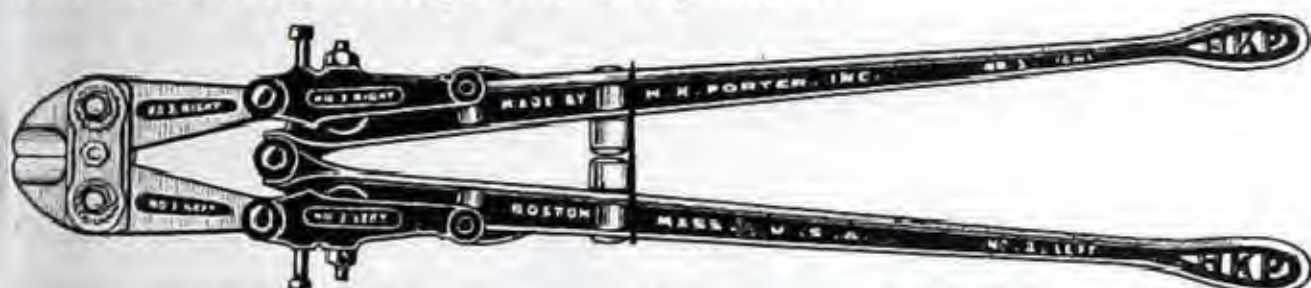
Handles are insulated with high grade heavy rubber covers. This type of insulator has the advantage of being easily replaced.



HKP Wire Cutter with Automatic Search Hook

Exactly the same as the regular insulated handle wire cutter with the addition of a double automatic search hook. This hook is invaluable when the tool is used in smoke or darkness. The hook catches the wire and swings either up or down, bringing the wire into the open jaws. This tool is essential equipment for fire departments. It is used for fast work, clearing up storm damage on power lines, for rescue and wrecking work in railroad accidents and for emergency work in flying fields.

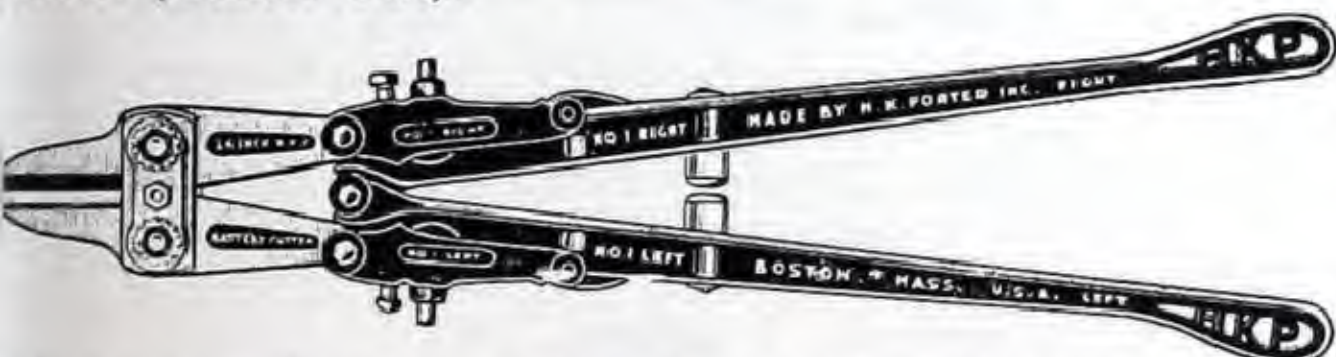
Every detail of workmanship and every part is of a quality consistent with the purpose for which the tool was devised. Search hook and straps nickel plated.



HKP Wire Cutters without Insulated Handles

These tools are exactly the same as the Insulated Handled Porter Wire Cutter minus the insulation. The same wide jaw opening has been provided to permit use on insulated wire. This additional jaw opening does not increase the cutting capacity of the tool on bare wire or other material.

For cutting 16,000 and 25,000 stranded wire we provide tools with cutting jaws of special steel bevelled from each side center (Center Cut).



HKP Storage Battery Cutter for large battery installations. Designed to cut the necks of lead plates in large power plants (not auto batteries). Jaws are specially shaped and rusted for this purpose and cutting edges are 2 1/2 inches long. The great power of this tool makes cutting easy and construction and tempering assures long service. Made in two sizes, No. 1 with 1 1/8" jaw openings and No. 2 with 1 1/4" jaw openings.

	No. 0	No. 1	No. 2	No. 3
Electric Wire Cutters with Insulated Handles, List Price each...	\$6.50	\$8.25	\$11.00	\$14.00
Special Cutters—not Insulated, List Price, each.....		5.75	7.50	9.75
Fireman's Cutters—Insulated Handles and Search Hook, List Price, each...		14.00	22.00	25.00
Storage Battery Cutters, List Price, each.....		9.00	15.00	.....

HKP SWIVEL HEAD CUTTERS



Swivel Type

Here is a Bolt Clipper with all of the power and durability of the standard Porter Models—plus wrist action.

When you want to reach with your hand around a corner or over and back of an obstruction you bend your wrist—and that is what this new Porter Swivel Head Cutter does—it bends around to the job and cuts where the work is. The head swings through a ninety degree arc on either side of the axis of the tool and with full power and ease cuts bolts, rods, wire, etc. It eliminates awkward reaching, straining, and bending on the part of the operator—it gets in and cuts where no straight clipper could ever be used—it actually does cut around a corner.

There is no change in time-tested Porter construction—the same handles, the same cutting heads, the same fine steel and the same lever and toggle joint power multiplication. The same complete adjustment and part replacement design—plus a combination of Swivel Ball and Shoe with positioning spring.

The construction is so simple that with a kit of a few parts a standard Porter Clipper may be easily converted into a Swivel Head Cutter.

THE SWIVEL KIT

If you have standard Porter tools on hand and in good working condition, they may be easily converted into Swivel Heads by purchase of the Kit shown above. Simple and complete instructions with each Kit make the change-over an easy matter. Porter Swivel Head Cutters and Conversion Kits are now ready for delivery in the New Easy models shown in tables below. All cutter heads of any given size are readily interchangeable on the job and may be shifted to the type best suited to the work in hand. Swivel Kit No. 0—\$2.25. No. 1—\$2.50. No. 2—\$2.75.

	Either Clipper Cut or Center Cut or Wire Cutter (not insulated)	Either Soft Chain or Hard Side Splitter	Either End or Angular End Nut Splitter	Electric Wire Cutters with Insulated Handles
List of Complete Swivel Head Tools of Different Types				
No. 0 Swivel Head Cutter.....	\$6.25	\$6.75	Not available	\$8.75
No. 1 Swivel Head Cutter.....	7.50	8.00	\$8.50	10.25
No. 2 Swivel Head Cutter.....	9.75	10.50	Not available	13.25

	Either Clipper Cut or Center Cut or Wire Cutter (not insulated)	Either Soft Chain or Hard Side Splitter	Either End or Angular End Nut Splitter	Electric Wire Cutters with Insulated Handles
List of Cutterheads Available for Swivel Head Tools				
No. 0 Size.....	2.50	3.00	Not available	2.50
No. 1 Size.....	3.25	3.75	\$4.25	3.25
No. 2 Size.....	4.00	4.75	Not available	4.00

The Fireman's Cutter with Automatic Search-hook can be furnished with Swivel head in the No. 1 and No. 2 sizes. The same is true of Storage Battery Cutters in these two sizes. Prices on application. Please note that the Storage Battery Cutters are designed to cut the necks of large plates in large power plants (not auto or radio batteries).

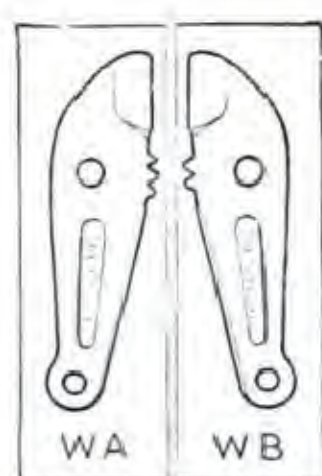
HKP WIRE CUTTERS

CAPACITIES

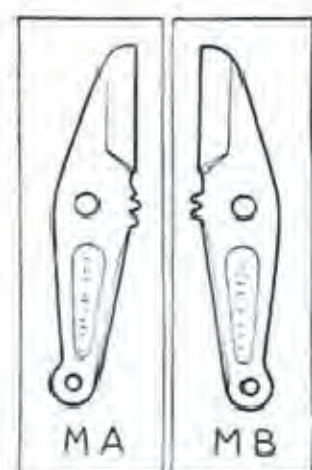
of Electric Wire Cutters and Special Cutters are the same as Regular Bolt Clippers when used on wires, rods and bolts. The extra jaw opening as indicated below is to take in the soft insulation about the wire.

No.	Description	Jaw Openings
0-WC	Electric Wire Cutters, insulated handles...	$\frac{1}{2}$ "
1-WC	Electric Wire Cutters, insulated handles...	$\frac{3}{4}$ "
2-WC	Electric Wire Cutters, insulated handles...	$1\frac{1}{8}$ "
3-WC	Electric Wire Cutters, insulated handles...	$1\frac{1}{4}$ "
1-X	Special Cutters, not insulated.....	$\frac{3}{4}$ "
2-X	Special Cutters, not insulated.....	$1\frac{1}{8}$ "
3-X	Special Cutters, not insulated.....	$1\frac{1}{4}$ "
1-F	Fireman's Cutter.....	$\frac{3}{4}$ "
2-F	Fireman's Cutter.....	$1\frac{1}{8}$ "
3-F	Fireman's Cutter.....	$1\frac{1}{4}$ "
1-SBR	Storage Battery Cutter, clipper cut.....	$\frac{13}{16}$ "
2-SBR	Storage Battery Cutter, clipper cut.....	$1\frac{1}{8}$ "
1-SBC	Storage Battery Cutter, center cut.....	$\frac{13}{16}$ "
2-SBC	Storage Battery Cutter, center cut.....	$1\frac{1}{8}$ "

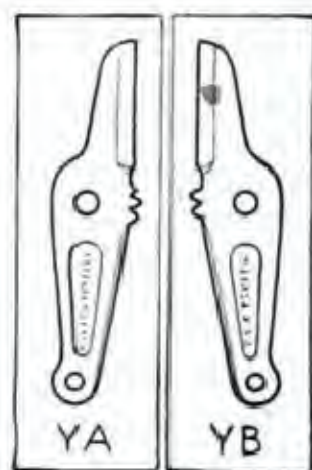
JAWS



Electric Wire Cutter
Special Cutter
Fireman's Cutter



Storage Battery Cutter
Clipper Cut



Storage Battery Cutter
Center Cut

LIST PRICE JAWS PER PAIR

Order by Letters and Size

List No.	Left Jaw	Right Jaw	Description	List Price
0-WC	WA	WB	Electric Wire Cutter.....	\$2.00
1-WC	WA	WB	Electric Wire Cutter.....	2.75
2-WC	WA	WB	Electric Wire Cutter.....	3.30
3-WC	WA	WB	Electric Wire Cutter.....	5.00
1-X	WA	WB	Special Cutter.....	2.75
2-X	WA	WB	Special Cutter.....	3.30
3-X	WA	WB	Special Cutter.....	5.00
1-F	WA	WB	Fireman Cutter.....	2.75
2-F	WA	WB	Fireman Cutter.....	3.30
3-F	WA	WB	Fireman Cutter.....	5.00
1-SBR	MA	MB	Storage Battery, clipper cut....	6.00
2-SBR	MA	MB	Storage Battery, clipper cut....	11.00
1-SBC	YA	YB	Storage Battery, center cut.....	6.00
2-SBC	YA	YB	Storage Battery, center cut.....	11.00

HKP BOLT CUTTER



No. 1855

Bolt Clipper

"1855"

with

CLIPPER CUT JAWS

An excellent small Clipper with a normal capacity up to $\frac{7}{32}$ " annealed bolts in the thread. Designed for the occasional tool user and to sell at a low price, certain economies have been practised in its manufacture. The quality of the tool is fully up to Porter standards but it is put together with rivets instead of connecting bolts. No adjusting sections are provided to compensate for wear although some adjustment may be made by filing away the stops between the handles, as necessary. Stops have no rubber buffers.

The savings effected enable us to give the buyer an unusual value for a small expenditure.

The 1855 is a low priced tool without the sacrifice of essential quality and will give satisfactory service where a bolt clipper is required infrequently. For steady use we recommend other Porter Models. The 1855 is made in one size only.

List No.	Description	Length	Cuts Bolts	Cuts Soft Rods	Net Wt. Lbs.	List Price
1855	Bolt Cutter	12"	$\frac{7}{32}$ "	$\frac{5}{32}$ "	$1\frac{1}{2}$	\$2.00

Strand Cutter

No. 3



No. 3 Strand Cutter

This tool is recommended for cutting 16 M and 25 M strand used commonly in guying poles and other construction. The center cut jaws give maximum support to the cutting edge. The strand cutter jaws are of a temper somewhat harder than the standard type of jaws.

List No.	Description	Length	Cuts Strand	Net Wt. Lbs.	List Price
3	Strand Cutter	36"	$\frac{1}{2}$ "	$12\frac{1}{4}$	\$9.75

HAND DRILLS



No. 5

Chuck: three jaw, springless. Capacity 0-1/4". Single speed. Thrust bearing. Cut gears. Steel pinions. Wide gear for fast drilling. Hollow end main handle of cocobolo, containing eight wood boring points. Double pinion. Large gear painted red; malleable iron frame enamelled black. Other parts nicked. Length, 12 7/8 inches. Packed one in box, weight 1 3/4 pounds.

Set No. 5 with drills and points, List Price, each... \$5.50

BREAST DRILLS

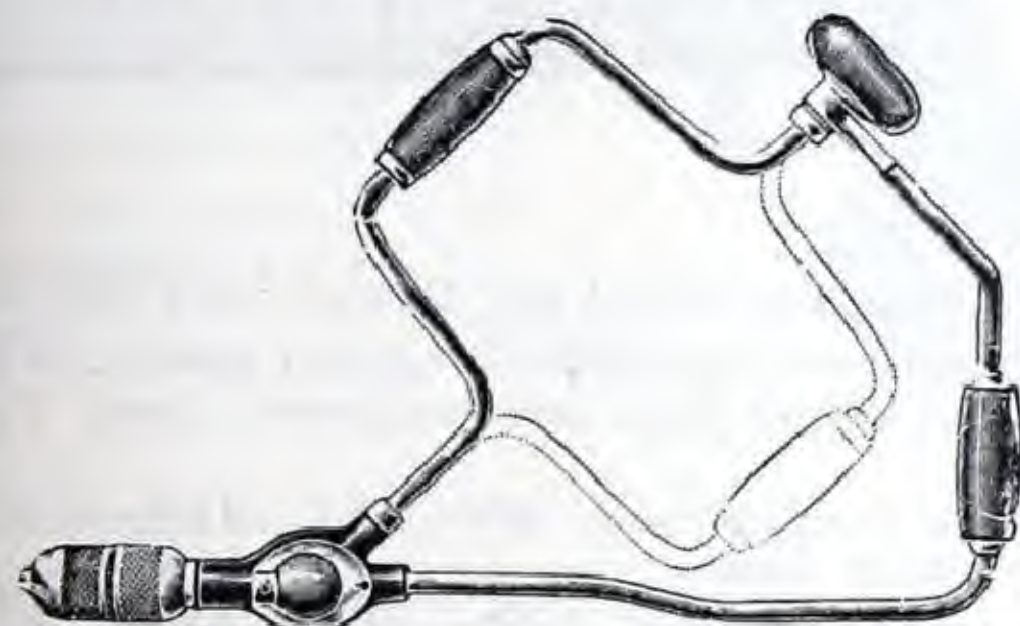


No. 12

Master chuck, holding round from 1/8 to 1/2 inch bit, and shanks. Speed, two. Changed by removing set screw shifting large gear. Ball thrust bearing. Crank handle reversible. Cut gears. Pinion of steel. Idler roll to equalize wear. Adjustable breast plate. Frame and breast plate painted iron enamelled black. Level attached. Large gear painted red. Other metal parts nicked. Length 17 1/2 inches. Weight, 6 1/2 pounds.

Set No. 12, List Price, each... \$8.00

CORNER BIT BRACES



Cocobolo wood handles. Metal parts polished and nicked. Painted japanned hub casting. Ball bearing head. Chuck held by inclosed gears (case hardened). Hardened bearings.

Length In.	Sweep In.	List Price Each
17	10	\$12.00
17	8	12.00

RATCHET BRACES



Carbonized head and handle. Heads are full steel clad, lined with washer which minimizes friction.

Sw'p In.	List Price Each	List No.	Sw'p In.	List Price Each
12	\$5.50	1323	8	\$5.50
10	5.50	1324	6	5.50

AUGER BITS



Bores all the way through any wood, leaving a smooth hole.

Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price
4/16	1 1/8	\$.80	11/16	3	\$1.50	17/16	5	\$2.20
5/16	1 1/2	.90	12/16	3 1/4	1.60	18/16	5 3/4	2.40
6/16	1 5/8	1.00	13/16	3 3/4	1.70	19/16	5 7/8	2.70
7/16	1 3/4	1.10	14/16	3 7/8	1.80	20/16	6 1/4	3.00
8/16	2 1/8	1.20	15/16	4	1.90	22/16	7 3/8	3.30
9/16	2 3/8	1.30	16/16	4 3/8	2.00	24/16	7 7/8	3.60
10/16	2 7/8	1.40	.....	.....	.....	.....	.....	.....

ELECTRICIANS' BITS



Bores rapidly and can be used in metal ceiling work.

Size Bore	Wgt., Lbs., per Doz	List Price, Each
10/16"	2 7/8 lbs.	\$1.40
11/16"	3 lbs.	1.50
12/16"	3 1/4 lbs.	1.60

SOLID CENTER CAR BITS



For end boring. Will bore the entire length of the bit without pressure.

Length of twist, 8 inches. Length over all, 12 inches.

Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price
4/16	1 1/2	\$8.25	10/16	4 1/4	\$10.00	16/16	6 3/4	\$15.00
5/16	1 7/8	8.25	11/16	4 1/2	11.50	17/16	7	16.50
6/16	2	8.25	12/16	5	11.50	18/16	7 1/2	16.50
7/16	2 1/2	8.25	13/16	5 1/2	13.50	20/16	10	18.00
8/16	3	8.25	14/16	5 5/8	13.50	22/16	13	21.00
9/16	3 1/2	10.00	15/16	6 1/2	15.00	24/16	16	24.00

Length of twist, 12 inches. Length over all, 18 inches.

Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price	Size	Wgt. lbs.	List Price
4/16	2	\$11.25	10/16	6	\$13.75	16/16	10	\$22.00
5/16	2 1/4	11.25	11/16	6 3/4	15.00	17/16	11 3/4	24.00
6/16	3 1/2	11.25	12/16	7	16.25	18/16	11 3/4	26.00
7/16	3 3/4	11.25	13/16	8 1/2	17.50	20/16	14	26.00
8/16	4 1/4	11.25	14/16	9 1/4	19.00	22/16	17	34.00
9/16	5 1/2	12.50	15/16	9 3/4	20.50	24/16	20	38.00

HENDERSON BORING MACHINES

JOIST TYPE

For the rapid boring of overhead joists. Ball bearing bit head. Floating chain drive. Collapsible to easy carrying length. Universal bit holders, uses Standard Bits.

Cuts down labor costs for thousands of contractors.

List Price, each... \$25.00

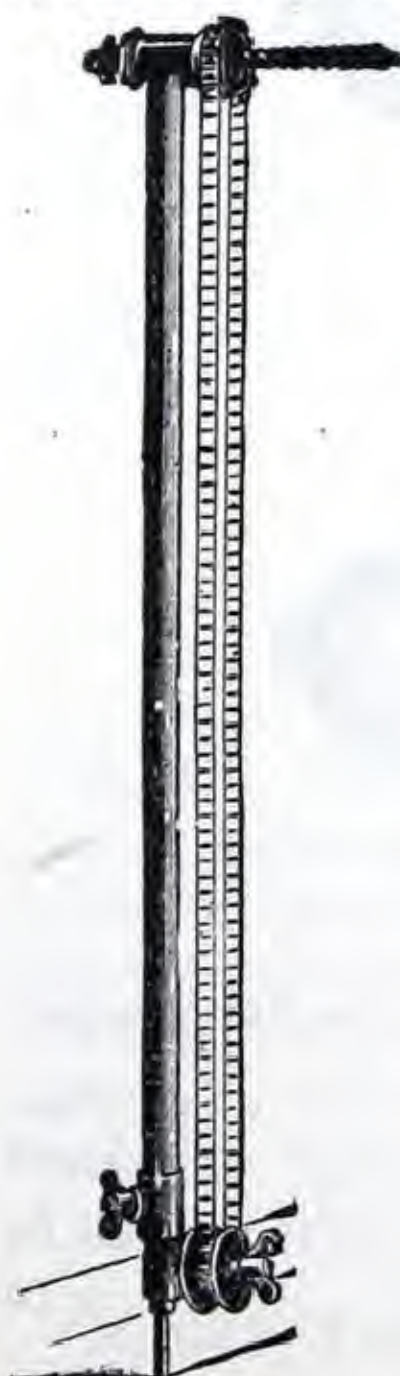
FLOOR JOIST TYPE

For boring holes straight through joists beneath the floor, for wiring old buildings, or residences where the floor has to be taken up.

The bit is revolved by a floating chain drive and is forced through or backed out by the handle on the standard, an exclusive feature.

Will bore a hole straight through a joist in a few seconds. Uses Standard Bits.

List Price, each... \$25.00



SOCKET FIRMER CHISELS



No. 11

LEATHER CAPPED HANDLE, PLAIN BACK

Inches.....	1/8	1/4	3/8	1/2	5/8	3/4
Weight, lbs. per doz....	3 1/2	4	4 1/2	5	6 1/2	7
List Price, per doz....	\$17.40	\$17.40	\$17.40	\$17.40	\$19.20	\$19.80
Inches.....	7/8	1	1 1/4	1 1/2	1 3/4	2
Weight, lbs. per doz....	7 1/2	8	10 1/2	12	14	15
List Price, per doz....	\$22.80	\$23.40	\$25.80	\$27.60	\$30.00	\$31.20

DRAWING KNIVES



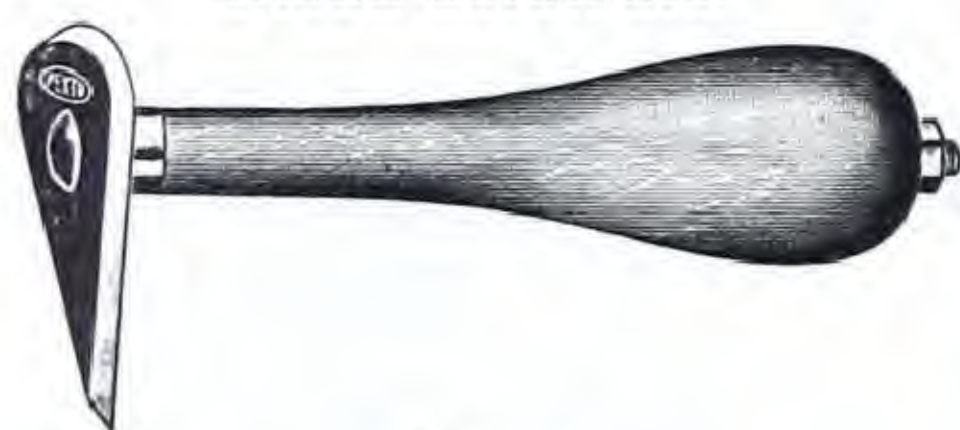
No. 15

Width of blade, 1 1/2 inches

Inches.....	6	7	8	9
Weight, lbs. per dozen.....	12	12 1/2	13 1/2	14
List Price per dozen.....	\$34.80	\$34.80	\$34.80	\$37.20
Inches.....	10	12	14	
Weight, lbs. per dozen.....	15	16 1/2	18	
List Price per dozen.....	\$40.20	\$46.20	\$54.00	

In boxes of one-half dozen each

CABLE SCRAPERS



No. 11



No. 12

Blades, forged steel, Tempered. Length of handle, 5 inches.

List No.		List Price per dozen
11	Oval; weight per dozen 1 1/4 lbs.....	\$5.04
12	Triangular; weight per dozen 1 3/4 lbs.....	5.04

Packed in box

ELECTRICIANS' SCISSORS



List No.	Steel—Full Nickle-Plated	Length of Cut	Weight per Doz.	List Price Each
175E	Full Length 5"	1 7/8"	2 lbs.	\$1.75
75E	Steel—Japanned Handles—Polished Blades	5" 1 7/8"	2 lbs.	\$1.50

ELECTRICIAN'S SCISSORS



List No.	Steel—Natural Finish	Length of Cut	Weight per Doz.	List Price Each
075E	5" 1 5/8"	2 lbs.	\$1.45	
1075E	Steel—Nickel-Plated	5" 1 5/8"	2 lbs.	\$1.60

NAIL HAMMERS



Adze Eye, Bell Face, Round Neck and Poll

Drop forged from one piece of highest grade crucible hammer steel, hardened face and tempered claws, thoroughly tested.

List Nos.	10	11	11 1/2	12	13
Weight without handle, ozs.....	28	20	16	13	
Length overall, in.....	14	13 1/2	13	12 3/4	1
Weight, per case, lbs....	170	145	130	105	7
List Price, per dozen...	\$45.60	\$30.00	\$28.80	\$27.00	\$25

SCREW-DRIVERS



No. 9

An exceptionally well-made driver of the common type. High in quality, carefully tempered and hardened. Blade and ferrule are nicely polished. Handles heavily fluted, have black rubberoid finish.

Length of Blade, inches...	2	3	4	5	6
Length over all, inches....	5 3/4	6 3/4	9	10 1/2	11
Width of Point, inches....	3/16	3/16	7/32	1/4	
Thickness of Pt., inches....	3/32	3/32	3/32	3/32	
Weight, lbs. per dozen....	1 5/16	1 7/16	2 1/8	3 1/4	
List Price per dozen.....	\$3.20	3.40	3.70	4.10	4.40
Length of Blade, inches...	7	8	10	11	
Length over all, inches....	13 1/2	14 1/2	17 1/4	18 1/2	
Width of Point, inches....	3/32	5/16	3/8	3/4	
Thickness of Pt., inches....	3/32	3/32	3/32	3/32	
Weight, lbs. per dozen....	5	5 1/4	7 1/4	8 1/2	
List Price per dozen.....	\$5.50	5.90	7.10	8.40	9.70

Packed one-half dozen in cardboard box.

C. & L. TORCHES

THE MECHANICS' FAVORITE

For Gasoline



No. 32A performs perfectly either indoors or outdoors under severe weather conditions. The burner produces an intensely hot blue blast 7 inches long which may be regulated for lighter work. A wind shield protects the gas generator in cold and windy weather. The gas orifice of the burner jet is automatically cleaned but never enlarged by the control needle cleaner tip. Greatly improved internal vein construction results in unusually long burning life. The torch is ruggedly constructed and designed for extra severe service.

Capacity one quart. Shipping weight 5¼ lbs. List price \$10.00.

THE MECHANIC WHO USES A BLOW TORCH OCCASIONALLY

For Gasoline

No. 144A is a remarkable value in the medium price field and a great favorite with mechanics who use a blow torch occasionally. The self-cleaning burner is supplied with non-enlargeable orifice and cleaner tip on control needle. It produces an extra hot flame only slightly smaller than No. 32A. It compares favorably in operating results with the best priced competitive torches. With the exception of the burner, it is similar to our No. 32A.

Capacity one quart.

Shipping weight 4½ lbs.

List price \$15.00



No. 144A Torch

No. 38 is similar to No. 144A but is smaller in size and fitted with a smaller self-cleaning burner.

Capacity one pint. Shipping weight 4 lbs. List price \$17.00

SMALLER PRICED TORCH FOR THE OCCASIONAL USER

For Gasoline



No. 600A Torch is designed for the occasional user who wants a torch to use on odd jobs under ordinary weather conditions. It is similar to No. 158A in general construction but is not equipped with windshield for outdoor use. The tank is highly finished buffed brass with concave bottom making it easy to fill, fitted with brass filler plug and neat red handle grip. The burner has tapered burner tube closed at the back, producing a hot well controlled flame. Control valve wheel is supplied with cool cover. The pump is quick acting having the lock down feature for the pump plunger. C. & L. patented interlocking fittings which make them rigid with the tank prevent leaks. It is a safe torch to use—the best value ever offered to the occasional user.

Capacity one quart. Shipping weight 4½ lbs. List price \$9.00.

No. 700A has smaller polished brass tank.

Capacity one pint. Shipping weight 3½ lbs. List price \$9.00.

No. 600A Torch
Highly Polished
Brass Tank

C. & L. TORCHES

GASOLINE TORCHES

The Tool Kit Torch

No. 252—Compact—2" thick; 5" long; 9½" high—convenient to carry in tool kit and to use in corners and close places. Burner produces powerful blast which may be regulated—it is equipped with non-enlargeable orifice and self-cleaning tip on control needle. Tank is drawn from seamless cartridge brass and is so shaped that it will not tip over easily. These tanks are built to stand rough handling without leaking.

Capacity one pint. Shipping weight 4¼ lbs. List price \$15.55.



No. 252 Torch

C. & L. TORCHES

MULTI-FLAME TORCH

For Gasoline



No. 325 Torch

No. 325 Multi-Flame is a Universal Torch for extra heavy or very light work under the most severe weather conditions. The burner produces a blue blast over ten inches long which may be reduced to a small pointed flame for light work. Greatly improved internal vein construction insures long burning life, and economical operation. Burner is equipped with non-enlargeable orifice and self-cleaning tip on control needle. A large pump produces ample pressure quickly. It is designed for soldering copper pipe and fittings, melting out soil pipe joints and for all around use by plumbers. The torch will burn in any position. The No. 325 is of sturdy construction throughout and built to withstand the most severe service of electric light and power, railroad and telephone mechanics. Regularly supplied for burning gasoline. Kerosene may be burned by changing the orifice block which will be supplied at no extra cost if specified.

Capacity, 1 quart. Shipping weight, 6 lbs. List Price \$21.90.

LARGE AND POWERFUL

For Gasoline

No. 225. Our finest Multi-Flame burner mounted on a two quart capacity tank—produces 10-inch blast flame which may be closely regulated to small size, improved internal vein construction, cleaner tip on control needle. Supplied with large size pump. Extensively used by service stations and garage repair men, railroad shops, marine use, etc. Kerosene may be burned by changing the orifice block which will be supplied at no extra cost if specified.

Capacity, 2 quarts. Shipping weight, 8¼ lbs. List Price, \$30.00.

TURNER TORCHES



No. 30-A

a smart red handle. Gasoline Fuel. Capacity 1 quart. Shipping weight, 4½ lbs. List Price \$3.90

The Turner No. 206-A is an entirely new, powerful and moderate priced blotorch for professional use. The new type heavy burner develops exceptionally high head and gives superior performance in any weather. The orifice cannot become damaged through abuse and the only wearing parts are the orifice block and wire needle tip which may be easily replaced after years of service. Windshield protection and the improved undervein construction cause more rapid generation. An adjustable air syphoning tube controls combustion and always insures an intense blue flame. The cool composition valve wheel has a deeply corrugated never-slip grip, and an effective trouble free pump is mounted in the highly polished seamless brass tank. The substantial and comfortable handle grip has an attractive red lacquer finish. Gasoline Fuel. Capacity: 1 quart. Shipping weight, 4¾ lbs. List Price \$6.00



No. 206-A



No. 39-A

The Turner No. 39-A is a new supertorch for professional users and is the finest development in the Turner Standard Line. Its massive well-proportioned burner develops a constant, powerful and intensely hot working blast that will operate perfectly under all weather conditions. A priming valve fills the drip cup quickly and conveniently, and rapid generation is possible because of windshield protection and improved undervein construction. It is impossible to jam the orifice by rough usage and both the cleaning needle tip and orifice block may be easily replaced at trivial expense after years of service. Combustion is controlled and a concentrated blue flame obtained by means of the adjustable air syphoning tube. Both valve handles are made of cool composition material, the upper one having a deeply corrugated never-slip grip. The highly polished seamless brass tank is equipped with a sturdy trouble free pump and has a handsome red and very comfortable handle. Gasoline Fuel. Capacity 1 quart. Shipping weight, 5 lbs. List Price \$8.50

TURNER TORCHES



No. 45A

The Turner No. 45-A is a super-design professional torch which will deliver a powerful blue blast under all weather conditions. The burner has only two wearing parts, the wire cleaning needle and orifice block, both of which may be replaced at slight cost after years of service. A priming valve conveniently fills the drip cup and blue flame combustion is maintained constantly by means of an adjustable air syphoning tube. The cool valve wheel has a deeply corrugated edge with non-slip grip. The pump is very rapid in its action but over-pumping is impossible because of the automatic safety valve, another exclusive Turner feature. Mechanics like to appreciate the popular Turner pistol grip handle. Highly polished seamless brass tank. 1 quart capacity. Gasoline Fuel. Shipping weight 5½ lbs. List Price \$9

Klein's Torch

Specially designed to meet the conditions of service necessary for satisfactory use of public utility companies at same time a most satisfactory torch for general use.

Has double length generating channels which quickly vaporize the fuel. Produces an intensely hot flame which can be regulated from minimum to full blast. Will not backfire. Cleaning plugs at all angles. Needle has positive shoulder stop, preventing damage to burner by enlarging orifice. Pump well made and sturdy. The tank is heavy gauge copper—capacity one quart.



List No.	Description	Wgt. Lbs. Each	Price
3428	Klein's 1-quart Gasoline Torch.....	4½	\$24

Melting Ladles



Cast One-Piece Bowl, Double Lipped, Wrought Iron Handle

List Nos.	1	2	3	4	5	6
Diameter Bowl, in.	2½	3	3½	4	4½	5
Weight, per doz. lbs.	8	9½	11	13	20	24
List Price, per doz.	\$4.10	4.30	5.80	6.90	9.60	12.00

Soldering Coppers



With Square Points for Common Use

These coppers are made of drawn copper bolts of the quality, and are shaped under a hammer. By this method they are better heat retainers.

List Nos.	1	1½	2	2½	3	4
Weight, lbs., per pair	1	1½	2	2½	3	4
List Nos.	6	7	8	10	12	14
Weight, lbs., per pair	6	7	8	10	12	14

Prices on application.

C. & L. FIRE POTS Gasoline Coil Fire Pots



QUICK DETACHABLE COIL UNIT

Unscrew Coupling Nut and Lift Out Through Hinged Door.

All inlet and outlet fittings are seamed integral with tank under heavy hydraulic pressure.

Tank shells are made of thick steel and heavily tinned inside and outside to prevent rusting.

Steel cushion band protects tank bottom from injury.

No. 22A Coil Fire Pot

No. 22A is easy to start and simple to operate. Burns low grade gasoline perfectly in any kind of weather. Produces hot blast flame of large volume; it is efficient, fast and economical for melting solder and babbitt in metal pots. A powerful pump produces air pressure quickly. The patented, quick detachable coil unit, when clogged after long use may be replaced in 45 seconds.

Capacity One Gallon. Shipping Weight 15 3/4 lbs.

Price..... \$25.00

No. 50A is popular with the user who desires a small tank fire pot at a moderate price. The tank is fitted with automatic pump and filler plug with dust-proof cap. Quick detachable coil unit and hinged door coil cup makes it easy to clean and replace.

Capacity 3/4 Gallon. Shipping Weight 13 1/4 Lbs.

List Price..... \$20.00

HEAVY DUTY FIRE POTS For Gasoline or Kerosene

No. 75 produces an extra large, powerful Blast Flame which may be easily regulated by the flame control device. The burner lasts long service without adjustment. Has a large quick action pump. Patented construction enables user to remove burner unit and insert new in five seconds. Substantial construction throughout — no rattles to rattle loose—no disassembling for cleaning purposes. Easily melts 75 pounds of solder, kettle of paraffin or insulating compound. Because of its silent, trouble-free performance, this fire pot is rapidly being universally adopted as standard by Telephone and Utility Companies. Regularly used for burning gasoline; kerosene may be used by changing burner jet which will be supplied at no charge specified. Top shield 10 inches in diameter.

Capacity One Gallon. Shipping Weight 26 lbs.

List Price..... \$50.00

MULTI-FLAME FIRE POT For Gasoline or Kerosene

No. 88—The large volume of heat and precise flame control are the outstanding features of the No. 88. After quickly melting lead or solder the volume of flame may be reduced to a small fire to keep the metal hot without burning. Top plate is fitted with 8-inch shield to accommodate a large metal pot. Burner is the quick detachable type, easy to clean or replace. Pump is large and quick acting. No. 88 is recommended for those users who desire controlled heat. Burns perfectly in cold or windy weather. Regularly supplied for burning gasoline; kerosene may be used by changing the burner orifice block which will be supplied at no charge if specified.

Capacity One Gallon. Shipping Weight 22 3/4 lbs.

List Price..... \$38.10



No. 88 Fire Pot



No. 75 Fire Pot



No. 76-B

TURNER FIREPOTS

No. 76-B

The finest general purpose firepot on the market. Has a patented copper bronze lifetime burner which operates as flexibly as a blowtorch, giving perfect flame control. Will melt a pot of metal more quickly than a coil type furnace and then, with flame turned low, will hold it molten for hours without burning and wasting it. Has a cool composition valve handle with deeply corrugated edge which affords a firm grip. Gas orifice is cleaned automatically with each valve closing. Impossible to jam the orifice by rough usage, and both the cleaning needle tip and orifice block may be easily replaced at trivial cost after years of usage. Coil replacements, repair expenses, and job tie-ups completely eliminated with this new type fire pot. Operators' time saved owing to fact it will function continuously at low heat, and need not be regenerated many times while working on long jobs. New design malleable cast top plate has handle which locks in vertical position, horizontal to support soldering coppers, or may be removed entirely so that firepot can be used as a blowtorch. Effective, quick-action, trouble-free pump; heavy lead-coated welded steel tank. Gasoline fuel. Capacity 1 gallon. Shipping weight 13 lbs. List Price \$12.60

No. 6

A very popular coil-type firepot of improved design. Delivers an excellent flame and is very satisfactory for all general purpose work. The hinged top may be tilted over, exposing the coil, jet block, and drip cup for easy cleaning or replacement of parts. Coil removal is simplified through easy loosening of a draw-down nut which seats it firmly in valve casting. Improved bail locks handle in vertical position, horizontal to support soldering coppers, or may be removed if fire pot is to be used as a blowtorch. Double drip cup prevents overflowing of ignited fuel when generating. Quick-action, trouble-free pump; heavy lead-coated welded steel tank. Gasoline fuel. Capacity 1 gallon. Shipping weight 11 lbs.



No. 6

List Price \$10.00



No. 66-B

No. 66-B

Designed especially to meet the rigid service requirements of telephone, power and other public service companies. Heavy patented copper bronze burner gives complete flame control. Dual-action valve controls gas flow and regulates flame volume for quick melting blast or low pilot blaze which will keep metal molten for hours without burning and wasting it. Gas orifice cleaned automatically each time valve is closed; wire cleaning needle tip and orifice block easily removable for replacement. This firepot will operate continuously and effectively under severe weather conditions and will melt solder, lead, paraffin or insulating compound more quickly than old style burners.

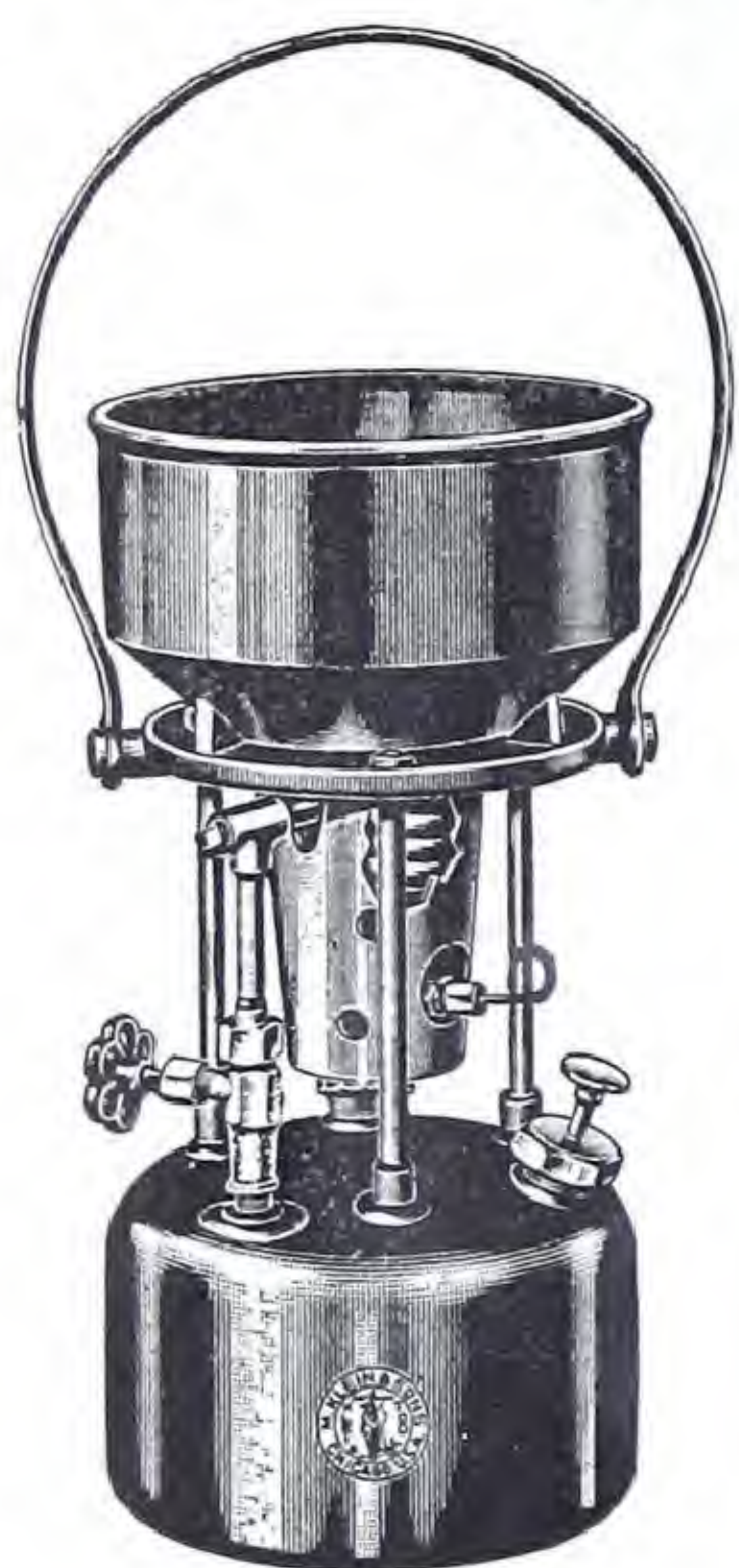
Top hood may be removed for heating compound kettle, soldering coppers, etc. Separate funnel filler with dust cap; rapid action, trouble-free pump unit. Diameter of top hood 9 1/2" (takes 8" melting pot); overall height 17 1/2"; tank capacity 1 gallon; shipping weight 18 lbs. Gasoline fuel.

List Price \$21.60

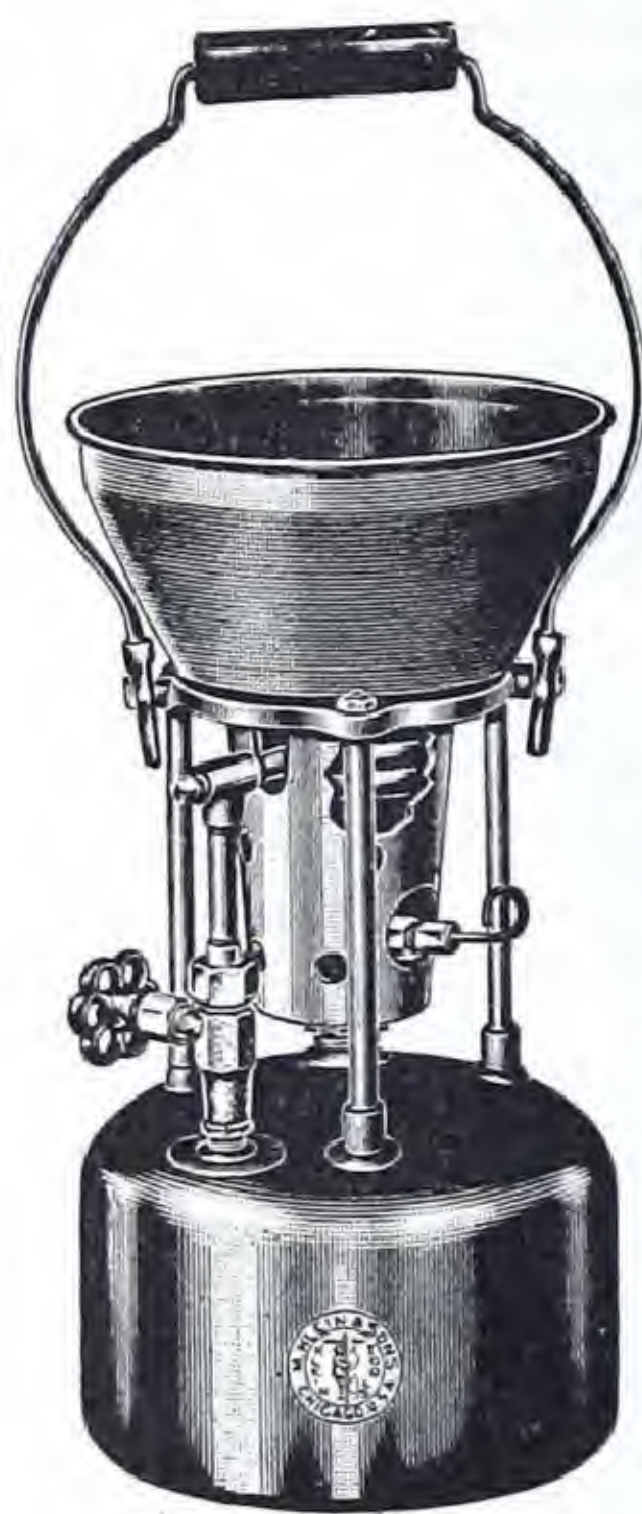
KLEIN'S FURNACES

These Furnaces are of sturdy construction with a minimum of parts and are especially made to stand up to the field requirements of Public Utility Companies. They are well suited for general use where quality is desired.

Quick starting is ensured by multi coil burner which is economical and vaporizes the fuel thoroughly, producing an intensely hot fire. Simple cleaning device to remove carbon deposit without taking burner apart. Filler caps have needle shut-off valve and check combination; one-gallon capacity tanks, formed of heavy gauged steel with bottom rolled in—no chance for leaks. All fittings brazed. Furnished with pump in fount or special hand pump separate. Shipped complete with shield unless otherwise ordered. Burn either gasoline or kerosene without change of burner.



No. 3529
For Kerosene



No. 3528
For Gasoline

List No.	Description	Weight Each	List Price Each
3528	Gasoline or Kerosene Furnace (with pump separate)..	12½ lbs.	\$30.10
3529	Gasoline or Kerosene Furnace (pump in fount).....	12 lbs.	32.45

PUMP FOR KLEIN FURNACES

3000	Brass Barrel and Plunger.....	½ lb.	\$ 2.45
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SHIELDS FOR KLEIN FURNACES

3010	For Gasoline-Kerosene Furnace....	2½ lbs.	\$ 4.10
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EVERYTHING For Your Pole Line

Whatever your line requirements, we can supply them. For more than thirty years we have specialized in this field, always keeping abreast of the times with new and improved devices. From the ground to the top of the pole, you can standardize on Northern Electric material. This General Catalogue lists all standard items required to build a safe and highly efficient line: poles, wires and cables, galvanized hardware, cross-arms, steel pins, insulators, guy strand, specialties and tools. Should you be interested in any material not shown we will appreciate your inquiry. Quality, prices and deliveries are in keeping with our position—"A national electrical service."



for
**POWER
APPARATUS
INDEX**

See Back of
this Page



*See alphabetical index for
page numbers of listings
at back of book.*

The buyers in the Canadian market seeking motors, controllers and other power apparatus, will find in the Northern Electric Company one source of supply whatever the requirements may be. Through the Power Apparatus Specialists, located in the principal cities of Canada, at the command of you and your consulting engineers, for aid in the selection of the proper equipment, the Northern Electric Company stands ready to serve you upon call.



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POWER APPARATUS DIVISION



INDEX

Condit Oil Circuit Breakers
Cutler-Hammer Control Apparatus
E.E.E. Disconnects, Switchboard and Protective
Fittings
Ferranti Transformers and Surge Absorbers
G. and W. Electric Specialties
Hewittic Mercury Arc Rectifiers
Igranic Control Apparatus
Ilg Ventilating Equipment
J. P. Tubular Electric Heating Systems
Lincoln Meters
Mather and Platt Motors, Generators and Pumps
Megger Test Sets
Power Switchboards
Reyrolle Switchgear and Oil Circuit Breakers
Sangamo Meters
Slater Cutouts and Disconnects
T.C.C. Static Condensers
Weston Instruments

CONDIT AIR MOTOR STARTERS

Type "A"

- Button Control
- Undervoltage Protection
- Wall or Flat Surface Mounting
- Time-Lag Overload Protection



Type A-20 Air Motor Starter



Type H-6 Push Button

Features

totally enclosed—dust-proof. Easy to install. Controlled at any number of points. Noiseless operation. Wide range application. Knockouts for conduit connections. Parts easily accessible. Single throw—three pole. Interchangeable contacts. Design involves principle of arc prevention. Long low maintenance. Provision for locking case. Compact without crowding. Safe—positive in action.

General

The type A line of air motor starters and combination switches is especially designed for the control and protection of squirrel cage induction motors. A new principle—arc prevention—is an outstanding feature of their design, affording interruption of stalled and starting currents of motors at maximum rated horsepower with no more than a spark. There is relatively no contact burning or formation of gas. This arc prevention principle has resulted in multiplying the life of the contacts. Even on severe service, deterioration is very slow.

The movable contacts of each starter are mounted on a removable base which upon being pulled out affords instantaneous inspection of the contacts. By turning the contact over and then replacing, the starter can be locked out so there is no way in which it can be accidentally closed—a real safety convenience when work is to be done on the motor.

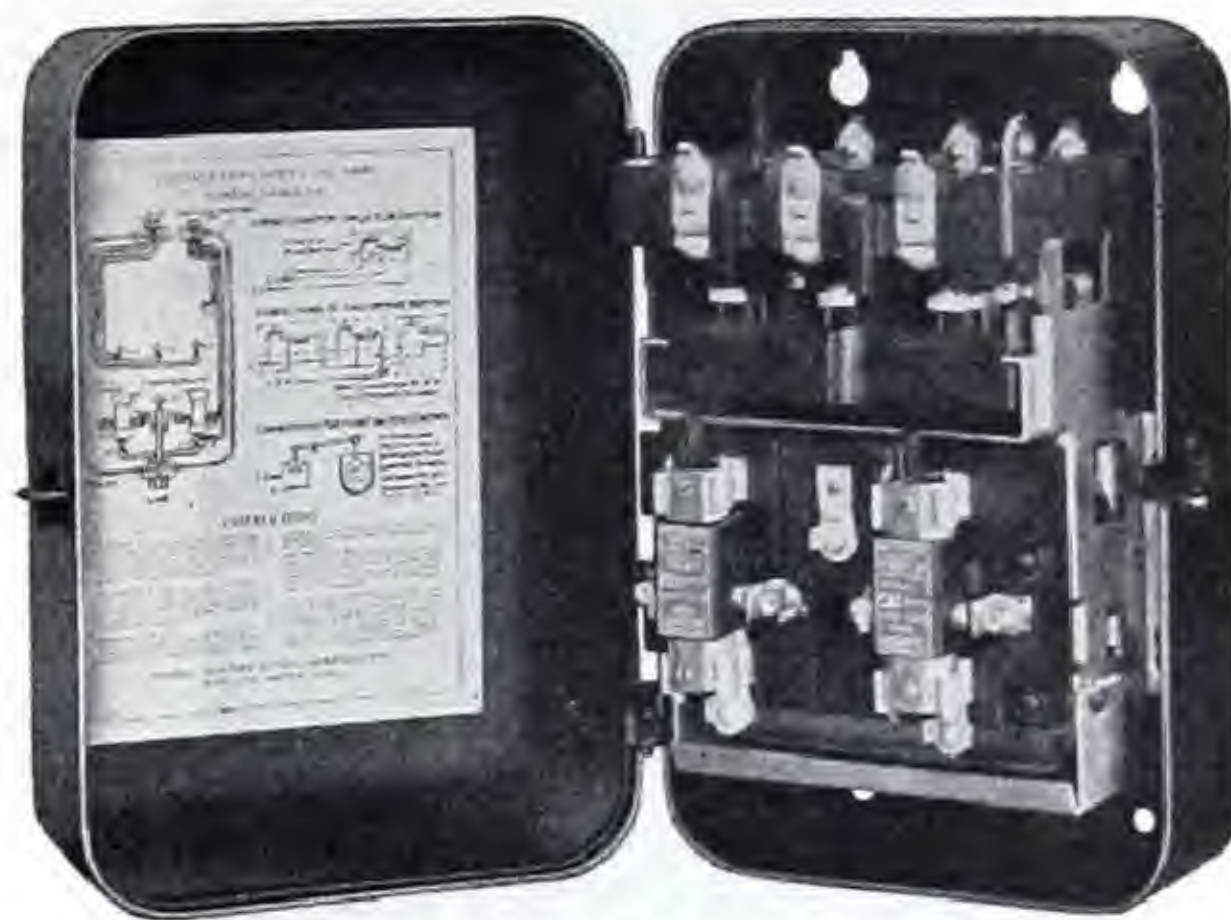
The mechanisms and all other parts are designed to afford long life. All metal parts except cases and contacts are cadmium plated, affording prevention against corrosion. All starters have been approved by Underwriters Laboratories and Associated Factory Mutual Companies.

Temperature relays are furnished, affording time delay overload protection. The temperature relays can be removed and replaced as easily as fuses.

Applications requiring Shipper Rod Control Switch are available up specially.

CONDIT AIR MOTOR STARTERS

Type A



Type A-31 Air Motor Starter

GENERAL PURPOSE STARTERS

The types A-20 and A-31 are general purpose starters. Each is enclosed in a substantial pressed steel case from which it can be quickly removed for inspection. The cover is held in the closed position by a gravity latch and can be locked shut if desired. The enclosing case is provided with six knock-outs for conduit connections, three at the top and three at the bottom, affording facilities for bringing out leads as desired. The type A-31 is equipped with silver contacts.



Type A-20C Dust-Tight Air Motor Starter

DUST-TIGHT AND WATER-TIGHT STARTERS

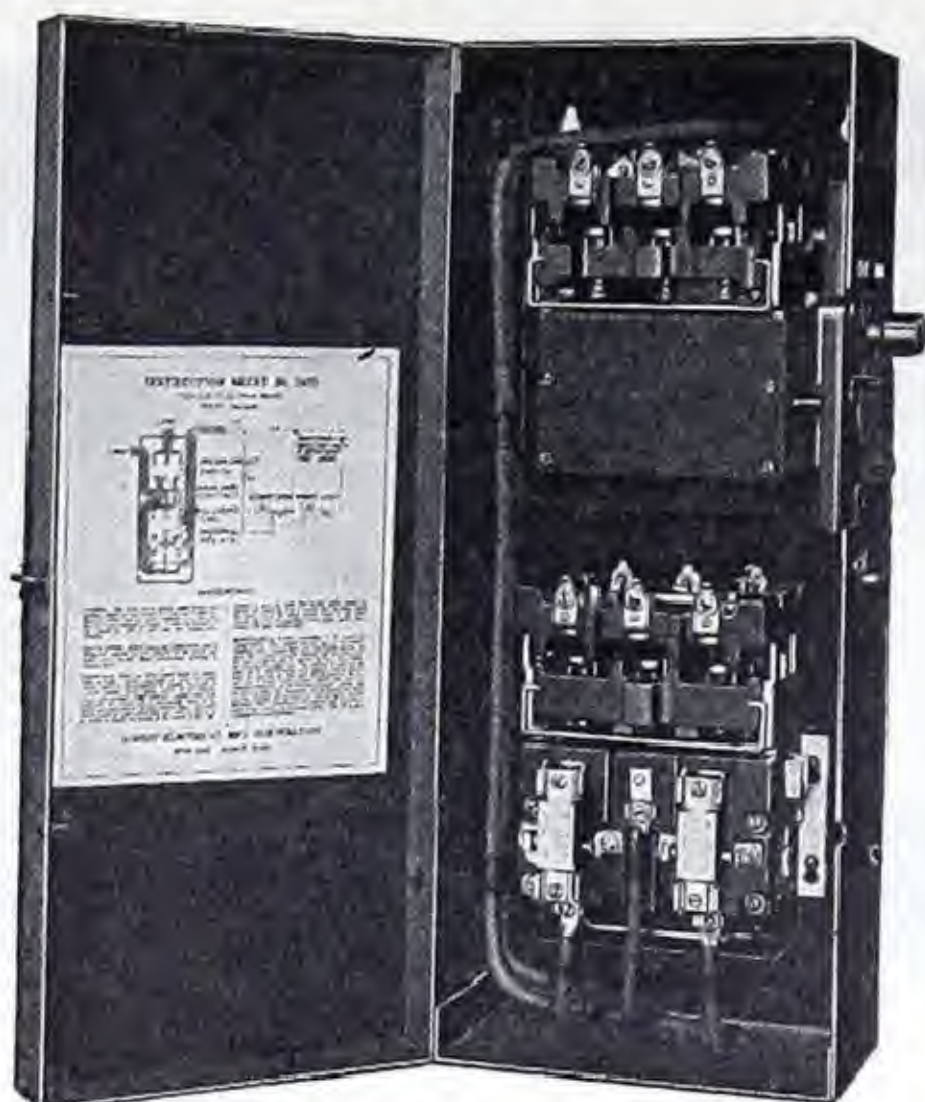
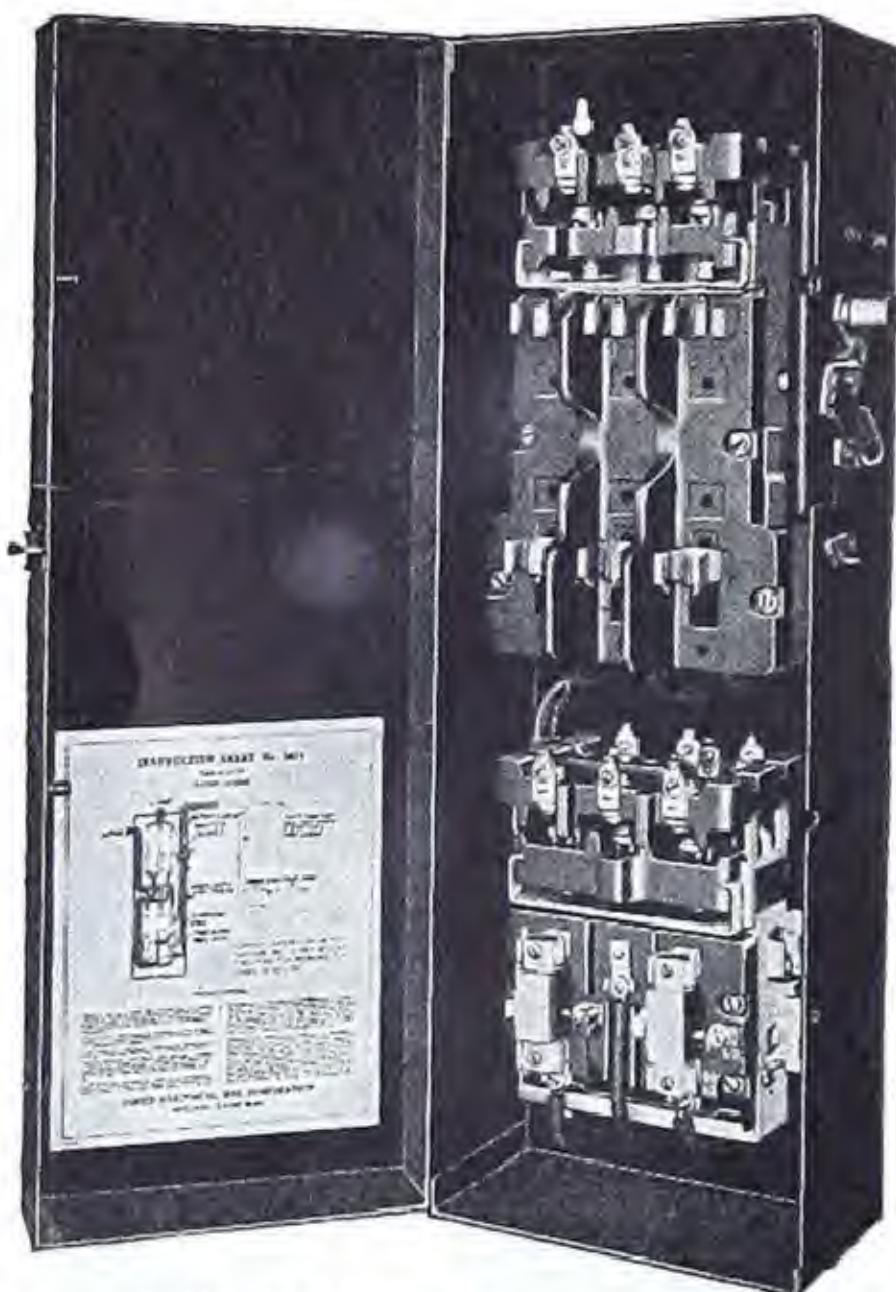
The types A-20-C and A-31-C are similar to the types A-20 and A-31, except that the enclosing case is of exceptionally strong cast iron construction which makes them especially suitable for the control and protection of induction motors in woodworking plants, cement mills, flour mills, pulverizing plants, chemical plants and other industries where a large amount of dust or moisture may interfere with the efficient operation of a general purpose starter.

The cast iron enclosing case is provided with six outlets for threaded conduit, three in the top and three in the bottom, affording facilities for bringing out leads as desired.

A gasket is provided between the cover and the case. Four heavy eye bolts and nuts hold the cover tight. The cover is hinged and provision is made for padlocking it closed. The type A-C-31 is equipped with silver contacts.

CONDIT AIR MOTOR STARTERS

Type A

Type A-31-D Combination
Air Motor StarterType A-31-DF Combination Air Motor
Starter with Fuse Clips

The National Electric Code now requires a disconnecting means ahead of motor starters.

Condit A-20 and A-31 motor starter combinations include the motor starter and disconnecting means in one case, saving an extra box and running of wires and conduit between fuses.

Standard combinations are types A-20-D and A-31-D consisting of motor starter with motor circuit switch, and types A-20-DF and A-31-DF consisting of motor starter with motor circuit switch and fuse clips.

Each combination is enclosed in a substantial metal case, furnished with a hinged cover, which may be locked shut if desired. The enclosing case is provided with knock-outs for conduit connections in the top, bottom and sides, affording facilities for bringing out leads as desired.

The motor circuit switch is manually operated and interlocked with the cover so that it is necessary to throw the switch "off" to open the cover. The switch cannot be thrown "on" until the cover is closed. Visible indication is provided for "on" and "off" positions. The motor circuit switch will open the same overload as the starter.

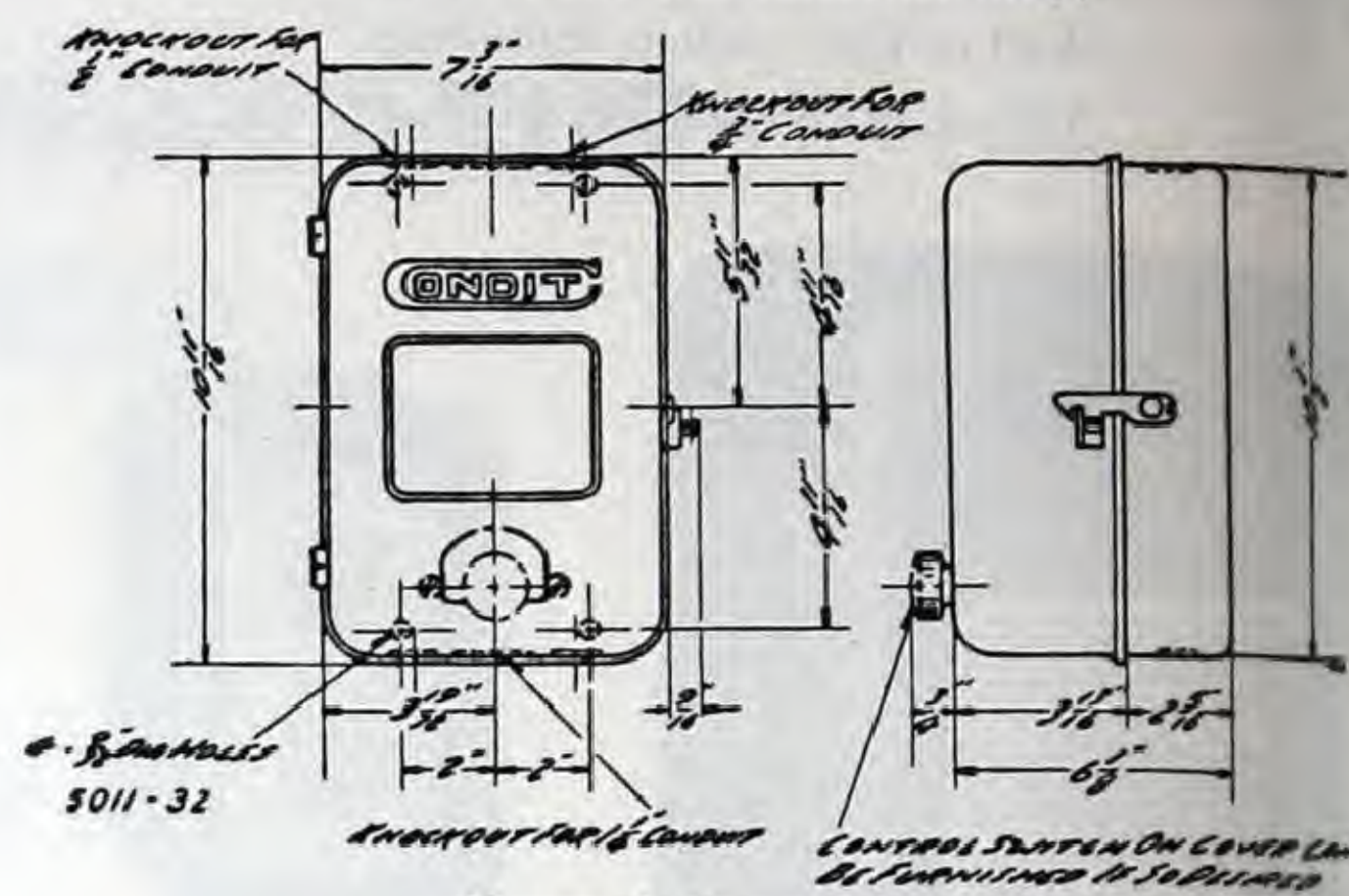
In the type A-31 combinations, the motor starters are equipped with silver contacts.

The types A-20-DF and A-31-DF can be equipped with ammeter test jacks—price on application.

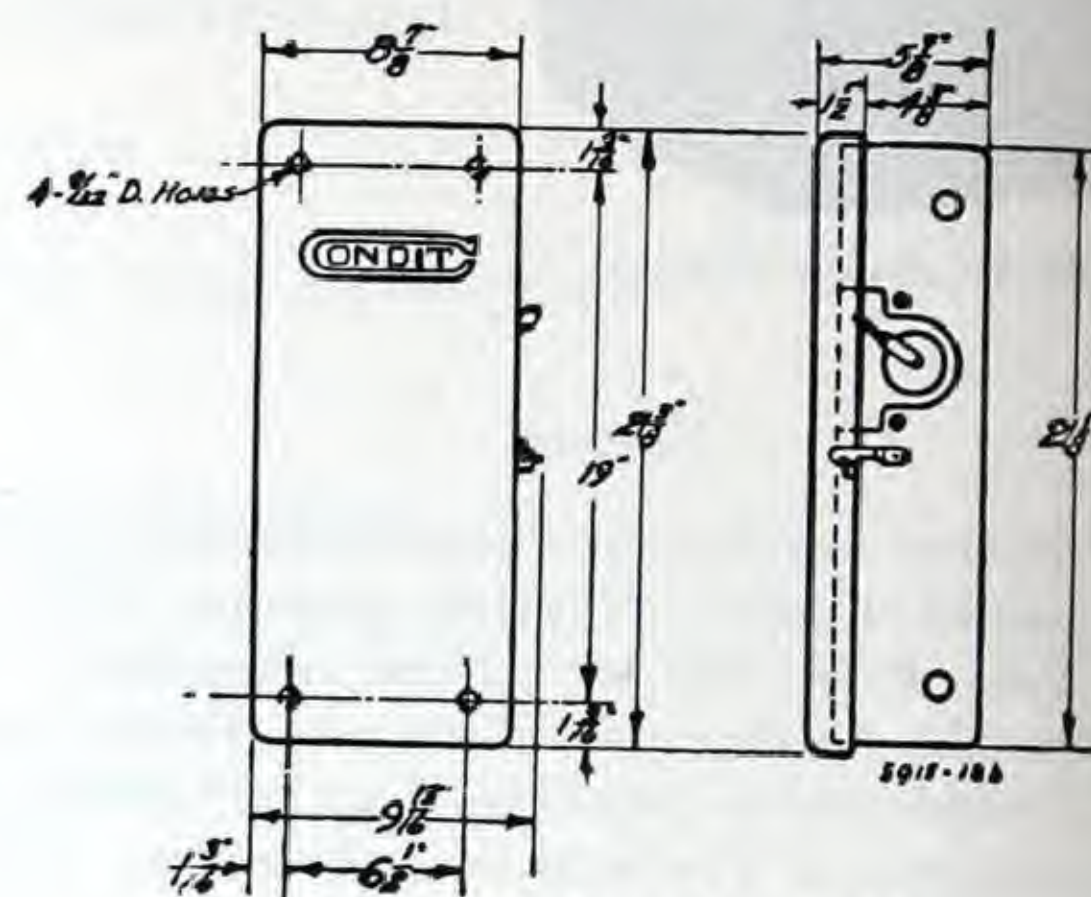
CONDIT AIR MOTOR STARTERS

Type A

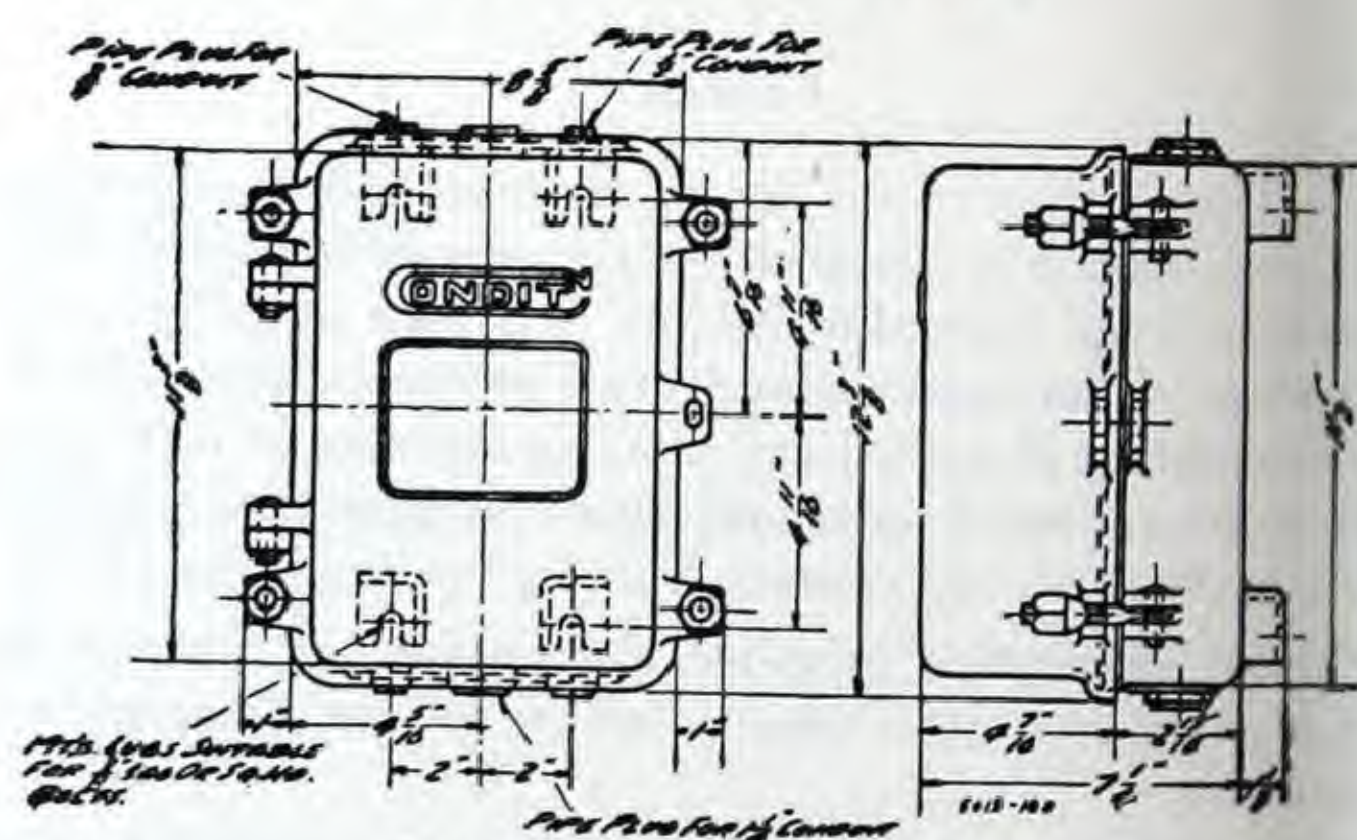
Dimensions (for reference only)



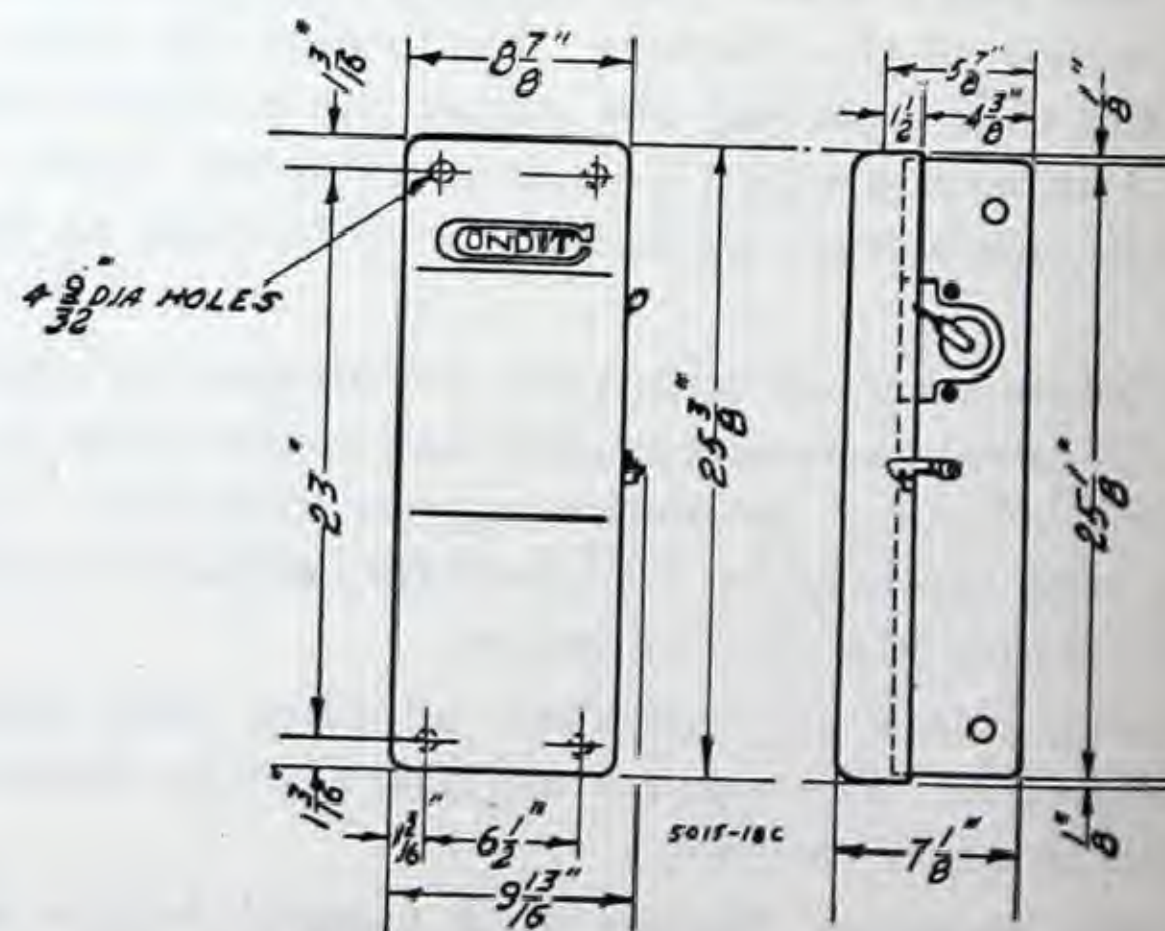
Types A-20 and A-31



Types A-20-D and A-31-D



Types A-20-C and A-31-C



Types A-20-DF and A-31-DF

CONDIT AIR MOTOR STARTERS

Type A

GENERAL-PURPOSE CROSS-THE-LINE AIR MOTOR STARTERS

Price includes two Type C-30 Automatic Temperature Overload Relays but does not include Push-Button*

Max. 3 Phase
Rating of
Motor Starters

H.P.	Type	Size	List Number 60 cycles	25 cycles	List Price
110 Volts					
1/2 to 3	A-20	1	16820A	12820A	\$16.00
1/2 to 7 1/2	A-31	2	16831A	12831A	30.00
220 Volts					
1/2 to 5	A-20	1	26820A	22820A	16.00
1/2 to 15	A-31	2	26831A	22831A	30.00
440 Volts					
1/2 to 7 1/2	A-20	1	46820A	42820A	16.00
1/2 to 20	A-31	2	46831A	42831A	30.00
550 Volts					
1/2 to 7 1/2	A-20	1	56820A	52820A	16.00
1/2 to 20	A-31	2	56831A	52831A	30.00
600 Volts					
1/2 to 7 1/2	A-20	1	66820A	62820A	16.00
1/2 to 20	A-31	2	66831A	62831A	30.00

Approximate shipping weight 20 lbs.

*Add \$2.00 for type H-6 push-button station. Specify size and List No. of Temperature Overload Relays. If type C-40 hand reset relays are required add \$0.50 to price. If shipper rod control is required add \$8.50 for type H-4 shipper rod push-button station. If control in cover is required, add \$2.00. When ordering state List No., horse power, operating voltage and frequency.

DUST-TIGHT AND WATER-TIGHT CROSS-THE-LINE AIR MOTOR STARTERS

Price includes two Type C-30 Automatic Temperature Overload Relays but does not include Push-button**

Max. 3 Phase
Rating of
Motor Starters

H.P.	Type	Size	List Number 60 cycles	25 cycles	List Price
110 Volts					
1/2 to 3	A-20-C	1	1620AC	1220AC	\$28.00
1/2 to 7 1/2	A-31-C	2	1631AC	1231AC	54.00
220 Volts					
1/2 to 5	A-20-C	1	2620AC	2220AC	28.00
1/2 to 15	A-31-C	2	2631AC	2231AC	54.00
440 Volts					
1/2 to 7 1/2	A-20-C	1	4620AC	4220AC	28.00
1/2 to 20	A-31-C	2	4631AC	4231AC	54.00
550 Volts					
1/2 to 7 1/2	A-20-C	1	5620AC	5220AC	28.00
1/2 to 20	A-31-C	2	5631AC	5231AC	54.00
600 Volts					
1/2 to 7 1/2	A-20-C	1	6620AC	6220AC	28.00
1/2 to 20	A-31-C	2	6631AC	6231AC	54.00

Approximate shipping weight 57 lbs.

**Add \$2.00 for type H-6 push-button station. Add \$6.50 for type H-2-C water-tight and dust-tight push-button station. Specify size and List No. of Temperature Overload Relays. If type C-40 hand reset relays are required add \$0.50 to price. If shipper rod control is required add \$8.50 for type H-4 shipper rod push-button station. When ordering state List No., horse power, operating voltage and frequency.

CONDIT AIR MOTOR STARTERS

Type A

COMBINATION CROSS-THE-LINE AIR MOTOR STARTERS

Price includes two Type C-30 Automatic Temperature Overload Relays but does not include Push-button or Fuses†.

Max. 3
Phase Rating Fuse Clip
of Motor Capacity

Starters H.P.	Amperes	Size	Type	List Number 60 cycles	25 cycles	List Price
110 Volts						
1/2 to 3	30	1	A-20-DF	16522A	12522A	\$31.00
1/2 to 3	60	1	A-20-DF	16422A	12422A	31.00
1/2 to 3	Unfused	1	A-20-D	16321A	12321A	25.00
5 to 7 1/2	60	2	A-31-DF	16432A	12432A	51.00
5 to 7 1/2	Unfused	2	A-31-D	16331A	12331A	42.00

220 Volts

1/2 to 5	30	1	A-20-DF	26522A	22522A	31.00
1/2 to 5	60	1	A-20-DF	26422A	22422A	31.00
1/2 to 5	Unfused	1	A-20-D	26321A	22321A	25.00
7 1/2 to 15	60	2	A-31-DF	26432A	22432A	51.00
7 1/2 to 15	Unfused	2	A-31-D	26331A	22331A	42.00

440 Volts

1/2 to 7 1/2	30	1	A-20-DF	46522A	42522A	31.00
1/2 to 7 1/2	60	1	A-20-DF	46422A	42422A	31.00
1/2 to 7 1/2	Unfused	1	A-20-D	46321A	42321A	25.00
10 to 20	60	2	A-31-DF	46432A	42432A	51.00
10 to 20	Unfused	2	A-31-D	46331A	42331A	42.00

550 Volts

1/2 to 7 1/2	30	1	A-20-DF	56522A	52522A	31.00
1/2 to 7 1/2	60	1	A-20-DF	56422A	52422A	31.00
1/2 to 7 1/2	Unfused	1	A-20-D	56321A	52321A	25.00
10 to 20	60	2	A-31-DF	56432A	52432A	51.00
10 to 20	Unfused	2	A-31-D	56331A	52331A	42.00

600 Volts

1/2 to 7 1/2	30	1	A-20-DF	66522A	62522A	31.00
1/2 to 7 1/2	60	1	A-20-DF	66422A	62422A	31.00
1/2 to 7 1/2	Unfused	1	A-20-D	66321A	62321A	25.00
10 to 20	60	2	A-31-DF	66432A	62432A	51.00
10 to 20	Unfused	2	A-31-D	66331A	62331A	42.00

Approximate shipping weight 35 to 40 lbs.

†Add \$2.00 for type H-6 push-button station. Specify size and list No. of Temperature Overload Relays. If type C-40 hand reset relays are required add \$0.50 to price. If shipper rod control is required add \$8.50 for type H-4 shipper rod push-button station. When ordering state list No., horse power, operating voltage and frequency.

CONDIT TEMPERATURE RELAYS

Types C-30 and C-40

For use with Type A Line Air Motor Starters
and Combination Switches



Type C-40 Hand
Reset Temperature Relay



Type C-30 Automatic
Reset Temperature Relay

Properly applied, temperature relays minimize shutdowns for momentary overloads but operate in the case of prolonged or heavy overloads in ample time to protect the motor.

Condit types C-30 and C-40 temperature relays are of the cartridge type with ferrules on each end which snap into clips on the starter. The spacing between the ferrules and clips is such that a standard cartridge type fuse cannot be substituted in place of the relay.

The pilot circuit of the relays is independent and insulated from the main or heater circuit so that a separate source of potential may be used.

The type C-30 resets itself automatically after each operation. Furnished for three wire control only.

The type C-40 is of the hand reset type and resetting is accomplished by pushing a button at the end of the relay. It is adaptable to three-wire or two-wire control.

TYPE C-30 AUTOMATIC

Amperes	List No.	List Price	Amperes	List No.	List Price
1.0	24C	\$1.50	10	530C	\$1.50
1.3	26C	1.50	12	630C	1.50
1.6	28C	1.50	14	635C	1.50
2.0	30C	1.50	16	730C	1.50
2.5	129C	1.50	18	736C	1.50
3.0	130C	1.50	20	830C	1.50
3.5	131C	1.50	22	837C	1.50
4	230C	1.50	25	930C	1.50
5	232C	1.50	30	1030C	1.50
6	330C	1.50	35	1130C	1.50
7	333C	1.50	40	1138C	1.50
8	430C	1.50	45	1230C	1.50
9	434C	1.50	50	1330C	1.50

TYPE C-40 HAND RESET

Amperes	List No.	List Price	Amperes	List No.	List Price
2.0	40C	\$1.75	16	740C	\$1.75
2.5	139C	1.75	18	746C	1.75
3.0	140C	1.75	20	840C	1.75
3.5	141C	1.75	22	847C	1.75
4	240C	1.75	25	940C	1.75
5	242C	1.75	30	1040C	1.75
6	340C	1.75	35	1140C	1.75
7	343C	1.75	40	1148C	1.75
8	440C	1.75	45	1240C	1.75
9	444C	1.75	50	1340C	1.75
10	540C	1.75			
12	640C	1.75			
14	645C	1.75			

All relays calibrated to operate on 100% load when motor starter is in room temperature of 40° C.

Temperature Relays must be protected against short circuits by standard use of a rating not more than 400% of Temperature Relay Rating.

CONDIT AIR MOTOR STARTERS

Type A-15

MANUALLY OPERATED

Time-Lag Overload Protection
Wall or Flat Mounting

FEATURES

Easy to install.
Safe—positive in action.
Wide range of application.
Knockouts for conduit connections.
Parts readily accessible.
Single throw—three pole.
Design involves principle of arc prevention.
Long life—low maintenance.
Provision for locking case.
Compact without crowding.
Interchangeable contacts.
Totally enclosed—dust proof.



Type A-15

The type A-15 is a simple, compact, across-the-line motor starter of new air break design, especially applicable to the control and protection of squirrel cage induction motors. The entire starter is enclosed in a substantial metal case furnished with a hinged cover which may be locked shut if desired. The enclosing case is provided with six knockouts for conduit connections three at the top and three at the bottom, affording facilities for bringing out leads as desired.

The mechanism and all other parts are designed to afford long life. All metal parts except case and contacts are cadmium plated, affording prevention of corrosion. With leads disconnected, the switch unit can be quickly removed without disturbing the case.

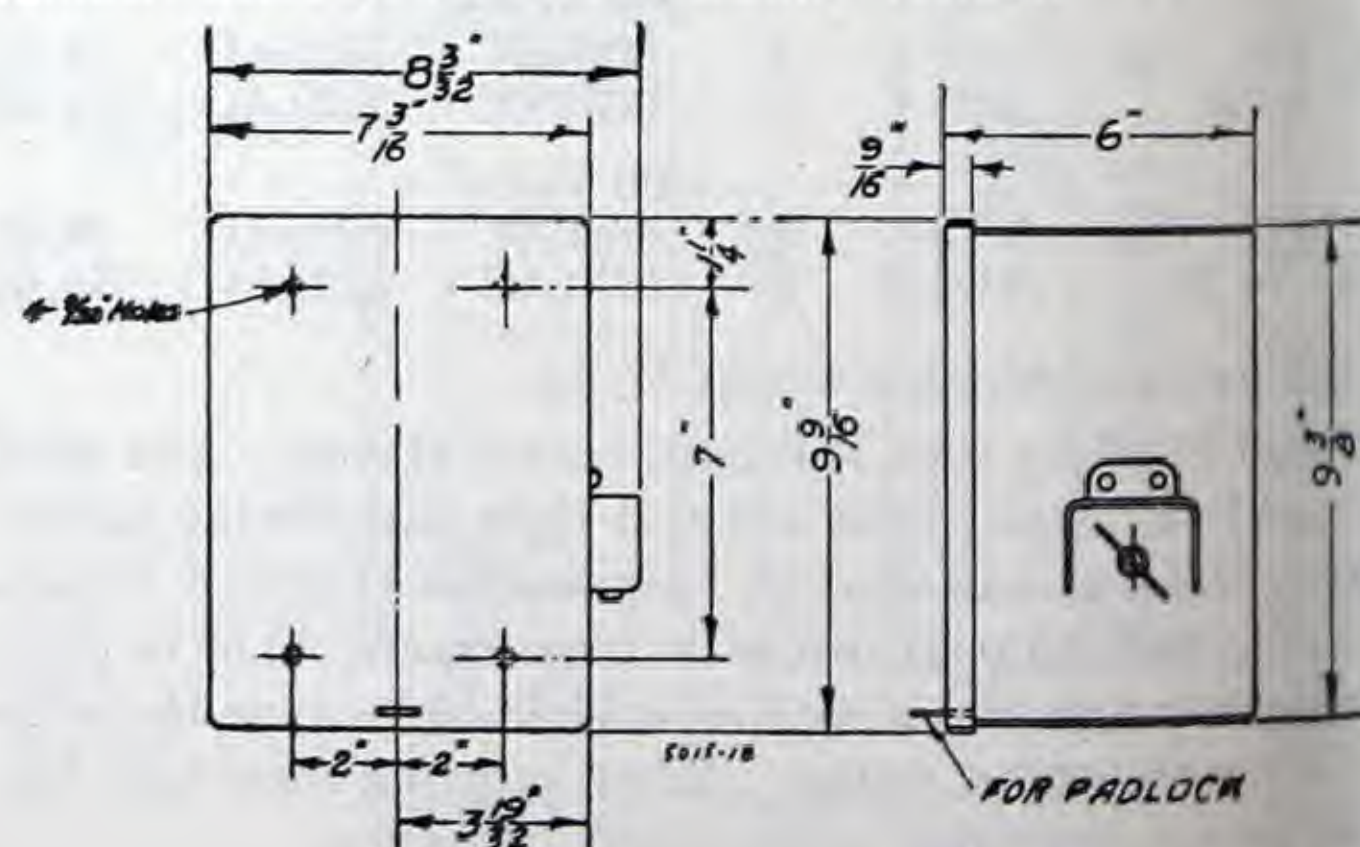
The movable contacts are mounted on a removable contact base which upon being pulled out affords instant inspection of the contacts, as well as easy means for replacing worn out contacts. By turning the contact base over and then replacing, the starter can be locked out, and there is no way in which it can be accidentally closed—a special safety convenience when work is to be done on the motor.

Thermal cutouts are furnished, affording time-lag overload protection. The cutouts are designed to operate in ample time to protect the motor on a sustained overload but not to operate on momentary overload or on starting. The thermal cutouts can be removed and replaced as easily as fuses.

Visible indication is provided for "on" and "off" position. Approved by Underwriters.

Type	H.P.	Volts	List No.	List Price	Boxed Wt. in Pounds
A-15	3	110	5615A	\$9.00	18
A-15	5	220	5615A		18
A-15	7½	440	5615A		18
A-15	7½	550	5615A		18

List number and price include two thermal cutouts and six fusible links (specify size). When ordering, state list number, horse power and operating voltage.



CONDIT AIR MOTOR STARTERS

Full-Load Motor Currents

(National Electrical Code—N.F.P.A)

Table No. 1—2 and 3 Phase A. C. Motors Squirrel Cage Induction Type.

110 Volts		220 Volts		440 Volts		550 Volts	
2 Phase	3 Phase	2 Phase	3 Phase	2 Phase	3 Phase	2 Phase	3 Phase
4.3	5.0	2.2	2.5	1.1	1.3	.9	1.0
4.7	5.4	2.4	2.8	1.2	1.4	1.0	1.1
5.7	6.6	2.9	3.3	1.4	1.7	1.2	1.3
7.7	9.4	4.0	4.7	2	2.4	1.6	2.0
10.4	12.0	5.0	6	3	3.0	2.0	2.4
		8	9	4	4.5	3.0	4.0
		13	15	7	7.5	6	6
		19	22	9	11	7	9
		24	27	12	14	10	11
		33	38	16	19	13	15

220 Volts		440 Volts		550 Volts		2200 Volts	
2 Phase	3 Phase	2 Phase	3 Phase	2 Phase	3 Phase	2 Phase	3 Phase
45	52	23	26	19	21	6	7
55	64	28	32	22	26	7	8
67	77	34	39	27	31	9	10
88	101	44	51	35	40	11	13
108	125	54	63	43	50	13	15
129	149	65	75	52	60	16	19
156	180	78	90	62	72	22	25
212	246	106	123	85	98	27	32
268	310	134	155	108	124	31	36
311	360	155	180	124	144	43	49
415	480	208	240	166	195		

Table No. 2—Single Phase A. C. Motors

H.P.	110 Volts	220 Volts	440 Volts
1/6	3.34	1.67	.....
1/4	4.8	2.4	.....
1/2	7.0	3.5	.....
3/4	9.4	4.7	.....
1 1/2	15.2	7.6	.....
1	11.0	5.5	.....
2	20	10	.....
3	28	14	.....
5	46	23	.....
7 1/2	68	34	17
10	86	43	21.5

THERMAL CUTOUT 600 Volts or Less



List Price (without links) \$1.00 each. List No. 10060

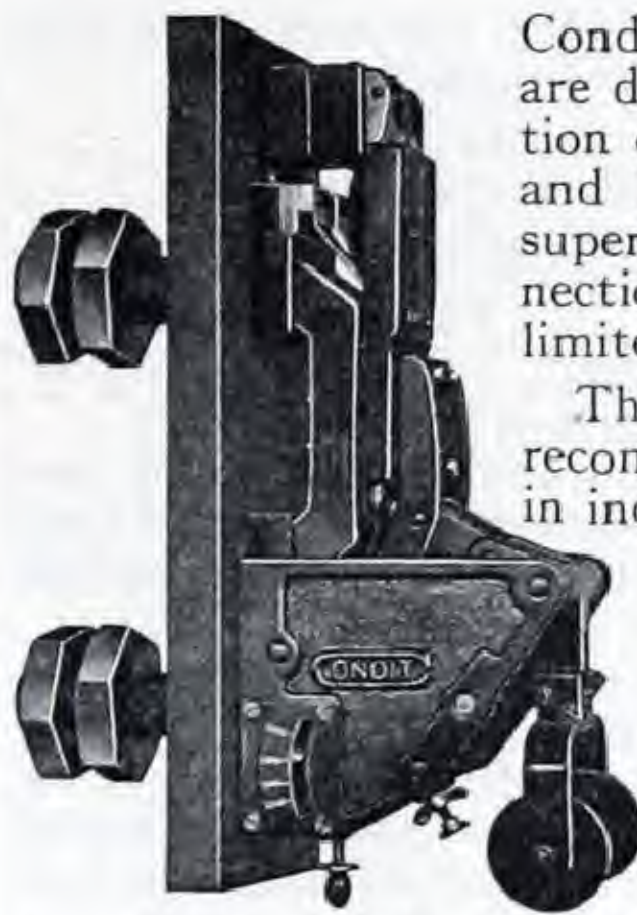
FUSIBLE LINK

List No.	List Price	Amp.	List No.	List Price
10061	Package of 3	7	10068	Package of 3
10062	(One size) \$0.25	8	10069	(One size) \$0.25
10063	"	10	10070	"
10064	"	12	10071	"
10065	"	16	10072	"
10066	"	18	10073	"
10067	"			

Thermal Cutouts must be protected against short circuits. Standard Fuses of a rating not more than 400% of the pole link Rating.

CONDIT AIR CIRCUIT BREAKERS

TYPE K-1



Condit type K-1 air circuit breakers are designed for the control and protection of D. C. and A. C. railway, power and light circuits, but the recognized superiority of oil circuit breakers in connection with A.C. service has generally limited their use to direct current.

The type K-1 air circuit breakers are recommended for use on switchboards in industrial plants, railroad and central stations, for protecting generators, motors, storage batteries and distributing circuits. They are built for heavy duty, designed to meet emergencies where the service is severe. They can be obtained for rear connection in capacities from 100 to 8,000 amperes, 650 volts or

less, D.C. or A.C., for either single, two, three or four poles, manual or electrical operation.

MANUALLY OPERATED—REAR CONNECTED—INDEPENDENT ARMS*

PLAIN OVERLOAD 650 VOLTS OR LESS, D.C. or A.C.

Ampere Ratings			Single Pole			Studs Round or Laminated
30 Deg's Rise (Cent.)	D.C.	A.C.†	List Price	List Price	List Price	
25	60					
100	100	100	\$63.00	\$131.00	\$199.00	Round
200	200	200	63.00	131.00	199.00	"
300	300	300	63.00	131.00	199.00	"
400	400	400	63.00	131.00	199.00	"
600	600	600	73.00	151.00	229.00	"
800	700	700	87.00	179.00	271.00	"
1200	1200	1200	126.00	257.00	388.00	"
1600	1500	1400	147.00	299.00	451.00	"
2000	1900	1800	190.00	385.00	580.00	"
3000	2500	2000	275.00	555.00	835.00	"
4000	3500	2700	345.00	695.00	1,045.00	"
5000	4400	3300	450.00	905.00	1,360.00	Laminated
6000	.....	.....	550.00	1,105.00	1,660.00	"

*Rigid arm furnished with two and three pole breakers, 2000 amperes or less, when specified, at no additional charge.

†Current transformers required above 3500 amperes, 25 cycles, and 2700 amperes, 60 cycles. Price additional.

Note. Plain Shunt Trip or Plain Undervoltage same price as Plain Overload.

Attachments for Plain Overload Breakers	Sh'p'g Wgt. Lbs.	List Price
*Undervoltage Attachment, Type V-2, 110 or 220 Volts.....	12	\$31.00
*Undervoltage Attachment, Type V-2, 440 or 550 Volts.....	12	31.00
*†Shunt-trip Attachment, Type VS, 110 or 220 Volts.....	12	31.00
*†Shunt-trip Attachment, Type VS, 440 or 550 Volts.....	12	31.00
Auxiliary Switch.....	2	8.00
Time-Limit Attachments (Adjustable)		
3000 amperes or less (D.C. Rating)—Type T-2	10	35.00
Above 3000 amperes, use shunt-trip or undervoltage breaker with overload relay.		

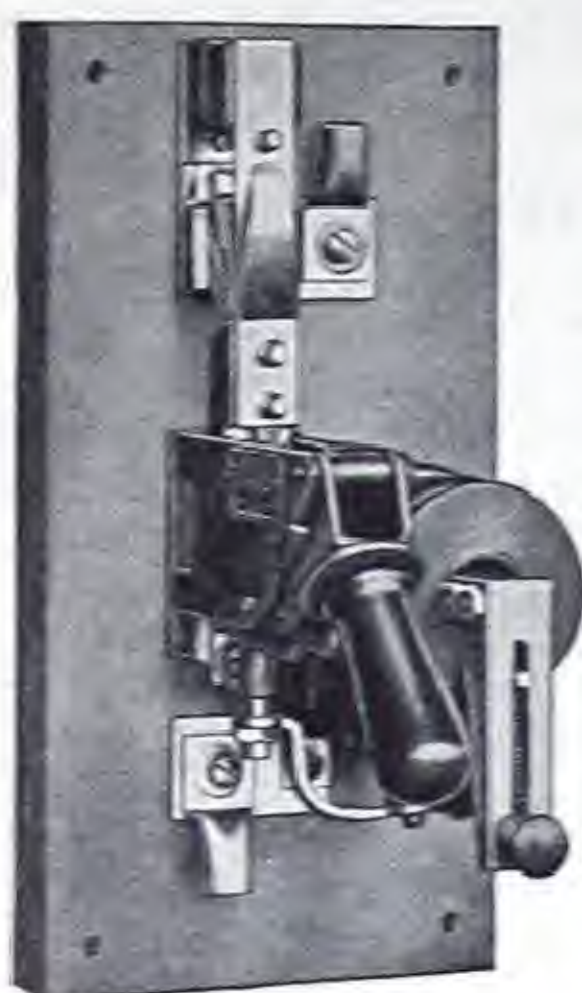
*When ordering give voltage, whether D.C. or A.C., if A.C., state frequency.

†An auxiliary circuit-opening switch is desirable if breaker does not open shunt-trip circuit.

Approximate Boxed Weights in Pounds	Single Pole	Two Pole	Three Pole
800 Amperes.....	85	160	245
1200 and 1600 Amperes.....	140	270	400
2000 and 3000 Amperes.....	190	370	550
4000 Amperes.....	260	510	760
5000 Amperes.....	325	640	950
6000 Amperes.....	375	740	1100

CONDIT AIR MOTOR STARTERS

Type K-2



Type K-2

Manually Operated — Front-
or-Rear-Connected

300 Amperes or Less:
600 Volts D. C.
750 Volts A. C.: or Less

Features

Rugged.
Simple in construction.
Laminated contacts for carrying current protected by large renewable metal and carbon arcing contacts.

Vibration-proof latch.

Large, quick break.

Furnished in single, two, three, and four poles and can be equipped with undervoltage, shunt-trip, underload and reverse current attachments.

Calibrated 80 to 160 per cent of rated current.

Furnished rear-connected for switchboard mounting and front-

connected on slate base for industrial requirements.

Condit type K-2 air circuit breakers are recommended for industrial application, shipboard use and isolated plants, for the control and protection of motors, generators, storage batteries and distribution circuits.

REAR CONNECTED OR FRONT CONNECTED

Amps.	Single Pole, One Coil		Two Pole, One Coil		Three Pole, Two Coils Rigid Arm	
	List No.	List Price	List No.	List Price	List No.	List Price

PLAIN OVERLOAD OR PLAIN UNDERLOAD

250 Volts D.C. or 440 A.C. without barriers

3	112K	\$22.00	122K	\$34.00	132K	\$58.00
5	312K	22.00	322K	34.00	332K	58.00
10	512K	22.00	522K	34.00	532K	58.00
20	812K	22.00	822K	34.00	832K	58.00
30	1012K	22.00	1022K	34.00	1032K	58.00
45	1212K	22.00	1222K	34.00	1232K	58.00
60	1312K	22.00	1322K	34.00	1332K	58.00
80	1412K	22.00	1422K	34.00	1432K	58.00
100	1512K	22.00	1522K	34.00	1532K	58.00
125	1612K	29.00	1622K	44.00	1632K	79.00
150	1712K	29.00	1722K	44.00	1732K	79.00
200	1912K	29.00	1922K	44.00	1932K	79.00
300	2112K	32.00	2122K	49.00	2132K	86.00

600 Volts D.C. or 750 Volts A.C. with barriers for two or three Pole

3	1162K	22.00	1262K	35.00	1362K	60.00
5	3162K	22.00	3262K	35.00	3362K	60.00
10	5162K	22.00	5262K	35.00	5362K	60.00
20	8162K	22.00	8262K	35.00	8362K	60.00
30	10162K	22.00	10262K	35.00	10362K	60.00
45	12162K	22.00	12262K	35.00	12362K	60.00
60	13162K	22.00	13262K	35.00	13362K	60.00
80	14162K	22.00	14262K	35.00	14362K	60.00
100	15162K	22.00	15262K	35.00	15362K	60.00
125	16162K	29.00	16262K	45.00	16362K	81.00
150	17162K	29.00	17262K	45.00	17362K	81.00
200	19162K	29.00	19262K	45.00	19362K	81.00
300	21162K	32.00	21262K	50.00	21362K	88.00

Approx. Boxed. Wgts.

14 Pounds

20 Pounds

35 Pounds

PLAIN UNDERVOLTAGE OR SHUNT TRIP

600 Volts D.C. 750 Volts A.C. or less

3-200	196512K	26.00	196522K	37.00	196532K	54.00
300	216512K	35.00	216522K	52.00	216532K	82.00

Approx. Boxed. Wgts.

14 Pounds

20 Pounds

30 Pounds

For K-2, 4-pole, rigid arm, panel mounting, rear connected, equipped with 2 overload coils, add \$21.00 net to price of two 2-pole breakers.

CONDIT AIR MOTOR STARTERS

Type K-2

ATTACHMENTS FOR PLAIN OVERLOAD BREAKERS

Description	List No.	List Price	Ship. Wgt. in Lbs.
Undervoltage attachment 250 volts or less.....	229V	\$ 9.00	7
Undervoltage attachment 600 volts or less.....	559V	12.00	7
Shunt-trip attachment 600 volts or less.....	554S	9.00	7
Reverse current attachment 3 to 100 amperes.....	153R	37.00	7
Reverse current attachment 125 to 200 amperes.....	193R	39.00	7
Reverse current attachment 300 amperes.....	213R	41.00	8

Rear-connected breakers same price as front-connected. Furnished rear connected unless otherwise specified.

Plain underload only furnished single pole for direct current only.

When ordering, state operating voltage, whether A.C. or D.C. If A.C., state frequency. Plain shunt-trip prices on application.

The buyers in the Canadian market seeking motors, controllers and other power apparatus, will find in the Northern Electric Company one source of supply whatever the requirements may be. Through the Power Apparatus Specialists, located in the principal cities of Canada, at the command of you and your consulting engineers, for aid in the selection of the proper equipment, the Northern Electric Company stands ready to serve you upon call.

CONDIT OIL MOTOR STARTERS

Type N-Line



Type N-4
Push Button Operated

throw. Positive in action. Small—compact.
to install. Knockouts for conduit connections.
be locked in open position.

Condit Type N-4 oil motor starters are especially designed for cross-the-line starting of motors not exceeding 5 H.P. The entire starter is enclosed in a substantial metal case with separate compartment for terminal connections. The mechanism is of special design, simple in construction, easy to install, and quick make.

Furnished 3 and 4 pole manually-operated and 3 pole push-button (remote) control. Fuse clips furnished for 250 volts and 550 volts.

Thermal lag overload protection is provided through thermal relays on the manually operated starters and temperature relays on the push-button operated starters.

The thermal cutouts and temperature relays are designed to operate in ample time to protect motor on a sustained overload but not to operate on momentary overloads or in start-up. They can be replaced as easily as fuses.

The contacts of the temperature relay are circuit-opening and automatically resetting.

Manually operated starters may be arranged for shipper rod or rope operation. Push-button operated starters by use of a shipper rod push-button may also be arranged for shipper rod or rope operation.

Overvoltage protection is inherently a feature of all push-button operated starters.



Type N-3

Condit Type N-3 manually operated starters are especially designed for the control and protection of induction motors. The entire starter is enclosed in a substantial metal case with separate compartment for terminal connections. The mechanism is of special design, simple in construction, and easy to install. It has laminated contacts protected by heavy visible and easily renewable arcing contacts. Visible position is provided for "on" and "off" position. Arranged for wall or flat surface mounting.

Overload protection is provided through series trip coils. Adjustable long time delay is a feature of automatic starters. Overvoltage protection furnished if desired.

Approved by Underwriters.

600 Volts A. C. or Less.
Wall or Flat Surface Mounting.

Overload Protection.

Features.

Non-Automatic

Wide range of application.

Long life—low maintenance.

CONDIT OIL MOTOR STARTERS

Type N-Line

TYPE N-4 (MANUALLY OPERATED)

H.P.	Volts	Poles	List No.	Without Fuse Clips	
				List Price With Oil	App. Boxed Wgt. in lbs.
3	110	3	5634N	\$12.00	15
5	220	3	5634N	12.00	15
5	440	3	5634N	12.00	15
5	550	3	5634N	12.00	15
3	110	4	5644N	15.00	20
5	220	4	5644N	15.00	20
5	440	4	5644N	15.00	20
5	550	4	5644N	15.00	20
With Fuse Clips*					
3	110	3	5734N	12.00	15
5	220	3	5734N	12.00	15
3	110	4	5744N	15.00	20
5	220	4	5744N	15.00	20
Equipped with Thermal Cutouts†					
3	110	3	5834N	14.00	17
3	220	3	5834N	14.00	17
5	440	3	5834N	14.00	17
5	550	3	5834N	14.00	17
3	110	4	5844N	18.00	22
5	220	4	5844N	18.00	22
5	440	4	5844N	18.00	22
5	550	4	5844N	18.00	22

When ordering state List Number, Horsepower and operating voltage.

Arranged for shipper rod or rope operation, \$0.80 additional.

*Fuses not included.

†List number and price include two thermal cutouts and six fusible links (specify size).

TYPE N-4 OIL MOTOR STARTER PUSH-BUTTON (REMOTE) CONTROL

Price does not include push button

H.P. Rating	Volts	Poles	Frequency	List No.	With Fuse Clips*	
					List Price With Oil	App. Boxed Wgt. Lbs.
3	110	3	25	1274N	\$16.00	20
3	110	3	60	1674N	16.00	20
5	220	3	25	2274N	16.00	20
5	220	3	60	2674N	16.00	20
5	440	3	25	.....	.....	..
5	440	3	60	.....	.....	..
5	550	3	25	.....	.....	..
5	550	3	60	.....	.....	..
Without Fuse Clips*						App. Boxed Wgt. Lbs.
					List Price With Oil	
3	110	3	25	1264N	\$16.00	20
3	110	3	60	1664N	16.00	20
5	220	3	25	2264N	16.00	20
5	220	3	60	2664N	16.00	20
5	440	3	25	4264N	16.00	20
5	440	3	60	4664N	16.00	20
5	550	3	25	5264N	16.00	20
5	550	3	60	5664N	16.00	20
Equipped with Temperature Relays**						App. Boxed Wgt. Lbs.
					List Price With Oil	
3	110	3	25	1284N	\$21.00	24
3	110	3	60	1684N	21.00	24
5	220	3	25	2284N	21.00	24
5	220	3	60	2684N	21.00	24
5	440	3	25	4284N	21.00	24
5	440	3	60	4684N	21.00	24
5	550	3	25	5284N	21.00	24
5	550	3	60	5684N	21.00	24

Add \$2.00 for Type H-6 general-purpose push-button station. Add \$6.50 for Type H-2-C water-tight and dust-tight push-button station. Add \$8.50 for type H-4 shipper rod push-button station. When ordering state List Number, Horsepower and operating voltage.

*Fuses not included.

**List number and price include two temperature relays (specify size).

CONDIT OIL MOTOR STARTERS

Type N-Line

TYPE N-3 OIL MOTOR STARTER
(MANUALLY OPERATED) THREE POLE

H.P. Ratings Squirrel Cage	Wound Rotor	Volts	Frequency	List No.	Non-Automatic List Price with Oil	Weight
10	15	110	25	5023N	\$17.00	40 lbs.
10	15	110	60	5023N	17.00	40 lbs.
15	30	220	25	5023N	17.00	40 lbs.
15	30	220	60	5023N	17.00	40 lbs.
25	60	440	25	5023N	17.00	40 lbs.
25	60	440	60	5023N	17.00	40 lbs.
25	75	550	25	5023N	17.00	40 lbs.
25	75	550	60	5023N	17.00	40 lbs.

Plain Undervoltage

10	15	110	25	1233N	\$27.00	45 lbs.
10	15	110	60	1633N	27.00	45 lbs.
15	30	220	25	2233N	27.00	45 lbs.
15	30	220	60	2633N	27.00	45 lbs.
25	60	440	25	4233N	27.00	45 lbs.
25	60	440	60	4633N	27.00	45 lbs.
25	75	550	25	5233N	27.00	45 lbs.
25	75	550	60	5633N	27.00	45 lbs.

Plain Automatic

10	15	110	25	5053N	\$34.00	45 lbs.
10	15	110	60	5053N	34.00	45 lbs.
15	30	220	25	5053N	34.00	45 lbs.
15	30	220	60	5053N	34.00	45 lbs.
25	60	440	25	5053N	34.00	45 lbs.
25	60	440	60	5053N	34.00	45 lbs.
25	75	550	25	5053N	34.00	45 lbs.
25	75	550	60	5053N	34.00	45 lbs.

Standard coil windings: 2, 3, 4, 6, 8, 10, 12, 16, 20, 25, 30, 40, 50, 60, 70, 80, 100 amperes.

For Plain Automatic with undervoltage add \$10.00 to Plain Automatic price.

TEMPERATURE RELAYS

Amperes	List No.	List Price
1	9061	\$1.75
1½	9062	1.75
2	9063	1.75
3	9064	1.75
4	9065	1.75
5	9066	1.75
6	9067	1.75
7	9068	1.75
8	9069	1.75
10	9070	1.75
15	9071	1.75
20	9072	1.75
25	9073	1.75
30	9074	1.75



TEMPERATURE RELAY
(600 Volts or less)

FUSIBLE LINK

For use with Thermal Cutout
Amp. List No. List Price

1	10061	Package of 3
1½	10062	(One size) \$0.25
2	10063	"
3	10064	"
4	10065	"
5	10066	"
6	10067	"
7	10068	"
8	10069	"
10	10070	"
12	10071	"
16	10072	"
18	10073	"



THERMAL CUTOUT
(600 Volts or less)

List Price (without links)
each.....\$1.00
List No. 10060.

Thermal cutouts and Temperature relays must be protected against short circuits by standard fuse of a rating not more than 400% of fusible link or Temperature Relay rating.

CONDIT OIL MOTOR STARTERS

Type N-Line



Type N-4 Push-Button Operated
Equipped with Temperature Relays

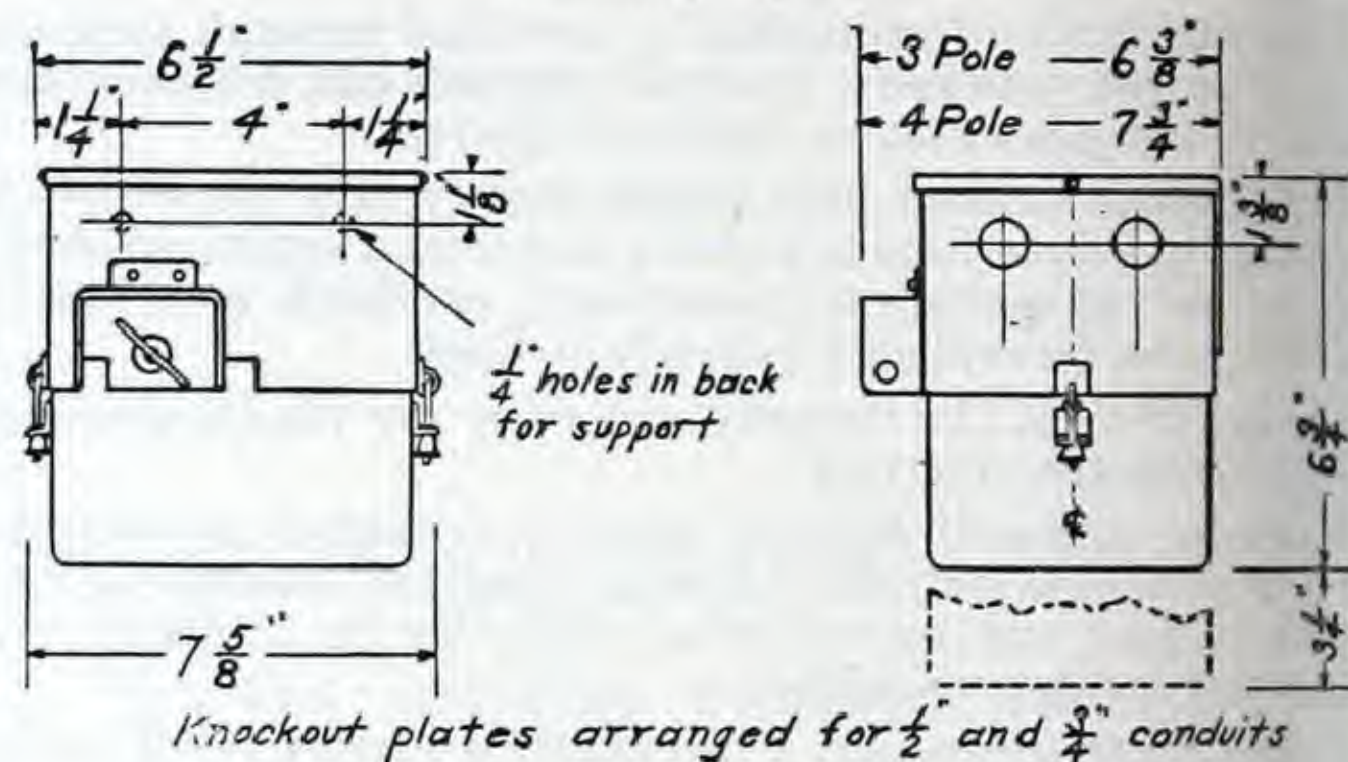


Type H-6
Push Button

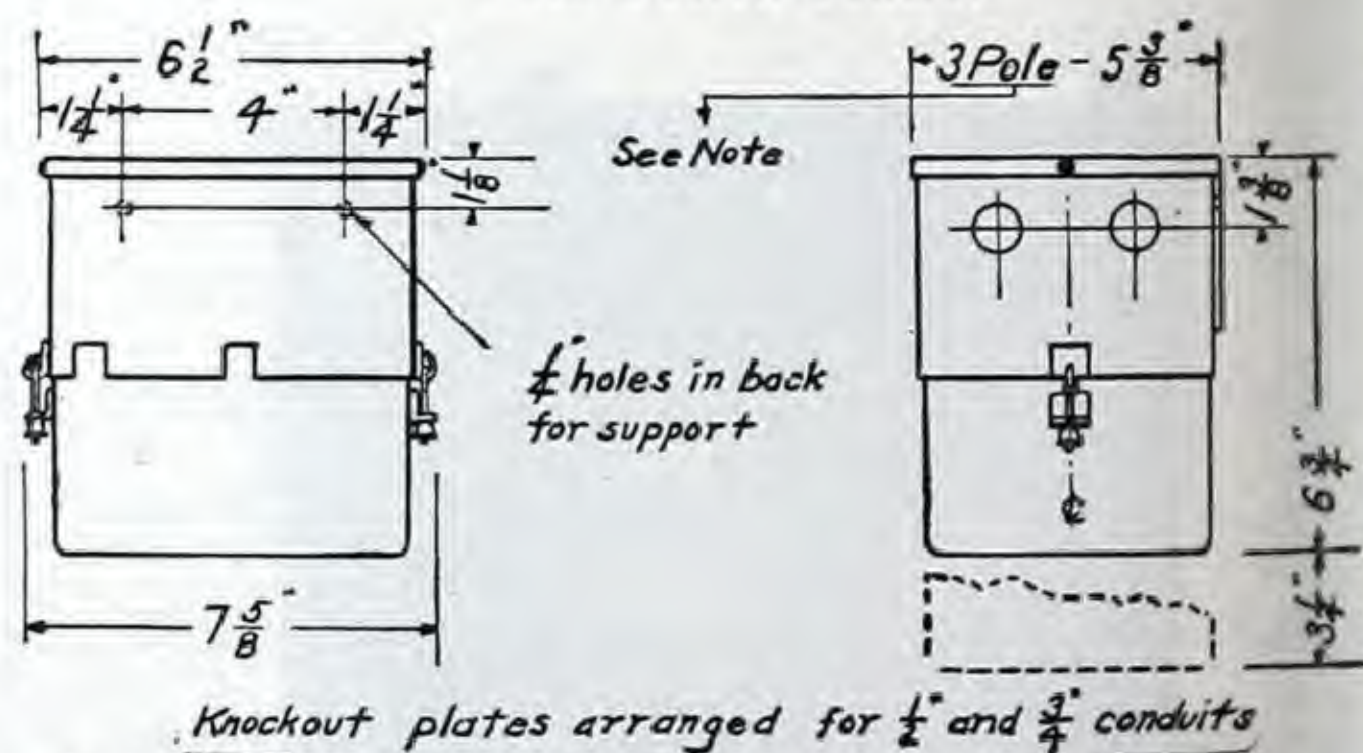


Type N-4 Manually Operated
Equipped with Thermal Cutouts

Type N-4 Dimensions (for reference only)
Manually Operated

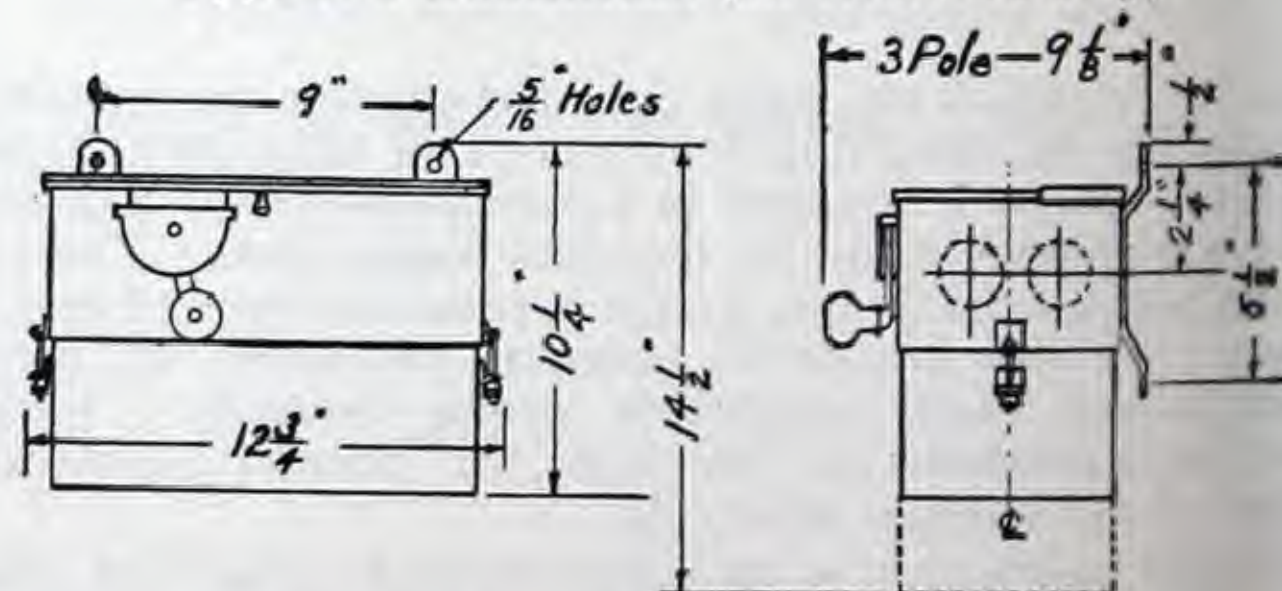


Push Button Control



Note. On the 3-pole temperature relay starter this dimension is 6 3/4.

Type N-3 Dimensions (for reference only)



Knockout plates arranged for 3/4" and 1 1/2" conduit.

CONDIT OIL CIRCUIT BREAKER

Type E-20

Flat Surface Mounting—
Automatic—2500 Volts
Less.

Manually Operated—Non-
Automatic—400 Amperes or
Less.



Type E-20
Oil Circuit Breaker

Type E-20
with Ammeter Mounting Cover

FEATURES

Small—compact. Easy to install
Trip free thermal overload mechanism
Totally enclosed—dust proof
Vibration proof latch
Single throw—three pole
Undervoltage protection if desired
Provision for locking in open position
Position indicator
Conduit Box if desired

The type E-20 is an indoor oil circuit breaker of general utility in the industrial field. Its primary application is in the protection of large motors used in conjunction with motor starting devices. It may be used in secondary circuits where the main incoming line is split up into a number of small branch circuits, to which application the breaker not only provides protection to the individual circuit, but also permits ready cutting-in or cutting-out of any circuit independently.

The breaker may be furnished with gaskets which make it suitable for installation in textile mills, flour mills, or mines, where excessive dust may be present.

NON-AUTOMATIC

Rated Amps	Rated Volts	List No.	List Price	Boxed Wgt. in Lbs.
60	2500	203013	\$ 56.00	135
200	2500	203019	67.00	140
400	2500	203023	110.00	155

AUTOMATIC (TRIP FREE) OVERLOAD PROTECTION

Rated Amps	Rated Volts	List No.	List Price	Boxed Wgt. in Lbs.
3	2500	203701	\$78.00	135
4	2500	203702	78.00	135
6	2500	203703	78.00	135
8	2500	203704	78.00	135
10	2500	203705	78.00	135
12	2500	203706	78.00	135
16	2500	203707	78.00	135
20	2500	203708	78.00	135
25	2500	203709	78.00	135
30	2500	203710	78.00	135
40	2500	203711	78.00	135
50	2500	203712	78.00	135
60	2500	203713	78.00	135
75	2500	203714	89.00	140
100	2500	203715	89.00	140
125	2500	203716	89.00	140
150	2500	203717	89.00	140
175	2500	203718	89.00	140
200	2500	203719	89.00	140
250	2500	203720	132.00	155
300	2500	203721	132.00	155
350	2500	203722	132.00	155
400	2500	203723	132.00	155

Price includes:

Non-Automatic—Includes switch unit for flat surface mounting, terminals and oil.

Automatic—Includes, in addition to non-automatic, temperature overload trip attachment with two temperature units and two current transformers.

CONDIT OIL CIRCUIT BREAKERS

Type E-20

(Continued)

ATTACHMENTS FOR USE WITH
TYPE E-20 OIL CIRCUIT BREAKERS

Description	Ship. Wgt. In Lbs.	List No.	List Price
Undervoltage Attachment Type V-20:			
25 cycle 110.....	5	2112	\$13.00
25 cycle 220.....	5	2122	13.00
25 cycle 440.....	5	2142	13.00
25 cycle 550.....	5	2162	13.00
60 cycle 110.....	5	2116	13.00
60 cycle 220.....	5	2126	13.00
60 cycle 440.....	5	2146	13.00
60 cycle 550.....	5	2166	13.00
Potential Transformer, Type W-4, 2200/110 Volts:			
25 cycle.....	10	2272	21.00
60 cycle.....	10	2276	21.00
Auxiliary Switch (for Controller Interlock).....			
Gasket.....	3	2310	11.00
Gasket.....	3	2420	2.00
Conduit Box.....	3	2710	9.00
Ammeter Mounting†.....	..	2840	42.00

†Includes bracket, ammeter, and current transformer.

CURRENT TRANSFORMERS*

FOR USE WITH TYPE E-20 OIL CIRCUIT BREAKERS

Type B-21 Wound Primary

Type B-21 Bushing Type			Type B-22 Bushing Type		
Primary Amperes	Secondary Amperes	List No.	Primary Amperes	Secondary Amperes	List No.
3	1.25	2501	75	1.25	2614
4	1.25	2502	100	1.25	2615
6	1.25	2503	125	1.25	2616
8	1.25	2504	150	1.25	2617
10	1.25	2505	175	1.25	2618
12	1.25	2506	200	1.25	2619
16	1.25	2507	250	1.25	2620
20	1.25	2508	300	1.25	2621
25	1.25	2509	...	....	....
30	1.25	2510	...	....	....
40	1.25	2511	350	1.25	2622
50	1.25	2512	400	1.25	2623
60	1.25	2513	...	....	...

Note—Undervoltage attachment may be added to either non-automatic or automatic types.

*Types B-21 and B-22 current transformers when sold separately \$14.00 net each.

INTERRUPTING CAPACITY†

		One Second		Five Second		Amperes per Phase— R.M.S. Values			
Amps.	Volts	Cap.	Cap.	Volts	Volts	Volts	Volts	Volts	Volts
60	2500	*6000	††3000	3000	3000	3000	3000	2400	
200	2500	20000	10000	10000	10000	10000	9700	2400	
400	2500	35000	20000	20000	20000	16700	9700	2400	

*Limited to 100 times current transformer rating.

††Limited to 50 times current transformer rating.

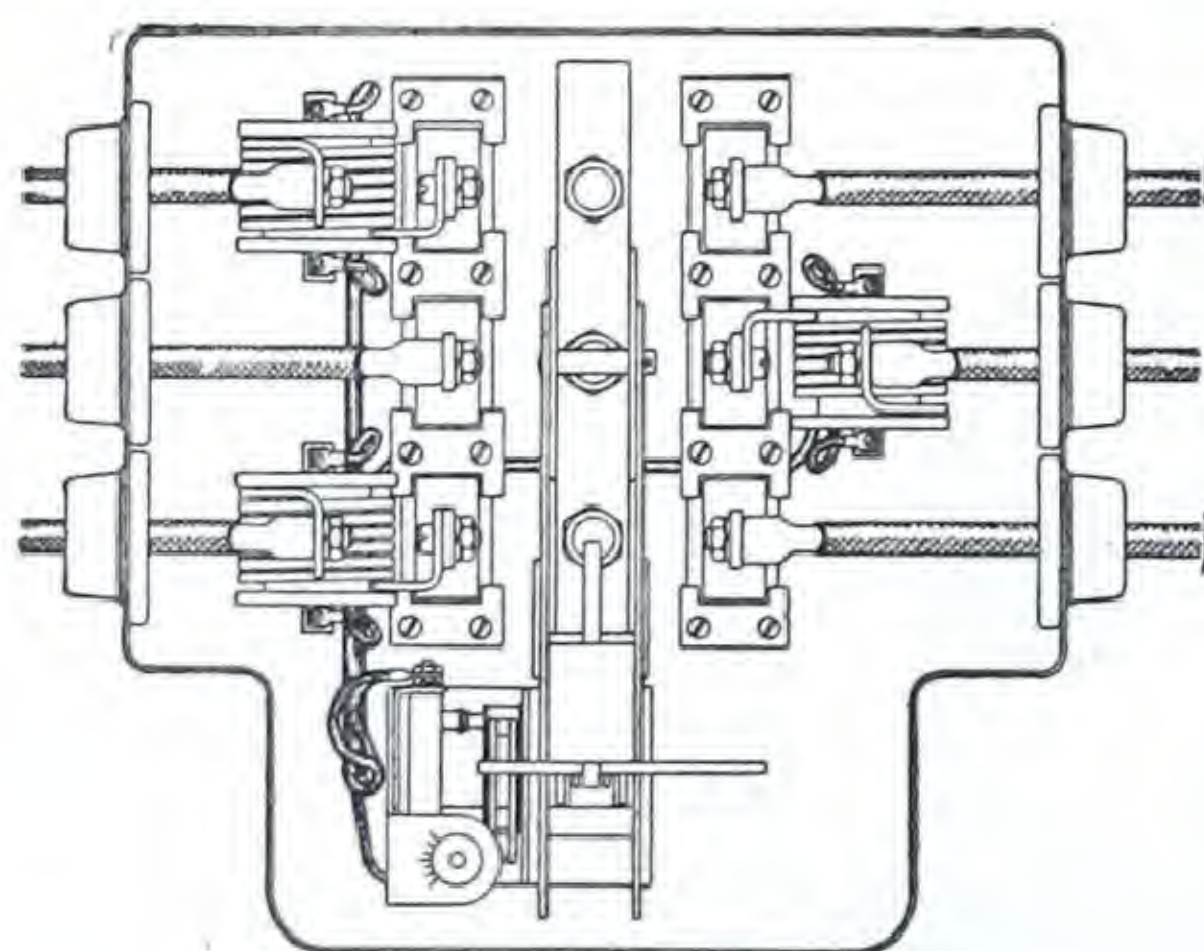
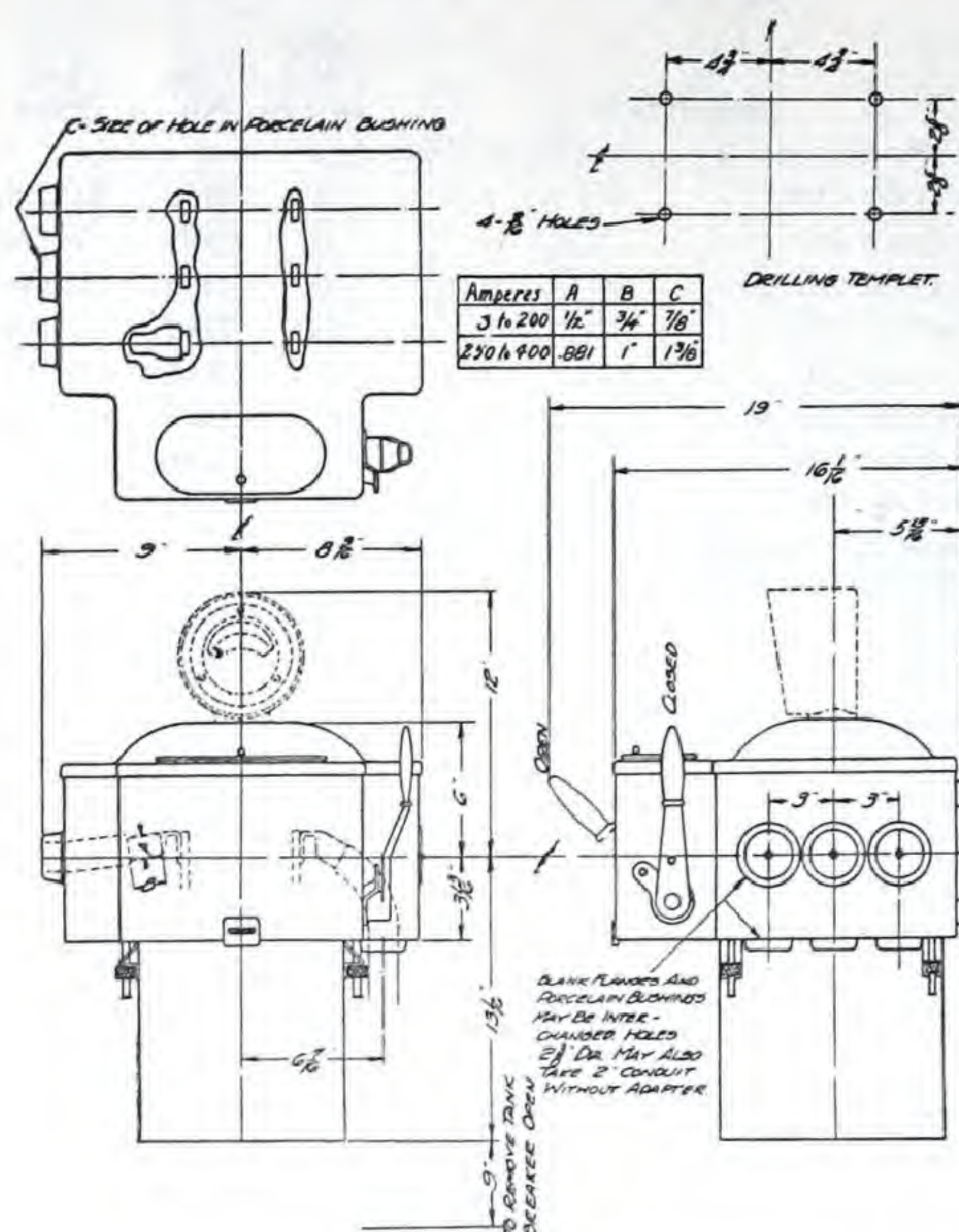
†These ratings are on the standard duty cycle interrupting capacity basis—2-OCO (two-minute interval).

CONDIT OIL CIRCUIT BREAKERS

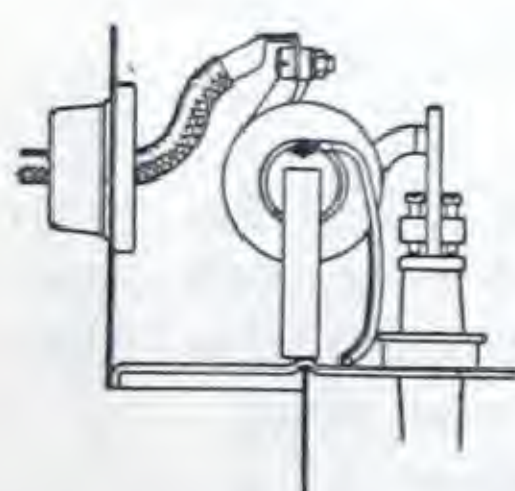
Type E-20

(Continued)

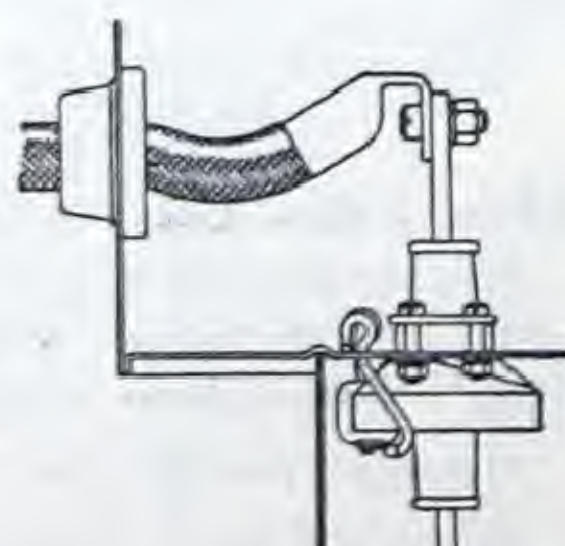
Dimensions—For Reference Only



PLAN OF E-20 BREAKER WITH 3 TRANSFORMERS WHEN ONLY 2 TRANSFORMERS ARE REQUIRED USE THOSE ON LEFT SIDE AND OMIT ONE ON RIGHT.



END ELEVATION
WOUND PRIMARY TYPE



END ELEVATION
BUSHING TYPE

A. TITAN RIVALED



The Titans were the forces of nature, giants born of heaven and earth, furious and destructive, until overthrown and confined by the greater power of Jupiter. Electricity, the modern Titan, is controlled by man more safely now than ever. In the Condit research and testing laboratories at West Allis, circuit breakers can be subjected to Titanic forces—to surge potentials of 2,000,000 volts or to inrush currents exceeding 2,500,000 amperes. Short circuits approximating half a million horse power, at varying voltages, can be closed and opened. And complete measuring equipment, including Cathode ray and magnetic oscillographs, together with speed, position, pressure and power recorders, enable Condit to study all the phenomena of circuit interruption, and to avail themselves of the knowledge thus acquired.

In the hands of a capable research staff, these facilities produce and prove the ideas and the product which, with their thirty-six years of experience in design and manufacture, assure the continuance of steady and rapid advance in circuit breaking achievement.

CONDIT OIL CIRCUIT BREAKERS

Maximum Current, Voltage and Interrupting Capacity Ratings of
Conduit Oil Circuit Breakers*

Type	Rated Volts	Rated Amps. 60 cycles	Approx. Inter- rupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Total Amperes at Various Bus Pressures					
				One Second	Five Seconds	Maximum Rating	600 Volts	2,500 Volts	5,000 Volts	7,500 Volts	15,000 Volts
MOTOR CONTROL											
.....	600	30	40	300	300	40	40				
.....	600	100	400	1,000	1,000	400	400				
.....	2,500	60	10,000	6,000†	3,000‡	3,000	3,000	2,400			
.....		200	10,000	20,000	10,000	10,000	10,000	2,400			
.....		400	10,000	35,000	20,000	20,000	10,000	2,400			
INDUSTRIAL AND SWITCHBOARD OIL CIRCUIT BREAKERS											
.....	5,000	200	10,000	15,000	10,000	10,000	10,000	2,700	1,150		
.....		400									
.....	5,000	200	20,000	15,000	10,000	15,000	15,000	4,800	2,400		
.....		400									
.....	5,000	200	20,000	15,000	10,000	15,000	15,000	4,800	2,400		
.....		400									
.....	7,500	600	25,000	20,000	20,000	20,000	20,000	6,000	3,000	2,000	
.....		2,500	800	25,000	20,000	20,000	20,000	20,000	6,000		
.....	7,500	600	25,000	20,000	20,000	20,000	20,000	6,000	3,000	2,000	
.....		2,500	800	25,000	20,000	20,000	20,000	20,000	6,000		
.....	15,000	600	50,000	40,000	30,000	20,000	20,000	12,000	6,000	4,000	2,000
.....		7,500	1,200	50,000	40,000	40,000	20,000	20,000	12,000	6,000	4,000
.....		5,000	2,000	50,000	40,000	40,000	20,000	20,000	12,000	6,000	
.....	2,500	1,500	35,000	40,000	40,000	29,000	29,000	8,000			
.....		2,000	35,000	40,000	40,000						
.....		2,500	35,000	60,000	60,000						
.....	2,500	4,500	70,000	100,000	100,000	50,000	50,000	16,000			
INDOOR STATION TYPE OIL CIRCUIT BREAKERS											
.....	7,500	3,000	100,000	80,000	80,000	80,000	80,000	24,000	12,000	8,000	
.....	15,000	600	50,000	40,000	30,000	20,000	20,000	12,000	6,000	4,000	2,000
.....		7,500	1,200	50,000	40,000	40,000	20,000	20,000	12,000	6,000	4,000
.....		5,000	2,000	50,000	40,000	40,000	20,000	20,000	12,000	6,000	
.....	15,000	600	100,000	50,000	30,000	30,000	....	24,000	12,000	8,000	4,000
.....		1,200	100,000	60,000	50,000	30,000	....	24,000	12,000	8,000	4,000
.....		7,500	2,000	100,000	60,000	50,000	30,000	....	24,000	12,000	8,000
.....	15,000	600	150,000	50,000	30,000	36,000	....	36,000	18,000	12,000	6,000
.....		1,200	150,000	60,000	50,000						
.....	15,000	600	250,000	50,000	30,000	50,000	....	50,000	30,000	20,000	10,000
.....		1,200	250,000	60,000	50,000	60,000	....	60,000			
.....		2,000	250,000	70,000	60,000	60,000	....	60,000			
.....	7,500	3,000	350,000	80,000	80,000	80,000	....	80,000	42,000	28,000	
.....	15,000	600	500,000	50,000	30,000	50,000	....	50,000	50,000	40,000	20,000
.....		1,200	500,000	60,000	50,000	60,000	....	60,000	60,000		
.....		2,000	500,000	80,000	80,000	80,000	....	80,000	60,000		

†Limited to 100 times current transformer rating.

‡Limited to 50 times current transformer rating.

MAXIMUM CURRENT, VOLTAGE AND INTERRUPTING CAPACITY RATINGS

Type	Rated Volts	Rated Amps.	Short Time Rating R.M.S. Total Amperes		Interrupting Rating		
			1 Sec.	5 Sec.	Kv-a	Amps. at	
						Rated Volts	Maximum Amps.
.....	5,000	200	15,000	10,000	20,000	2,400	15,000
.....	5,000	400	15,000	10,000	20,000	2,400	15,000

CONDIT OIL CIRCUIT BREAKERS

Maximum Current, Voltage and Interrupting Capacity Ratings of
Conduit Oil Circuit Breakers

INDOOR STATION TYPE OIL CIRCUIT BREAKERS (Continued)

Type	Rated Volts	Rated Amperes 60 cycles	Approx. Inter- rupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Total Amperes at Various Bus Pressures				
				One Second	Five Seconds	Maximum Rating	7,500 Volts	15,000 Volts	23,000 Volts	34,500 Volts
F-106.....	15,000	{ 600 1,200 2,000	150,000 150,000 150,000	50,000 60,000 70,000	30,000 50,000 60,000	36,000	12,000	6,000		
FZ-110.....	15,000	{ 600 1,200 2,000	250,000 250,000 250,000	50,000 60,000 70,000	30,000 50,000 60,000	50,000 60,000 60,000	20,000	10,000		
FZ-120-15B...	15,000	{ 600 1,200 2,000	500,000 500,000 500,000	50,000 60,000 80,000	30,000 50,000 80,000	50,000 60,000 60,000	40,000	20,000		
FZ-120-15D...	15,000	{ 1,200 2,000 3,000	1,000,000 1,000,000 1,000,000	80,000 100,000 100,000	60,000 100,000 100,000	80,000 100,000 100,000	80,000	40,000		
FZ-120-15F...	15,000	{ 1,200 2,000 3,000 4,000	1,500,000 1,500,000 1,500,000 1,500,000	100,000 100,000 120,000 120,000	80,000 100,000 120,000 120,000	100,000 100,000 120,000 120,000	100,000 100,000 120,000 120,000	60,000 60,000 60,000 60,000		
FZ-120-23B...	23,000	{ 600 1,200 2,000	500,000 500,000 500,000	50,000 60,000 60,000	30,000 50,000 60,000	25,000		20,000	12,500	
FZ-120-34D...	34,500	{ 1,200 2,000	1,000,000 1,000,000	60,000	60,000	25,000			25,000	17,000
FZ-120-34F...	34,500	{ 1,200 2,000 3,000	1,500,000 1,500,000 1,500,000	60,000 60,000 80,000	60,000 60,000 80,000	40,000			40,000	25,000
FZ-120-34H...	34,500	{ 2,000 3,000	2,500,000 2,500,000	80,000 100,000	80,000 100,000	65,000			65,000	42,000

OUTDOOR STATION TYPE OIL CIRCUIT BREAKERS—FRAME MOUNTED TYPES

Type	Rated Volts	Rated Amps. 60 cycles	Approx. Inter- rupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Total Amperes at Various Bus Pressures				
				One Second	Five Seconds	Maximum Rating	5,000 Volts	7,500 Volts	15,000 Volts	23,000 Volts
O-S.....	7,500	600	50,000	40,000	30,000	12,000	6,000	4,000		
O-10.....	15,000	600	50,000	40,000	30,000	12,000	6,000	4,000	2,000	
O-11.....	15,000	600	100,000	40,000	30,000	24,000	12,000	8,000	4,000	
OZ-12.....	15,000	{ 600 1,200	175,000 175,000	40,000 40,000	30,000 30,000	40,000 40,000	21,000	14,000	7,000	
OZ-12.....	23,000	600	150,000	40,000	30,000	7,500			7,000	4,000
FZO-50-15B.....	15,000	{ 600 1,200 2,000	500,000 500,000 500,000	Use 23Kv. 500,000 Kv-a breaker						
FZO-50-15D.....	15,000	{ 1,200 2,000 3,000	1,000,000 1,000,000 1,000,000	80,000 100,000 100,000	60,000 100,000 100,000	80,000 80,000 100,000	80,000 80,000 100,000	80,000	40,000	
FZO-50-15F.....	15,000	{ 2,000 3,000 4,000	1,500,000 1,500,000 1,500,000	100,000 120,000 120,000	100,000 120,000 120,000	100,000 100,000 120,000		100,000 100,000 120,000	60,000 60,000 60,000	
FZO-50-23B.....	23,000	{ 600 1,200 2,000	500,000 500,000 500,000	50,000 60,000 60,000	30,000 50,000 60,000	40,000 50,000 60,000		40,000	20,000	12,500
FZO-50-34X.....	34,500	600	150,000	40,000	30,000	4,000				4,000
FZO-50-34B.....	34,500	{ 600 1,200 2,000	500,000 500,000 500,000	50,000 60,000 60,000	30,000 50,000 60,000	12,500			12,500	8,400

CONDIT OIL CIRCUIT BREAKERS

Maximum Current, Voltage and Interrupting Capacity Ratings of
Condit Oil Circuit Breakers

Outdoor Station Type Oil Circuit Breakers—Frame Mounted Types (Continued)

Type	Rated Kv.	Rated Amperes 60 cycles	Approx. Interrupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Total Amperes at Various Bus Pressures				
				One Second	Five Seconds	Maximum Rating	23 Kv.	34.5 Kv.	46 Kv.	69 Kv.
0-50-34D.....	34.5	{ 1,200 2,000 3,000 }	{ 1,000,000 1,000,000 1,000,000 }	{ 60,000 60,000 80,000 }	{ 60,000 60,000 80,000 }	25,000	25,000	17,000		
0-50-34F.....	34.5	{ 1,200 2,000 3,000 }	{ 1,500,000 1,500,000 1,500,000 }	{ 60,000 60,000 80,000 }	{ 60,000 60,000 80,000 }	40,000	40,000	25,000		
0-50-46X.....	46	600	150,000	20,000	20,000	3,000	.....	2,500	2,000	
0-50-46B.....	46	600	500,000	20,000	20,000	10,000	.....	8,400	6,300	
0-50-46D.....	46	1,200	1,000,000	30,000	20,000	20,000	.....	17,000	12,500	
0-50-69X.....	69	600	250,000	20,000	20,000	4,200	.....	4,200	3,200	2,100
0-50-69B.....	69	600	500,000	20,000	20,000	8,400	.....	8,400	6,300	4,200
0-50-69D.....	69	{ 600 1,200 }	{ 1,000,000 1,000,000 }	{ 30,000 30,000 }	{ 20,000 20,000 }	17,000	.....	17,000	12,500	8,400
0-50-69F.....	69	{ 600 1,200 }	{ 1,500,000 1,500,000 }	{ 50,000 50,000 }	{ 30,000 30,000 }	25,000	.....	25,000	19,000	12,500

Outdoor Station Type Oil Circuit Breakers—Floor Mounted Types

Type	Rated Kv.	Rated Amperes 60 cycles	Approx. Interrupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Total Amperes at Various Bus Pressures				
				One Second	Five Seconds	Maximum Rating	115 Kv.	138 Kv.	161 Kv.	230 Kv.
0-60-115B.....	115	600	500,000	20,000	20,000	4,200	2,500			
0-60-115D.....	115	600	1,000,000	30,000	20,000	8,400	5,000			
0-60-115F.....	115	{ 600 1,200 }	{ 1,500,000 1,500,000 }	{ 30,000 30,000 }	{ 20,000 20,000 }	{ 12,500 12,500 }	{ 7,500 7,500 }			
0-60-138C.....	138	600	750,000	30,000	20,000	4,700	3,700	3,200		
0-60-138F.....	138	{ 600 1,200 }	{ 1,500,000 1,500,000 }	{ 30,000 30,000 }	{ 20,000 20,000 }	{ 9,500 9,500 }	{ 7,500 7,500 }	6,300		
0-60-138H.....	138	1,200	2,500,000	30,000	20,000	15,800	12,500	10,500		
0-60-161F.....	161	1,200	1,500,000	20,000	20,000	7,500	7,500	6,300	5,400	
0-60-161H.....	161	1,200	2,500,000	20,000	20,000	12,500	12,500	10,500	9,000	
0-60-230H.....	230	1,200	2,500,000	20,000	20,000	9,000	.....	.....	9,000	6,300

Subway and Pole Line Oil Switches

Type	Rated Volts	Rated Amperes 60 cycles	Approx. Interrupting Rating Kv-a	Short Time Rating R.M.S. Total Amps.		Interrupting Rating in R.M.S. Tot. Amps. at Various Bus Pressures				
				One Second	Five Seconds	Maximum Rating	2,500 Volts	5,000 Volts	7,500 Volts	
..... (Pole Line)	5,000	{ 200 300 }	{ 3,500 5,000 }	{ 10,000 15,000 }	{ 10,000 10,000 }	{ 400 600 }	{ 400 600 }	{ 400 600 }		
..... (Pole Line)	7,500	{ 200 400 }	25,000	15,000	10,000	12,000	6,000	3,000	2,000	
..... (Subway)	5,000	{ 200 300 }	{ 3,500 5,000 }	{ 10,000 15,000 }	{ 10,000 10,000 }	{ 400 600 }	{ 400 600 }	{ 400 600 }		
..... (Subway)	7,500	{ 200 400 }	25,000	15,000	10,000	12,000	6,000	3,000	2,000	

CONDIT OIL CIRCUIT BREAKERS

Interrupting Capacity Steps and Ratings

The interrupting capacity ratings of the oil circuit breakers listed in these tables are in accordance with the standard steps of interrupting capacity as approved by the E.E.I., A.E.I.C., and N.E.M.A.

The definition of interrupting capacity and the tabulation of oil circuit breaker duty cycle ratings below have also been approved by E.E.I., A.E.I.C., and N.E.M.A.

Definition of Interrupting Capacity

Oil circuit breakers are rated in R.M.S. amperes interrupting capacity as follows:—

(a) Interrupting Rating—

1. The interrupting rating of an oil circuit breaker is a rating based upon the highest R.M.S. current at normal voltage that the breaker can interrupt under the duty cycle specified.
2. The value of current shall be taken during the first half cycle of the arc between contacts during the opening stroke.

(b) Duty Cycle—

1. The duty cycle of an oil circuit breaker shall consist of a specified number of unit operations at stated intervals.
2. Each unit operation shall consist of a closing of the circuit breaker followed immediately by its opening without purposely delayed action.

(c) Interrupting Performance—

1. An oil circuit breaker shall perform at or within its interrupting rating without emitting flame.
2. At the end of any performance at or within its interrupting rating, the circuit breaker shall be in the following condition:

Mechanical: The breaker shall be substantially in the same mechanical condition as at the beginning.

Electrical: The breaker shall be capable of carrying rated voltage and its main current carrying parts shall be substantially in the same condition as at the beginning.

After performance at or near its interrupting rating, the interrupting ability of the breaker may be materially

reduced and it is not to be inferred that it may be reclose after such performance without inspecting, and, if necessary, making repairs.

(d) Conditions—

1. The conditions assumed in rating an oil circuit breaker include the stored electro-static and magnetic energy in the system, re-establishment of an arc under transient voltage conditions and other variable conditions. These influences are considered as not differing widely in average systems and are to be taken into account in the factor of safety employed in the rating of breakers.

Standard Operating Duty—

The standard interrupting rating (standard duty cycle) of an oil circuit breaker shall be based on two-unit operations at 15 second interval between operations, except non-oil-tight breakers 50,000 Kv-a interrupting capacity and below shall have two minute interval.

The one second short time current ratings given in these tables are the maximum which any circuit breaker will safely carry for any period, however short. The five second rating is the maximum current which the circuit breaker will safely carry for a period of five seconds.

The information in these tables applies only to the circuit breaker. When current transformers are in the circuit, the short time current rating will be based on the short circuit capacity of the breaker at the operating voltage, unless otherwise stated.

To obtain the ampere interrupting rating of a breaker for use on a system of less than rated voltage, use the following formula:

Amps. at System Voltage—

$$\text{Amps. at Rated Voltage} \times \frac{\text{Rated Voltage}}{\text{System Voltage}}$$

If the value so calculated exceeds that given in the column headed "Maximum Rating," then the maximum rating must be used as the interrupting rating of the breaker.

Tabulation of Standard and Multiple Shot Duty Cycles

50,000 Kv-a Interrupting Capacity and Above

Number of Groups	Total Number of Unit Operations	Percentage of Standard Interrupting Rating at Currents Specified				
		0 to 5,000 Amp.	5,001 to 10,000 Amp.	10,001 to 20,000 Amp.	20,001 to 40,000 Amp.	Above 40,000 Amp.
Successive unit operations with 15 second intervals.						
—	2	100	100	100	100	100
—	4	95	95	90	85	80
—	8	85	80	70	55	50
—	16	75	65	50	35	—
Groups of two (2) unit operations with zero* second interval between operation and 2 minute intervals between groups.						
1	2	90	85	75	65	60
2	4	80	75	60	45	—
4	8	70	65	50	35	—
8	16	60	55	40	25	—
Groups of four (4) unit operations with 0-15-60 second intervals between operation and 2 minute intervals between groups.						
1	4	85	80	65	50	—
2	8	75	70	55	40	—
4	16	65	60	45	30	—

*Zero second shall be interpreted to mean no intentional time delay.

Note. It is intended that satisfactory performance of breakers will be obtained under the rating schedule suggested at rates of recovery voltage normally encountered in practice.

CONDIT OIL CIRCUIT BREAKERS

Type E-135

200 & 400 Amperes—5000 Volts

MANUALLY OR ELECTRICALLY OPERATED
NON-AUTOMATIC OR FULL AUTOMATIC



Type E-135, 3 Pole, Single Throw, 200 Ampere, 5000 Volt Oil Circuit Breaker.

The Type E-135 is a Switchboard Type Oil Circuit Breaker with relatively low interrupting capacity, designed for the control and protection of feeder circuits and of synchronous and induction motors where the starting duty is severe.

The Type E-135 is furnished in 2 and 3 pole, full automatic, non-automatic, manually or electrically operated. Full automatic Oil Circuit Breakers are mechanically trip-free in the handle at any position of the stroke and are furnished with both current transformer and relay trip, and may be provided with undervoltage and time delay attachments.

Construction

Frame—A frame of rigid construction carries the mechanism and bushings. It has a deep web extending down over the tank protecting the upper part of the tank. The frame is designed for flat surface or pipe frame (with bracket) mounting.

Insulation—The bushings are one-piece bakelamin, a high electric material of great mechanical strength. The bushings provide insulation well in excess of A.I.E.E. voltage test requirements. The bushings are impervious to moisture and

Brush Rods—The brush rods are selected straight grained, hard maple, well seasoned.

Main Contacts—The movable current carrying members are standard Condit laminated brushes of hard drawn copper alloy. The main stationary contact members are copper blocks of high conductivity.

Tank—The tank is rectangular, of steel plate, electrically protected by shielded arc method. It is equipped with a high quality liner and with barriers between phases. It is securely fastened to the frame by four studs.

Arcing Contacts—The arcing contacts are of the butt type. The movable and stationary contacts are identical specially formed pieces of large contact area and mass, rigidly supported, easily removable and self-aligning. Their large mass and density afford excellent thermal absorption ability which materially reduces arcing and deterioration.

The movable arcing contacts are mounted on a rigid channel member and firm contact pressure is assured by two strong compression springs. The arcing contacts make before and break after the main contacts by such a margin as to provide protection to the brush even after arcing contacts have been materially reduced in size and are very effective on closing against the high currents that are met on motor starting duty.

CONDIT OIL CIRCUIT BREAKERS

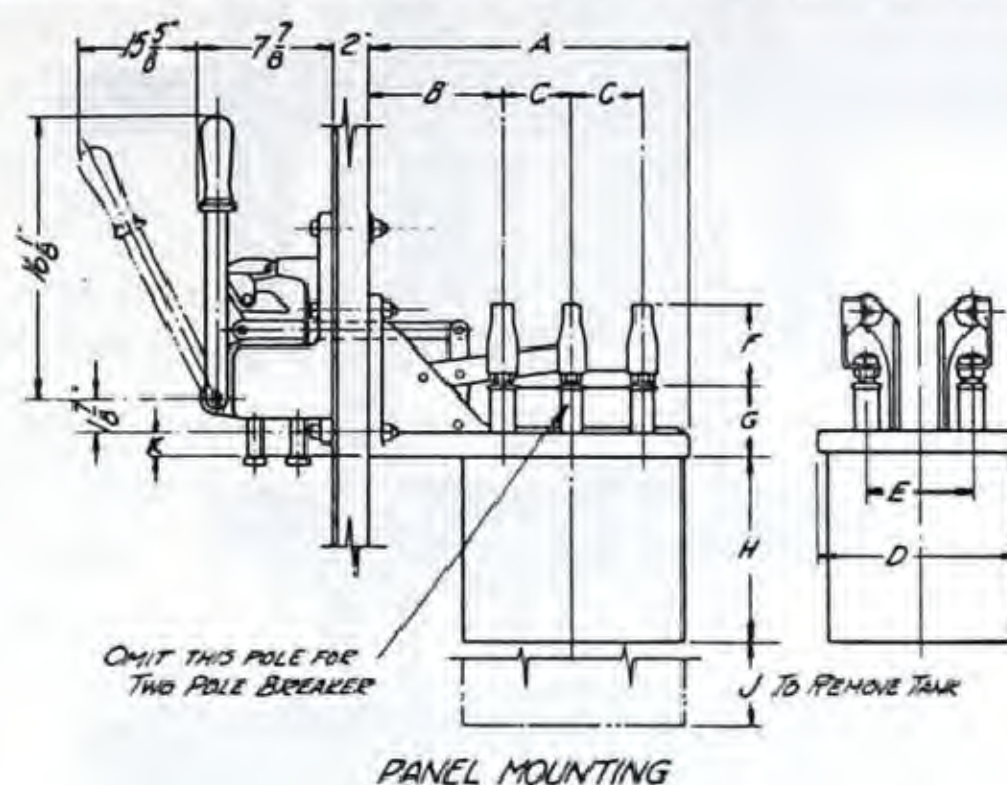
Type E-135

MAXIMUM CURRENT, VOLTAGE AND
INTERRUPTING CAPACITY RATINGS

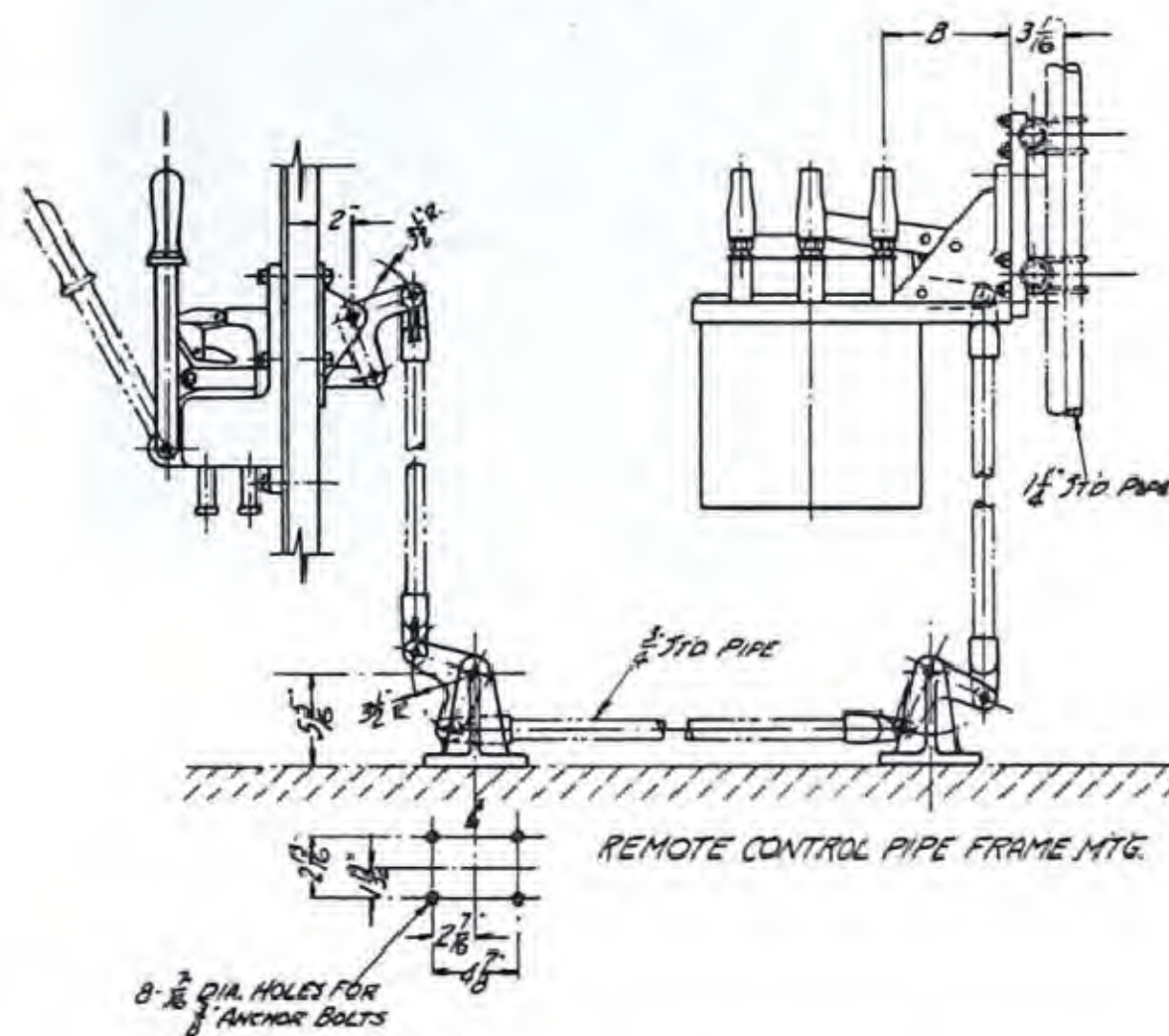
Rated Volts	Rated Amps.	Short Time Rating R.M.S.		Interrupting Rating KV-A	Interrupting Rating	
		Total Amperes 1 Sec.	5 Sec.		Amperes At Rated Volts	Max. Amps.
5000	200	15,000	10,000	10,000	1150	10,000
5000	400	15,000	10,000	10,000	1150	10,000

Price on application.

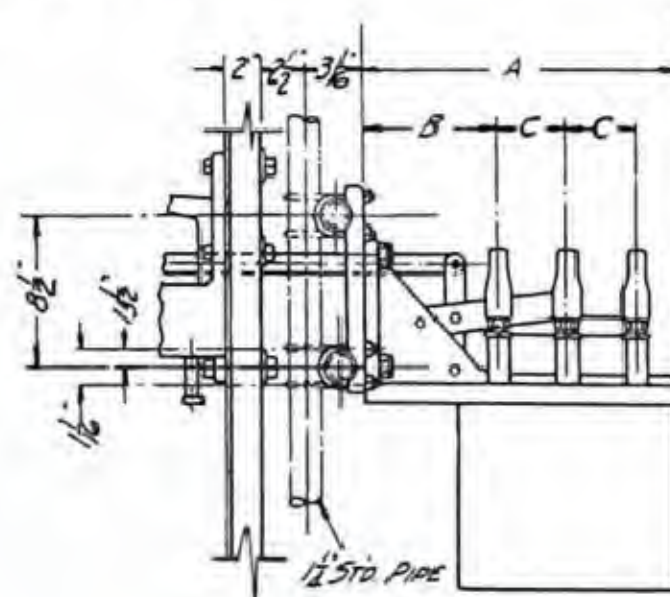
GENERAL DIMENSIONS—FOR REFERENCE ONLY



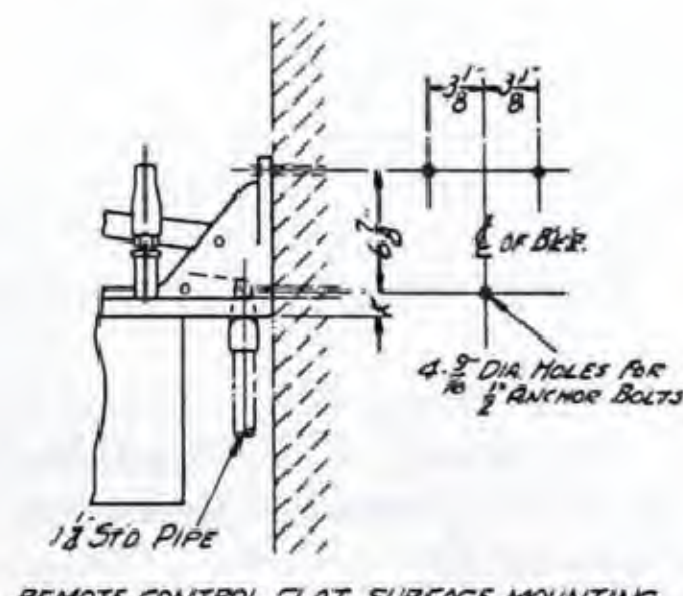
PANEL MOUNTING



REMOTE CONTROL PIPE FRAME MOUNTING



PANEL FRAME MOUNTING



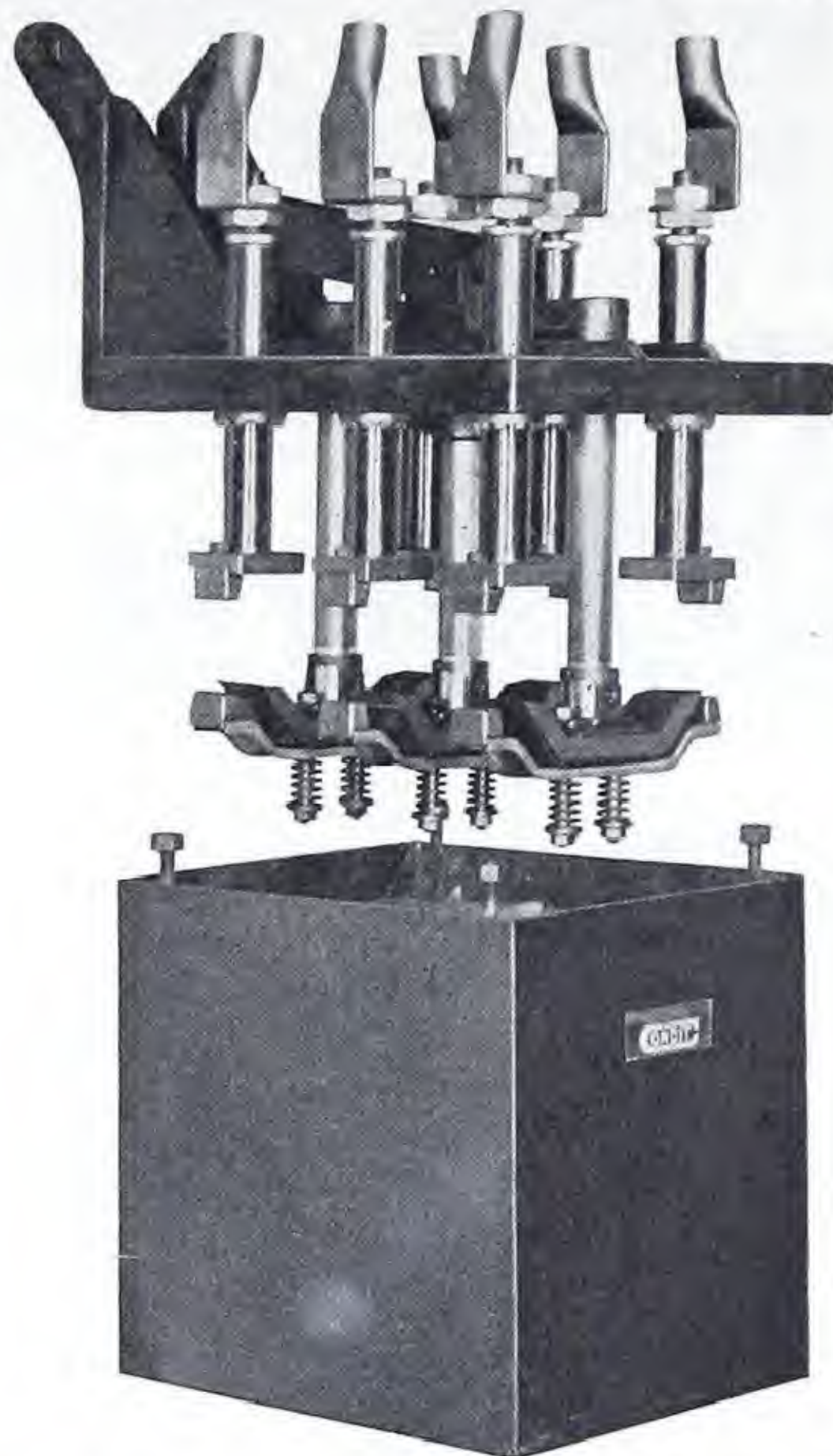
REMOTE CONTROL FLAT SURFACE MOUNTING

Type	Amp.	A	B	C	D	E	F	G	H	J	K
E-135	200	14 3/4	7 1/4	2 3/4	9 3/8	5	2 3/4	3 7/8	9 3/4	10 1/2	1 5/8
E-135	400	14 3/4	7 1/4	2 3/4	9 3/8	5	4 5/8	3 7/8	9 3/4	10 1/2	1 5/8

CONDIT OIL CIRCUIT BREAKERS

Type E-145

200 & 400 Amperes—5000 Volts

MANUALLY OR ELECTRICALLY OPERATED
NON-AUTOMATIC OR FULL AUTOMATIC

Type E-145, 3 Poles. Single Throw, 400 Ampere, 5000 Volt Oil Circuit Breaker.

The Type E-145 is a Switchboard Type Oil Circuit Breaker of moderate interrupting capacity, designed for the control and protection of feeders and transformer banks. It is especially suitable for industrial service for the control and protection of synchronous and induction motors where the starting duty is severe.

The Type E-145 is furnished 2, 3 or 4 pole, full automatic or non-Automatic, manually or electrically operated. Full Automatic Oil Circuit Breakers are mechanically trip-free from the handle at any position of the stroke and are furnished in both current transformer and relay trip and may be provided with undervoltage and time delay attachments.

Construction

Frame—The frame is a rigid cast structure with ribbed reinforcement and with deep web extending down over and protecting the upper part of the tank. It is arranged for flat surface or pipe frame (with bracket) mounting.

Mechanism—The mechanism is of the flat angle easily accelerated type. Its design embodies the highly important feature of easy closure, while at the same time affording ample pressure of the contact surfaces.

Insulation—The bushings are one-piece bakelain, a high dielectric material of great mechanical strength. The bushings provide insulation well in excess of A.I.E.E. voltage test requirements. The bushings are impervious to moisture and oil.

Brush Rods—The Brush Rods are selected straight grained hard maple, well seasoned. The brush Rods are first subjected to a vacuum process to remove moisture, followed by a process of impregnation.

Main Contacts—The main movable current members are standard Condit brushes, built up of special hard drawn copper laminae. The main stationary contact members are copper blocks of high conductivity.

Arcing Contacts—The arcing contacts are of the butt type.

CONDIT OIL CIRCUIT BREAKERS

Type E-145

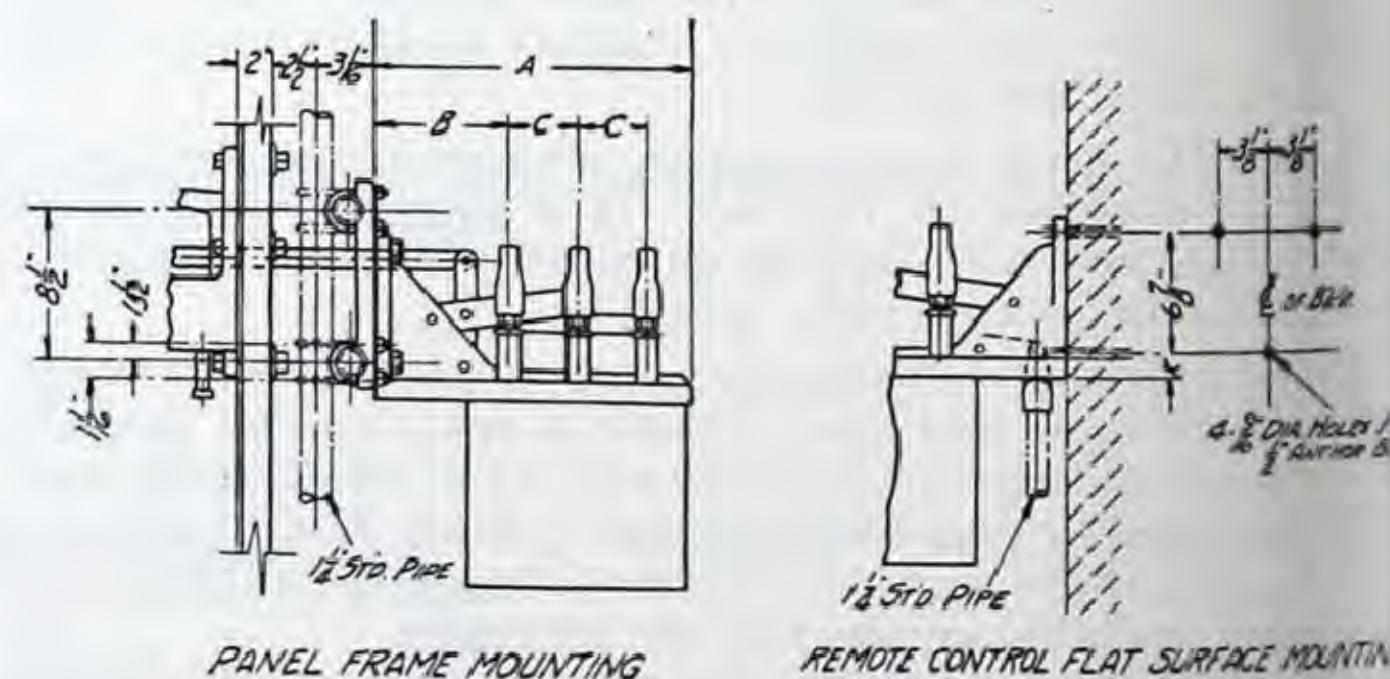
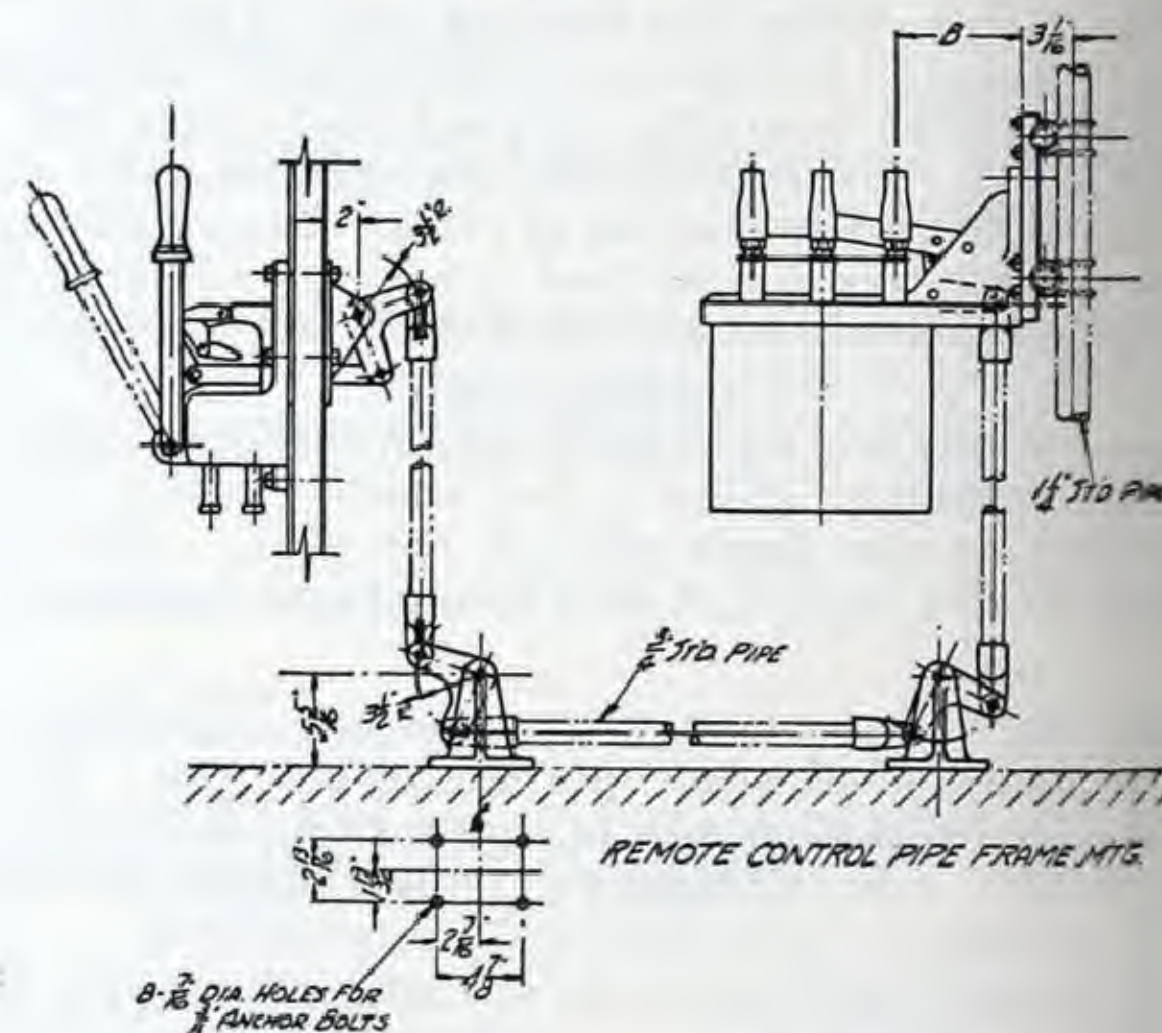
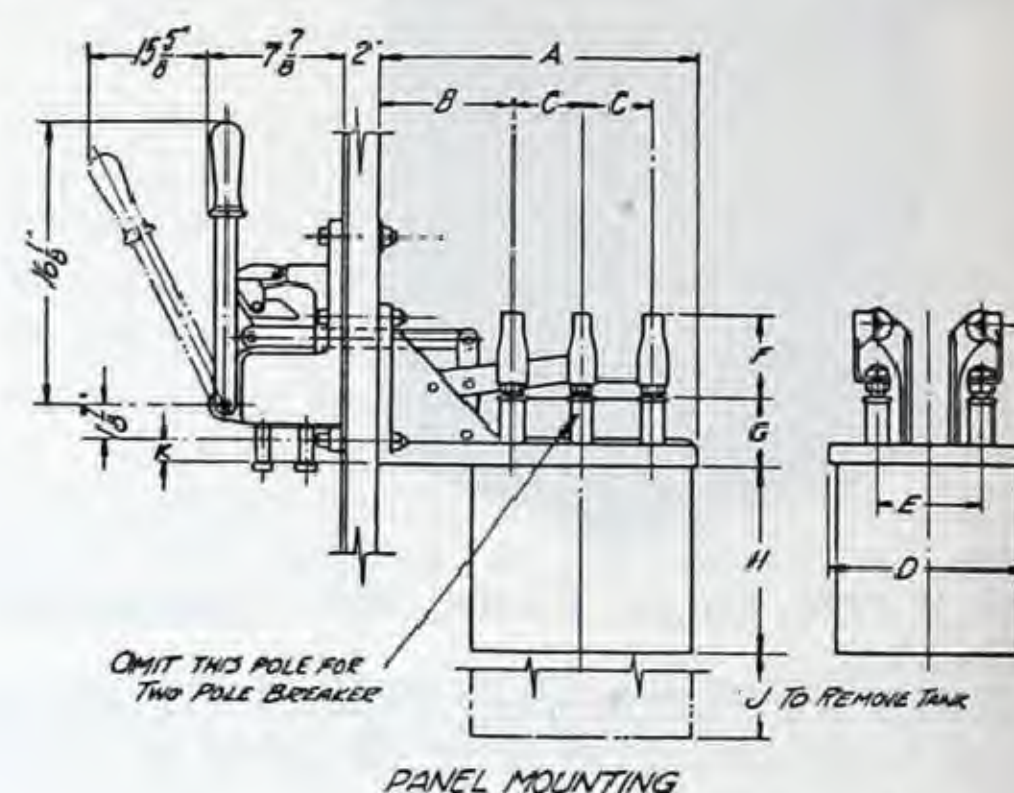
Tank—The Tank is rectangular, of steel plate, electrically welded by shielded arc method. It is equipped with a high quality liner and with barriers between phases. It is securely fastened to the frame by four studs.

MAXIMUM CURRENT, VOLTAGE AND INTERRUPTING CAPACITY RATINGS

Type	Rated Volts	Rated Amps.	Short Time Ratings R.M.S.		Interrupting Rating At Rated Max. Amps.
			Total Amperes 1 Sec.	5 Sec.	
145	5000	200	15,000	10,000	20,000
145	5000	400	15,000	10,000	20,000

Price on application.

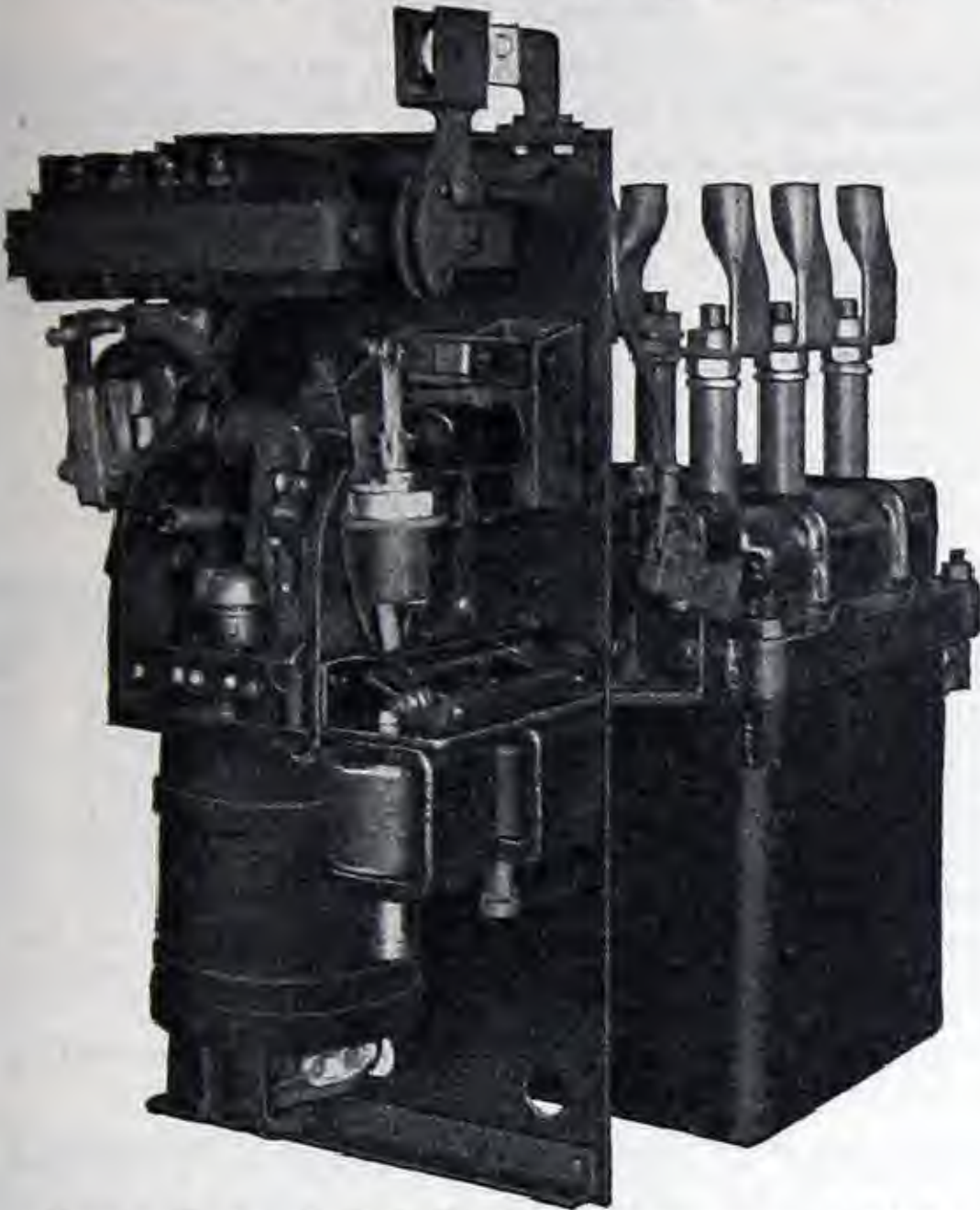
GENERAL DIMENSIONS—FOR REFERENCE ONLY



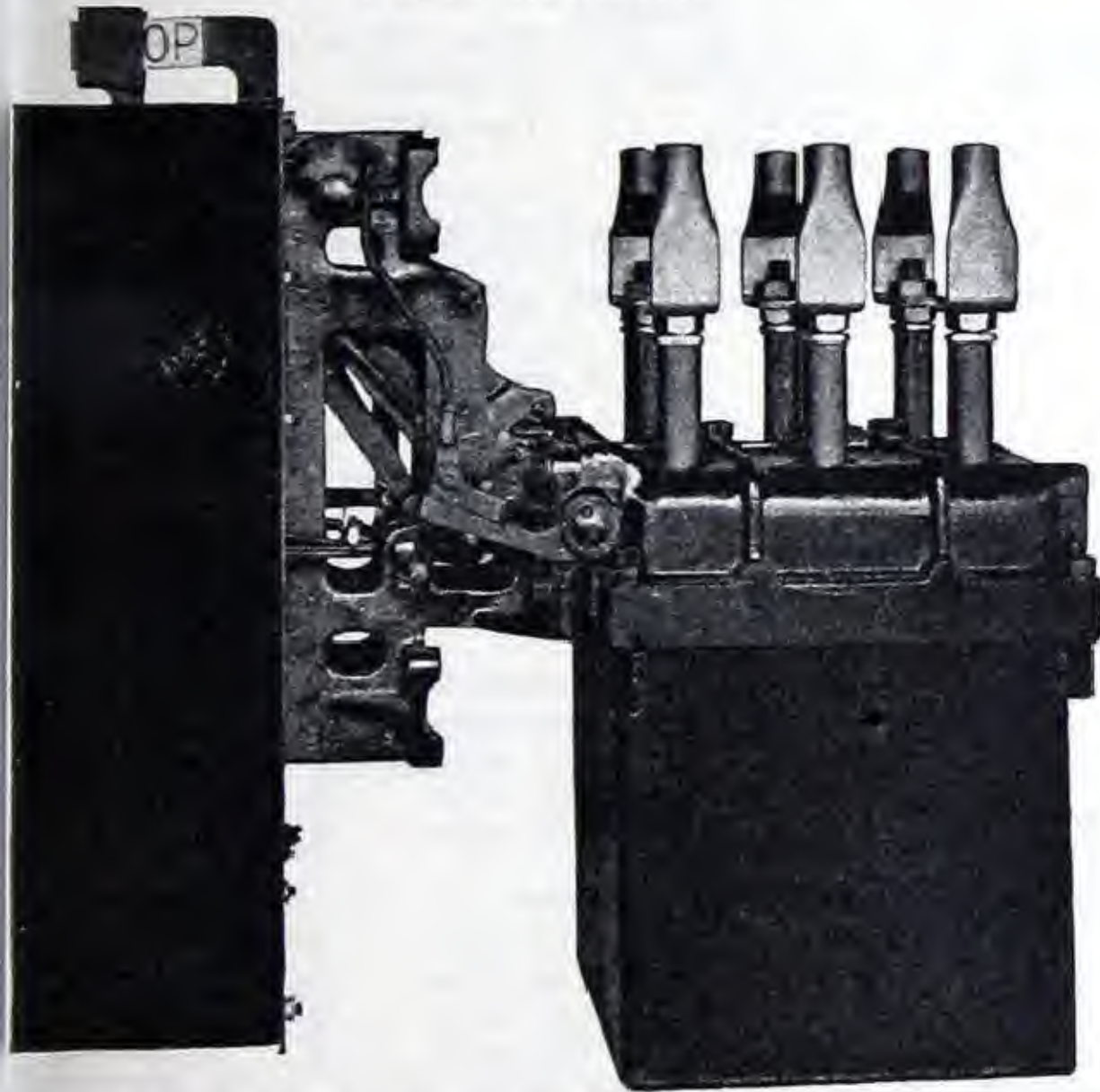
Amp.	A	B	C	D	E	F	G	H	J	I
200	18	7 $\frac{3}{8}$	4	11 $\frac{1}{4}$	6	3 $\frac{1}{2}$	4	10 $\frac{3}{16}$	12 $\frac{1}{4}$	1 $\frac{1}{2}$
400	18	7 $\frac{3}{8}$	4	11 $\frac{1}{4}$	6	4 $\frac{5}{8}$	4	10 $\frac{3}{16}$	12 $\frac{1}{4}$	1 $\frac{1}{2}$

CONDIT OIL CIRCUIT BREAKERS
Type E-47

600 Amperes, 7,500 volts; 800 Amperes, 2,500 volts
25,000 Kv-a Interrupting Capacity



Type E-47 3 P.S.T. 600 Amperes, 7,500
Volts with type UC-31 Motor Operator
Cover Removed



Type E-47 3 P.S.T. 600 Amperes, 7,500 Volts with
type UC-30 Motor Operator

The type E-47 is designed for the control and protection of power circuits, generators and transformer banks and is especially suitable for industrial service for the control and protection of synchronous and induction motors where the operating duty is severe. They are furnished full automatic or non-automatic, manually or electrically operated. Full automatic oil circuit breakers are mechanically trip free from handle at any position in the stroke and are furnished in both current transformer relay trip and may be provided with undervoltage and time-limit attachments. Method of mounting. The type E-47 may be furnished in any of the following mounting arrangements:

1. Panel Mounting.
2. Panel Frame Mounting.
3. Remote Control Pipe Mounting.
4. Remote Control Wall Mounting.
5. Direct Control Pipe Mounting.
6. In Switch Houses.
7. In Cubicles.

We do not recommend arrangements 1, 2 and 5 where the voltage to ground exceeds 2500 volts.

CONDIT OIL CIRCUIT BREAKERS
Type E-47

Operators. Manual—The type U-3 face plate is furnished for manual operation of the type E-47 oil circuit breakers. It is a neat, well finished faceplate, readily adaptable to all methods of protection and designed to give correct operation of oil circuit breakers. It is arranged for three transformer or relay trip coils with or without time delay. The type U-3 face plates are ordinarily furnished single throw, but can be adapted to double throw operation by the addition of sequence or non-selective mechanical interlocks. The hand grip rocks on a pivot so that when pulled toward the operator the circuit breaker is tripped from the handle and opens at full speed. This feature will extend the life of the contacts, which are often badly burned by the slow opening of circuit breaker by hand. The circuit breaker cannot be reclosed until the handle is pulled back to full open position to engage handle latch.

The type V-15 undervoltage attachment may be associated with the type U-3 face plate. It is designed to release the oil circuit breaker when the voltage drops to approximately 50% of normal. It is designed for operation directly across the line on 110, 220, 440 and 550 volt service, 25 or 60 cycle. It is usually connected on the line side of the circuit breaker. Since the cores are always closed, it cannot burn out because of open magnetic circuit. It is reset by pressing push button on the front of the attachment. If the attachment is connected to the load side, this push button must be held in until the circuit breaker is closed.

Electrical—For electrical operation either the type UC-30 motor operator or the type SO-25 solenoid operator may be furnished.

The type UC-30 is a high speed operator consisting of a universal motor directly connected to the oil circuit breaker through a mechanism, which may or may not be mechanically trip free. It is a marvel of compactness and simplicity as may be seen from a study of the illustrations and dimension cut. The type UC-30 will close the breaker in approximately 8 cycles and is thus especially suitable for automatic throwover service.

The type UC-30 may be furnished for either A.C. or D.C. tripping. Up to four trip coils may be furnished. An undervoltage attachment for instantaneous or time delay self-resetting may also be furnished.

Standard voltage ratings are 220 volts A.C. and 125 volts D.C. By use of an auto-transformer, operation can also be obtained at 440 or 550 volts A.C.

The type SO-25 solenoid operator is a simple non-mechanical trip-free operator. It has one trip coil and is furnished for D.C. tripping only. Mechanical trip-free solenoid operator may be furnished on application.

MAXIMUM CURRENT, VOLTAGE AND
INTERRUPTING CAPACITY RATINGS*

Type	Rated Volts	Rated Amps. 60 cyc.	Short Time Rating in R.M.S. Tot. Amps.		
			1 Sec.	5 Sec.	
E-47	7500	600	20000	20000	
E-47	2500	800	20000	20000	
Interrupting R.M.S. Amperes at Various Bus Pressures					
	750 Volts	2500 Volts	5000 Volts	6000 Volts	7500 Volts
E-47	20000	6000	3000	2500	2000
E-47	20000	6000			

* These ratings are on the standard duty cycle interrupting capacity basis—2-OCO (15 second interval).

CONDIT OIL CIRCUIT BREAKERS

Type E

TYPE E LINE INDOOR OIL CIRCUIT BREAKERS
(Continued)

Electrically Operated

Oil Circuit breakers listed below are electrically operated, single mechanically and electrically trip-free.

Rated Volts	Rated Amps. (60 cyc.)	Poles	Universal Mech. List No.	Operator Trip-Free List Price	Gals. of Oil	Ship. Wgt. with Oil in Lbs.
7500	600	2	25247E	†250.00	6¼	360
	600	3	25347E	†273.00	6¼	380
	600	4	25447E	†319.00	8¼	435
2500	800	2	26247E	†267.00	6¼	380
	800	3	26347E	†293.00	6¼	400
	800	4	26447E	†344.00	8¼	460

- ES INCLUDE: 1. Oil circuit breaker and A.C. Universal No. 3 oil
2. Terminals up to and including 1,200 amperes
3. Electrical operator as indicated
4. Four-stage type Q-7 auxiliary switch
5. Control relay

- ES DO NOT INCLUDE: 1. Accessories
2. Terminals for 2,000 ampere breakers
3. Control switch or signal lamp
4. Protective relays
5. Hand closing lever, framework or cell material

Circuit breakers include type UC-30 Universal motor operator for on 125 or 250 volts D.C., 220 volts A.C., 25 or 60 cycles. D.C. and operator same price.

ATTACHMENTS AND ACCESSORIES

The following prices only apply when ordered with the breaker)

Description	Approx. Ship. Wgt.	List No.	List Price
Hand closing lever (solenoid or motor).....	..	655L	\$7.00
Rotating type (See note) control relay, trip-free type JHL-7, single pole, 50 amp., 125 or 250 volts D.C.....	25	367JHL	32.00
Switch type H-1 with two 140 volt indicator lamps with red and green lenses complete.....	20	141H	13.00
Switch type H-1 with two 140 volt indicator lamps with lamp resistance for 125 and 250 volts and red and green lenses complete	20	281H	15.00
Indicator lamp receptacle, complete with indicator lamp, red or green lens, with base and fuse base.....	2	442H	2.00
Four stage for type Q-7 auxiliary switch (minimum capacity of switch 4 stages).....	..	...	3.00
UC-30 Motor Operator:			
Transformer trip coil.....	..	145T	25.00
Transformer trip coils.....	..	245T	31.00
Transformer trip coils.....	..	345T	37.00
Time delay trip coil.....	..	146T	30.00
Time delay trip coils.....	..	246T	36.00
Time delay trip coils.....	..	346T	42.00
Instantaneous undervoltage attachment, 125, 220, 440 and 550 volts. Specify volt- age and frequency.....	..	...	31.00
Time delay undervoltage attachment, 125, 220, 440, and 550 volts. Specify voltage and frequency.....	..	...	62.00
SO-30-1 and MC-31 Operators:			
Transformer trip coil.....	..	137T	30.00
Transformer trip coils.....	..	237T	36.00
Transformer trip coils.....	..	337T	42.00
Time delay trip coil.....	..	138T	35.00
Time delay trip coils.....	..	238T	41.00
Time delay trip coils.....	..	338T	47.00

The hesitating type is so designed that the contacts will remain closed for a short duration after the energy has been cut off from the hold-in coil. In general, this time lag is sufficient to insure proper closing of the breaker. The function of the trip-free feature on the type JHL-7 is to prevent the circuit breaker from being held closed upon short circuits by overloads.

TERMINALS

Amperes Capacity	400	600	800	1200	2000
Terminals†† (each)....	\$2.30	\$3.00	\$8.00	\$10.00	\$25.00
Nuts (each).....	.35	.45	1.30	2.00	3.00

bar terminal for 1200 amperes and above.

CONDIT OIL CIRCUIT BREAKERS

Type ED-20

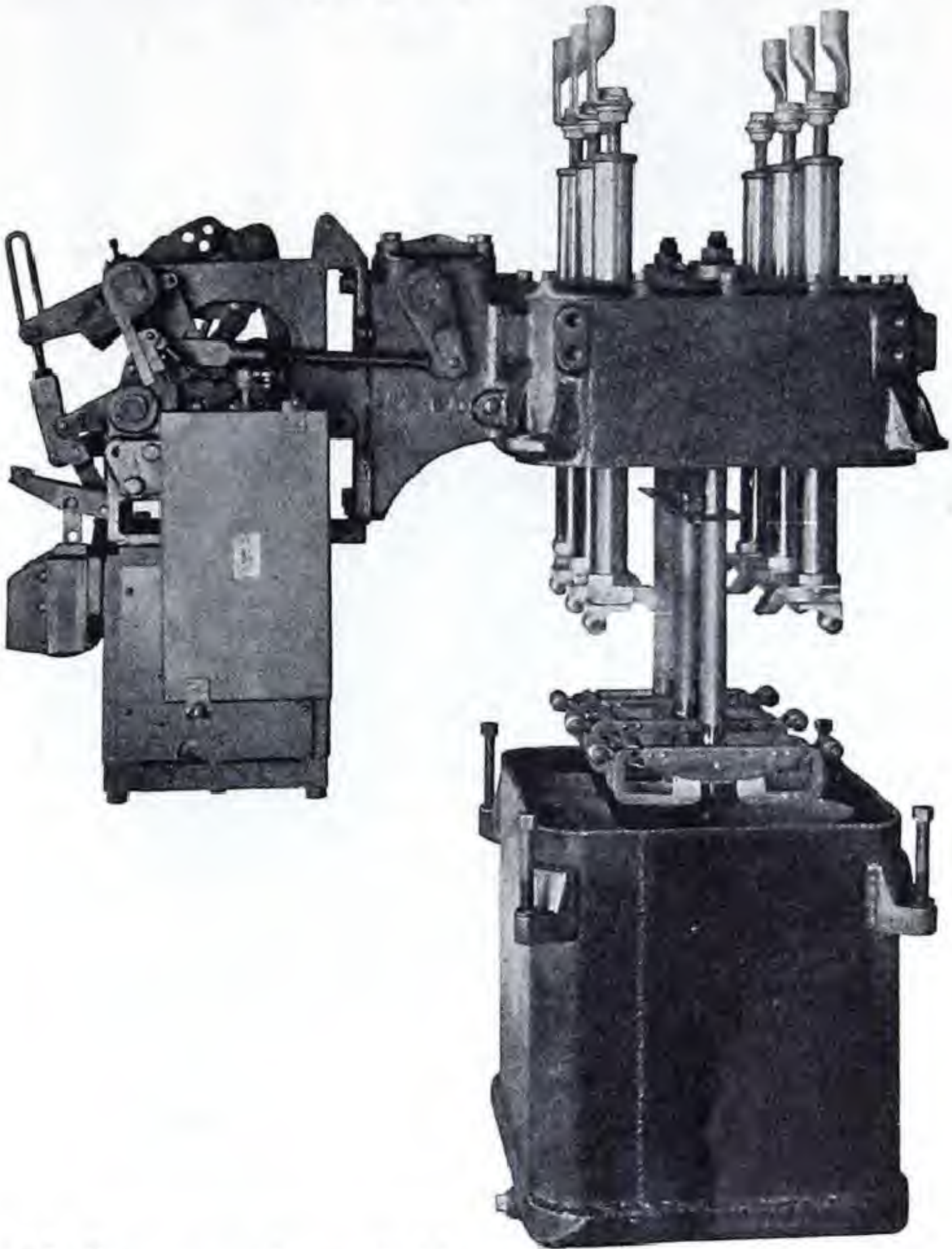
PANEL, PIPE OR FLAT SURFACE MOUNTING
AUTOMATIC OR NON-AUTOMATIC

600 Amperes—15000 Volts

1200 Amperes—7500 Volts

2000 Amperes—5000 Volts

Interrupting Capacity 50,000 Kv-A



Medium capacity switchboard type oil circuit breakers of enclosed mechanism type. All features of their design have been thoroughly proven by tests. They are arranged for panel, pipe frame or wall mounting.

Main contacts are Condit inverted laminated brushes of hard drawn copper laminae and a heavy copper bridging member.

Arcing contacts are butt type, of large contact area and mass, rigidly supported, easily removable, and self-aligning. Their large mass and high density provide excellent thermal absorption ability which materially reduces arcing and oil deterioration. Standard arcing contacts are of copper. Elkonite contacts can be furnished for special motor starting application at a slight additional cost. They are of special arc-resisting alloy and have a much greater life than the copper contacts. The design of the arcing contact circuit utilizes the electro-magnetic forces of high currents to preclude any blowoff effect or chattering while the arcing contacts are making or breaking contact, thus assuring positive protection to the main contacts.

Frame is a rigid cast rectangular structure with deep web extending down over and protecting upper part of tank. A deep groove is provided on the under side of the frame, against which the tank is drawn tightly by four short tank bolts.

Tank is rectangular of steel plate electrically welded by shielded arc method. It is equipped with a high quality liner and barrier between phases. An oil gauge and oil drain plug are furnished.

Mechanism is enclosed flat angle straight line motion type. Acceleration on opening is assisted by springs and contact action. Decelerators and bumpers absorb the impact of the moving parts near the end of the opening stroke.

Insulation is ample to meet requirements of A.I.E.E. Standards. Bushings are of one-piece Bakelain, a high dielectric material of great mechanical strength fully impregnated. The bushings are impervious to moisture and oil.

CONDIT OIL CIRCUIT BREAKERS

Type E Line Indoor

Manually Operated

Type E oil circuit breakers listed below are manually operated non-automatic single throw complete with face plate. For automatic operation add trip coils and accessories below.

Type	*Rated Volts	Rated Amps. (60 cyc.)	Poles	Gals. of Oil	†Approx. Ship. Wgt. with Oil in Lbs.
ED-20	15000	600	2	20	800
		600	3	20	840
		600	4	26	955
ED-20	7500	1200	2	20	890
		1200	3	20	940
		1200	4	26	1165
ED-20	5000	2000	2	19	940
		2000	3	19	1000
		2000	4	..	....

Type	Panel Mounting List No.	List Price	Panel Frame Mounting List No.	List Price	Remote Control Mounting List No.	List Price
ED-20	25252E	\$267.00	25262E	\$273.00	25272E	\$292.00
ED-20	25352E	314.00	25362E	320.00	25372E	339.00
ED-20	25452E	409.00	25462E	415.00	25472E	434.00
ED-20	28252E	449.00	28262E	455.00	28272E	474.00
ED-20	28352E	529.00	28362E	535.00	28372E	554.00
ED-20	28452E	689.00	28462E	695.00	28472E	714.00
ED-20	Not furnished		31262E	827.00	31272E	846.00
ED-20	Not furnished		31362E	993.00	31372E	1012.00
ED-20	Not furnished		31462E	On App.	31472E	On App.

*We do not recommend the installation of apparatus on the panel or switchboard when the voltage to ground exceeds 2500 volts. For such installation remote control apparatus is recommended.

†Weights are for panel mounting; for panel frame mounting, add 20 pounds; for remote control, add 70 pounds.

PRICE INCLUDES: 1. Oil circuit breaker and A.C. Universal No. 3 oil
2. Face plate but no accessories (trip coils, etc.)
3. Mounting details for breaker unit
4. Bell cranks with remote control
5. Terminals and nuts up to and including 1,200 amperes

PRICES DO NOT INCLUDE: 1. Accessories
2. Terminals for 2000 ampere breaker

ATTACHMENTS AND ACCESSORIES

(The following prices only apply when ordered with the breaker)

Description	Approx. Ship. Wgt. in Lbs.	List No.	List Price
A.C. Instantaneous transformer (5 ampere trip overload coil per coil (up to three), each	4	554T	\$6.00
	4	454T	6.00
	4	354T	6.00
Time delay attachment adjustable, each	10	462T	5.00
**Instantaneous undervoltage attachment,			
25 or 60 cycle	110 volts	7	1115V
	220 volts	7	2215V
	440 volts	7	4415V
	550 volts	7	5515V
**Time delay under voltage attachment,			
25 or 60 cycle	110 volts	8	1126V
	220 volts	8	2226V
	440 volts	8	4426V
	550 volts	8	5526V
**Magnetic interlock (includes instantaneous undervoltage protection and necessary auxiliary switch)			
A.C.	110 volts	16	11MS
	220 volts	16	22MS
25 or 60 cycle	440 volts	16	44MS
	550 volts	16	55MS
D.C.	125 volts	16	125MS
	250 volts	16	250MS
Mechanical interlock (Standard)	..	488M	7.50
Sequence Interlock	..	664S	36.00
Common trip bar	..	775T	3.00
Auxiliary switch type Q-7, one stage, circuit opening or circuit closing	15	467Q	10.00
Additional stage (maximum capacity of switch 4 stages) when ordered with breaker	1	....	3.00
Bell alarm switch	2	863BA	3.00
Crank hanger with bell crank and two 3/4 inch rod ends	20	861CH	6.00
Frame work for Type ED-20 2,000 ampere	..	761ED	25.00

**When ordering give catalog number, voltage, whether D.C. or A.C. If A.C., state frequency.

CONDIT OIL CIRCUIT BREAKERS

Type E Line Indoor

ELECTRICALLY OPERATED

Type E Oil Circuit breakers listed below are electrically operated, single throw, mechanically and electrically trip-free

Type	Rated Volts	Rated Amps. (60 cyc.)	Poles	Gals. of Oil	††Approx. Ship. Wgt. with Oil in Lbs.
ED-20	15000	600	2	20	900
		600	3	20	940
		600	4	26	1055
ED-20	7500	1200	2	20	990
		1200	3	20	1040
		1200	4	26	1265
ED-20	5000	2000	2	19	1040
		2000	3	19	1100
		2000	4	..	....

Solenoid Operator Mech. Trip-Free			Universal Operator Mech. Trip-Free		
Type	List No.	List Price	Type	List No.	List Price
ED-20	25282E	*\$ 417.00		25292E	†\$ 492.00
ED-20	25382E	* 464.00		25392E	† 539.00
ED-20	25482E	* 559.00		25492E	† 634.00
ED-20	28282E	* 599.00		28292E	† 674.00
ED-20	28382E	* 679.00		28392E	† 754.00
ED-20	28482E	* 839.00		28492E	† 914.00
ED-20	31282E	* 996.00		31292E	† 1071.00
ED-20	31382E	* 1162.00		31392E	† 1237.00
ED-20	31482E	* On App.		31492E	On App.

††For solenoid operated type ED-20 add 50 lbs.

PRICES INCLUDE: 1. Oil circuit breaker and A.C. Universal No. 3 oil
2. Terminals up to and including 1,200 amperes
3. Electrical operator as indicated
4. Four-stage type Q-7 auxiliary switch
5. Control relay

PRICES DO NOT INCLUDE: 1. Accessories
2. Terminals for 2,000 amperes breakers
3. Control switch or signal lamp
4. Protective relays
5. Hand closing lever, framework or cell material

*Oil circuit breakers include type SO-30-1 solenoid operator for operation on 125 or 250 volts D.C. one electrical trip-free solenoid control relay (if not desired deduct \$25.00).

†Oil circuit breakers include type MC-31 Universal motor operator for operation on 48, 125 or 250 volts D.C., 110 or 220 volts A.C., 25 or 60 cycle

ATTACHMENTS AND ACCESSORIES

(The following prices only apply when ordered with the breaker)

Description	Approx. Ship. Wgt. in Lbs.	List No.	List Price
Hand closing lever (solenoid or motor)	..	655L	\$ 7.00
**Hesitating type (See note) control relay, trip free type JHL-7, single pole, 50 amp., 125 volts or 250 volts D.C.			
Control switch type H-1 with two 140 volt indicating lamps with red and green lenses complete	25	367JHL	32.00
Control switch type H-1 with two 140 volt indicating lamps with red and green lenses complete	20	141H	13.00
Control switch type H-1 with two 140 volt indicating lamps with lamp resistance for 280 volts and red and green lenses complete	20	281H	15.00
Porcelain lamp receptacle, complete with candelabra lamp, red or green lens, with holder and fuse base	2	442H	2.00
Framework for type ED-20 2,000 amperes	..	76ED	25.00
Additional stage for type Q-7 auxiliary switch (maximum capacity of switch 4 stages)	3.00
For type UC-30 Motor Operator:			
1 Transformer trip coil	..	145T	25.00
2 Transformer trip coils	..	245T	31.00
3 Transformer trip coils	..	345T	37.00
1 Time delay trip coil	..	146T	30.00
2 Time delay trip coils	..	246T	36.00
3 Time delay trip coils	..	346T	42.00
Instantaneous undervoltage attachment, 110, 220, 440 and 550 volts. Specify voltage and frequency	31.00
Time delay undervoltage attachment, 110, 220, 440, and 550 volts. Specify voltage and frequency	62.00
For type SO-30-1 and MC-31 Operators:			
1 Transformer trip coil	..	137T	30.00
2 Transformer trip coils	..	237T	36.00
3 Transformer trip coils	..	337T	42.00
1 Time delay trip coil	..	138T	35.00
2 Time delay trip coils	..	238T	41.00
3 Time delay trip coils	..	338T	47.00

**Will close and break 200 amperes at 125 volts D.C. or 100 amperes 250 volts D.C. All control relays are front connected and enclosed. Spec voltage.

Note—The hesitating type is so designed that the contacts will remain closed for a short duration after the energy has been cut off from the holding-in coil. In general, this time lag is sufficient to insure proper closing the oil breaker. The function of the trip-free feature on the type JHL is to prevent the circuit breaker from being held closed upon short circuit or heavy overloads.

TERMINALS

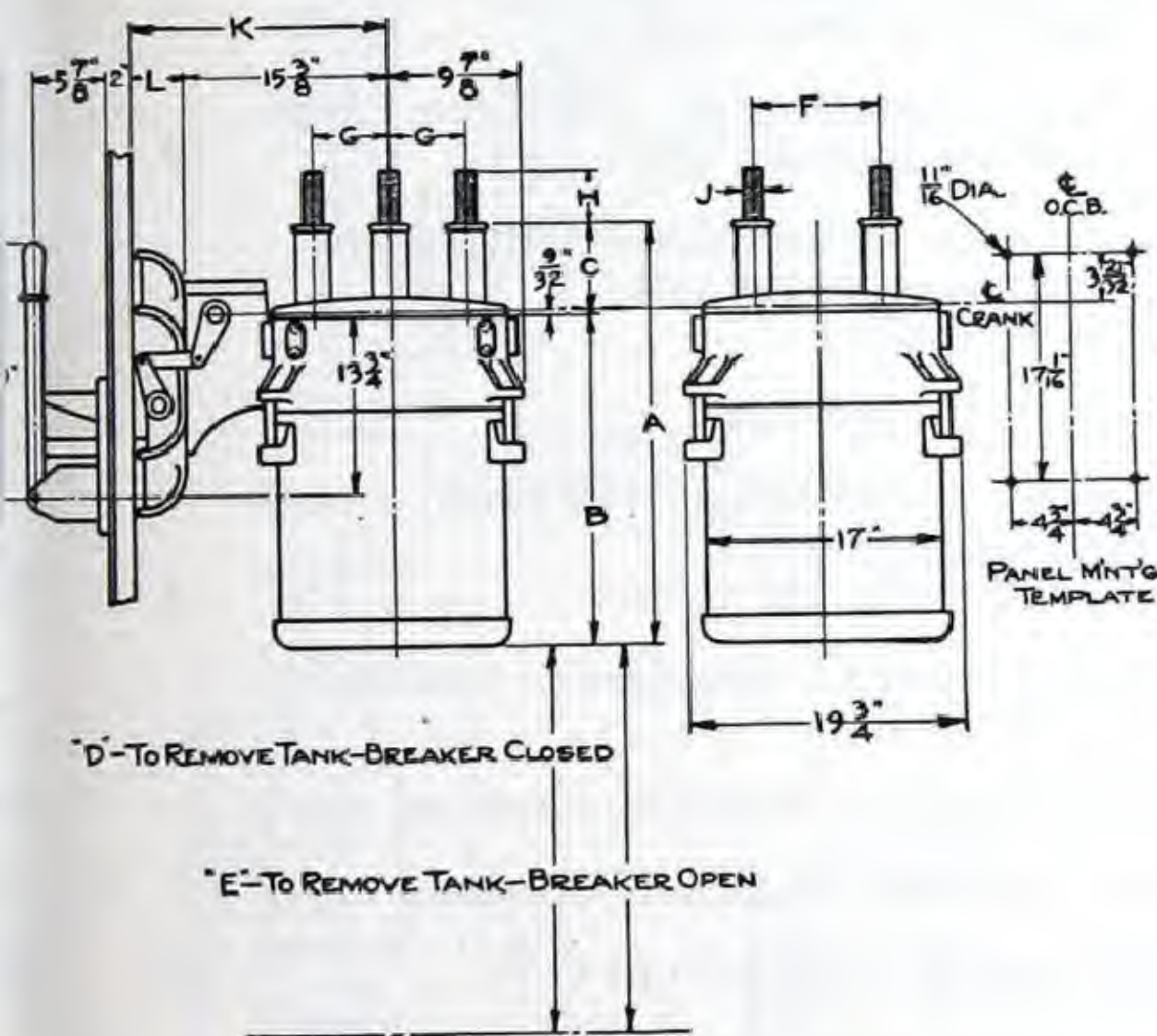
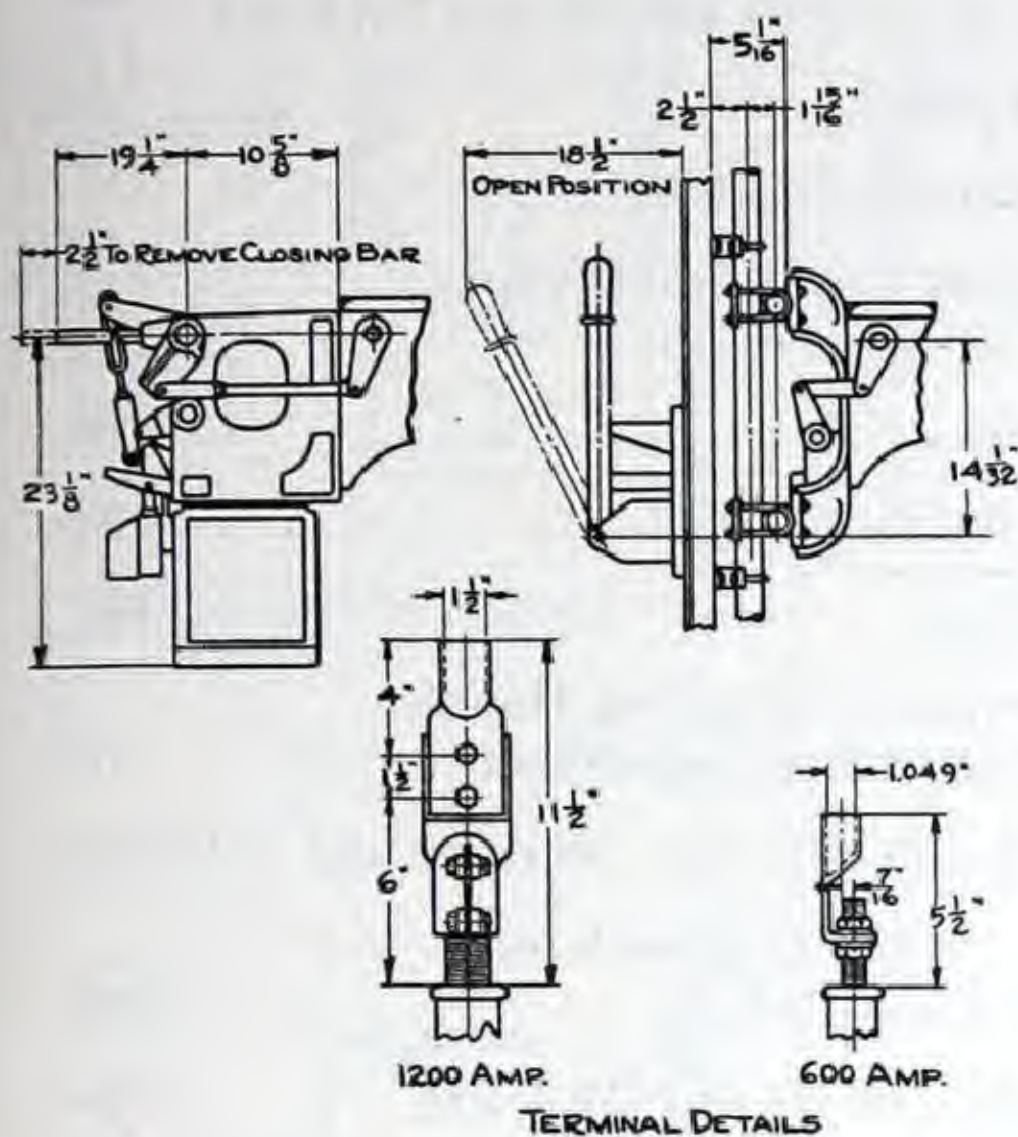
Ampere Capacity	400	600	800	1200	2000
Cable terminals†† (each)	\$2.30	\$3.00	\$8.00	\$10.00	\$25.00
Contact nuts (each)	.35	.45	1.30	2.00	3.00

††Busbar terminal for 1200 amperes and above.

CONDIT OIL CIRCUIT BREAKERS

Type ED-20

DIMENSIONS FOR REFERENCE ONLY



Amperes	A	B	C	D	E	F
600	31 7/16"	24 5/8"	6 13/16"	12"	18"	9 1/2"
1200	31 7/16"	24 5/8"	6 13/16"	12"	18"	9 1/2"
1500	31 5/16"	24 5/8"	6 11/16"	12"	18"	9"

Amperes	G	H	J	K	L
600	5 3/4"	2 1/2"	3/4"-16	19 3/8"	4"
1200	5 3/4"	3 1/2"	1 1/2"-12	19 3/8"	4"
1500	5 1/2"	6"	2 1/4"-12	19 3/8"	4"

CONDIT OIL CIRCUIT BREAKERS

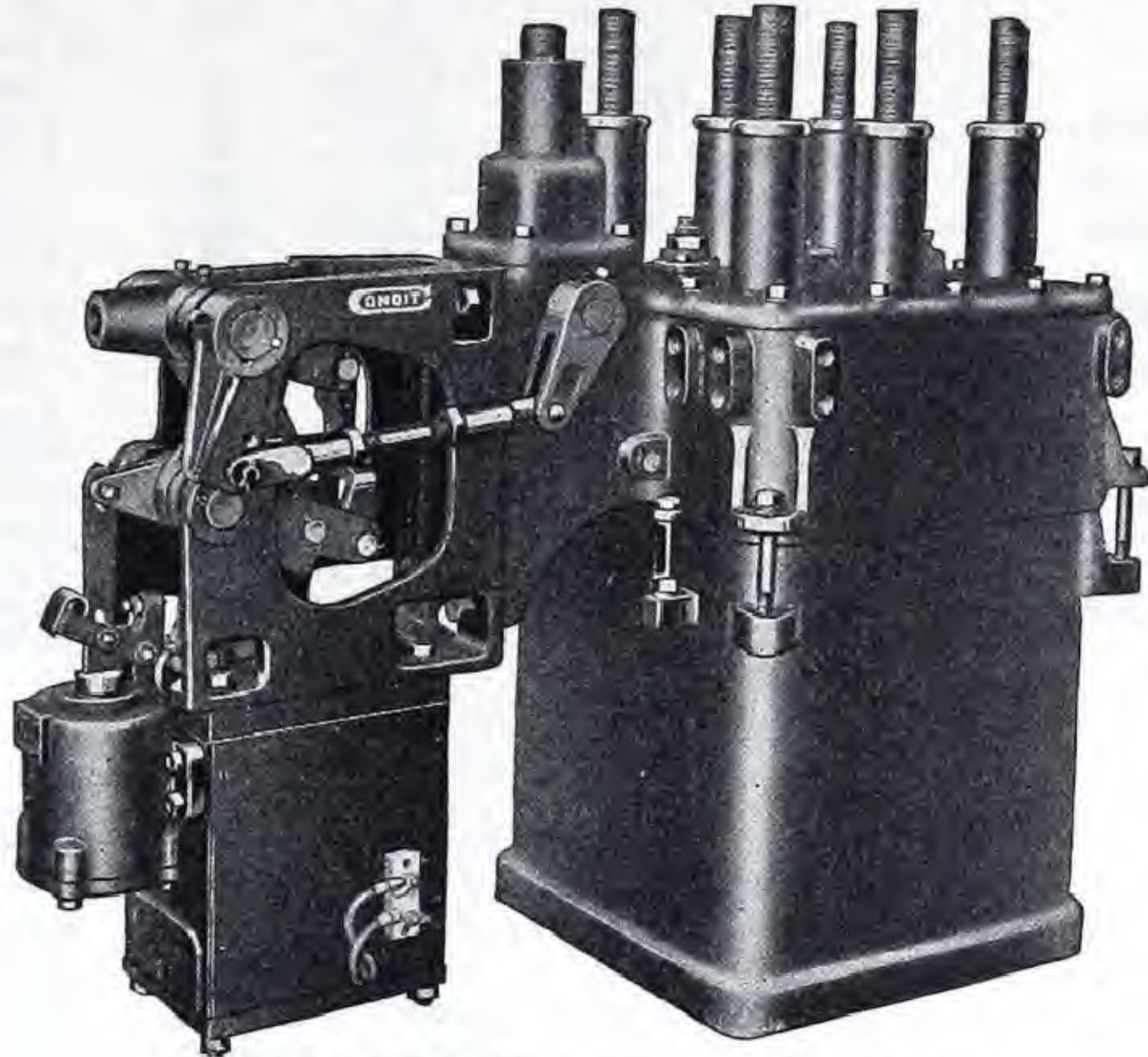
Indoor Station Type

Type DR-20

600 Amperes 15,000 Volts, 1200 Amperes 7,500 Volts—2000 Amperes 5000 Volts 50,000 Kv-a Interrupting Capacity.

Type DR-40

600 and 1200 Amperes 15,000 Volts—2000 Amperes 7500 Volts—100,000 Kv-a Interrupting Capacity.



Type DR-20, 1200 Amperes, 15000 Volts

General: As has been proven by severe interrupting capacity tests, the types DR-20 and DR-40 are conservatively rated, quick-clearing oil circuit breakers. They are of the oil-tight, enclosed mechanism type for indoor service. They are capable of wide application to central station and industrial service where a moderate interrupting capacity is desired and space is an important factor.

Mounting: The types DR-20 and DR-40 oil circuit breakers are very flexible in their mounting arrangements, being furnished in any of the following arrangements.

1. Panel Frame Mounting.
2. Flat Surface Mounting.
3. On Self-supporting Framework.
4. With Provision for Cell Mounting.
5. In Switchhouses.
6. In Cubicles.
7. In Metal-clad Switching Equipments.
8. In Safety-enclosed Switchboards.

The usual arrangement is to mount the breaker with its horizontal axis parallel to the operating mechanism or mounting surface. This is called reverse frame mounting. However, for special applications another arrangement may be obtained by mounting the breaker with its horizontal axis perpendicular to the operating mechanism. Unless otherwise specified, reverse frame mounting is furnished.

Operators: Electrical—The types DR-20 and DR-40 can be furnished with either high speed solenoid or motor operators mechanically trip free, with the operator and breaker back to back, or for cell mounting with operator either on back wall of cell, on floor, or overhead.

Standard voltage ratings of the solenoid operator are 48, 125 or 250 volts.

Standard voltage ratings of the motor operator are 48, 125 or 250 volts D.C. and 110 or 220 volts A.C. 60 cycles. For high speed characteristics, 220 volts A.C. operation is recommended.

Both solenoid and motor operators may be furnished for either A.C. or D.C. tripping. Up to three trip coils may be furnished. An undervoltage attachment for instantaneous or time delay tripping, self resetting, may also be furnished.

Manual—For manual remote control operation of the types DR-20 and DR-40, a mechanically trip-free face plate with provision for three trip coils is furnished. An undervoltage attachment for instantaneous or time delay tripping, reset by hand, may be furnished.

CONDIT OIL CIRCUIT BREAKERS

Type DR-20 and DR-40

CLASS "C"—THREE POLE—FOR FRAMEWORK OR CELL MOUNTING

Type	Rated Kv.	Rated Amps. 60 Cyc.	List Price		Oil Gals.	†App. Ship. Wgt. with Oil in Lbs.
			Man. Oper. Non-auto.	Sol. Oper. Mech. Trip-free		
DR-20	15	600	\$560.00	\$660.00	20	1,000
	7.5	1,200	780.00	880.00	20	1,100
	5	2,000	1,470.00	1,570.00	20	1,200
DR-40	15	600	760.00	860.00	22	1,200
	7.5	1,200	1,000.00	1,100.00	22	1,300
	5	2,000	1,670.00	1,770.00	22	1,400
Y-100	7.5	3,000	.....	1,925.00	57	3,000
DR-60	15	600	900.00	1,000.00	28	1,600
		1,200	1,180.00	1,280.00	28	1,700
DRZ-100	15	600	1,330.00	1,430.00	60	2,600
		1,200	1,660.00	1,760.00	60	2,700
		2,000	.....	2,760.00	60	2,900
DR-140	7.5	3,000	.....	4,450.00	83	5,000
DRZ-200	15	600	.....	2,200.00	75	3,200
		1,200	.....	2,520.00	75	3,300
		2,000	.....	3,700.00	75	3,600

Type	Kv-a.	Interrupting Rating		Short Time	
		R.M.S. At Rated Voltage	Tot. Amps. **Maximum Rating	Rat. in One Sec.	R.M.S. Total Amps. Five Sec.
DR-20	50,000	2,000	20,000	40,000	30,000
DR-20	50,000	4,000	20,000	40,000	40,000
DR-20	50,000	6,000	20,000	40,000	40,000
DR-40	100,000	4,000	30,000	50,000	30,000
DR-40	100,000	4,000	30,000	60,000	50,000
DR-40	100,000	8,000	30,000	60,000	50,000
Y-100	100,000	8,000	80,000	80,000	80,000
DR-60	150,000	6,000	36,000	50,000	30,000
DR-60	150,000	6,000	36,000	60,000	50,000
DRZ-100	250,000	10,000	50,000	50,000	30,000
DRZ-100	250,000	10,000	60,000	60,000	50,000
DRZ-100	250,000	10,000	60,000	70,000	60,000
DR-140	350,000	28,000	80,000	80,000	80,000
DRZ-200	500,000	20,000	50,000	50,000	30,000
DRZ-200	500,000	20,000	60,000	60,000	50,000
DRZ-200	500,000	20,000	80,000	80,000	80,000

†Weights are for solenoid operated breakers; for manually operated breakers deduct 100 lbs.

**To obtain the ampere interrupting rating of a breaker for use on a system of less than rated voltage, use the following formula:

Amps. at system voltage =

$$\text{Amps. at rated voltage} \times \frac{\text{Rated voltage}}{\text{System voltage}}$$

If the value so calculated exceeds that given in the column headed "Maximum Rating" then the maximum rating must be used as the interrupting rating of the breaker.

Motor Operated Breakers: For price of motor operated types add \$100.00 to solenoid operated prices.

PRICES INCLUDE:

1. Terminals or contact nuts on 600 and 1,200 ampere capacities. (No reduction for omission of terminals.)
2. A.C. Universal No. 3 oil.
3. Non-automatic face plate (without accessories, trip coils, etc.) with manually operated breakers. Bell cranks for remote control breakers.
4. Mechanically trip-free solenoid operator with solenoid operated breakers for 48, 125 or 250 volt D.C. operation, electrically trip-free control relay (omission price \$25.00), 4-stage Type Q-7 auxiliary switch.

PRICES DO NOT INCLUDE:

1. Control switch.
2. Terminals or contact nuts above 1,200 ampere capacity.
3. Protective relays.
4. Current transformers.
5. Hand closing lever or tank lifter.

CONDIT OIL CIRCUIT BREAKERS

Types DR-20 and DR-40

ACCESSORIES

The following prices only apply when ordered with the breaker

Description	Ship. Wgt. in Lbs.	List Price
Tank Lifter Portable Windlass Type		
Types DR-20, DR-40, DR-60 and DRZ-100	70	\$80.00
Type DRZ-200	95	115.00
Types Y-100 and DR-140	115	125.00
Tank Lifter Truck Type		
Types DR-20 and DR-40	275	130.00
Type DR-60	310	140.00
Types DRZ-100 and DRZ-200	390	150.00
Type DR-140	480	160.00
Emergency Operating Handle		
Types DR-20, DR-40 and DR-60	10	7.00
Types DRZ-100, DR-140, DRZ-200 and Y-100	20	12.00
Steel Framework for:		
Types DR-20 and DR-40	230	50.00
Types Y-100, DR-60 and DRZ-100	245	65.00
Types DR-140 and DRZ-200	445	100.00
Instantaneous A.C. transformer trip coils (manually-operated only)		
1 coil (up to three) each	7	6.00
Time delay attachment adjustable type (manually-operated only)		
	10	5.00
*Instantaneous undervoltage attachment (manually-operated only)		
25 or 60 cycle	7	31.00
Type V-15, 110 volts		
*Time delay undervoltage attachment (manually-operated only)		
25 or 60 cycle, 110 volts	8	62.00
Mechanical interlock (standard) (manually-operated only)		
		7.50
Sequence interlock (manually-operated only)		
		36.00
Common trip bar (manually-operated only)		
		3.00
Auxiliary switch 2-stage Type Q-7	15	13.00
Additional stage (maximum capacity of switch 4 stages)	1	3.00
Bell alarm switch (manually-operated only)	2	3.00
†Hesitating type (see note) control relay trip-free Type JHL-7		
Single pole, 50 amp., 125 volts or 250 volts D.C.	25	32.00

*When ordering give voltage, whether D.C. or A.C. I A.C. state frequency.

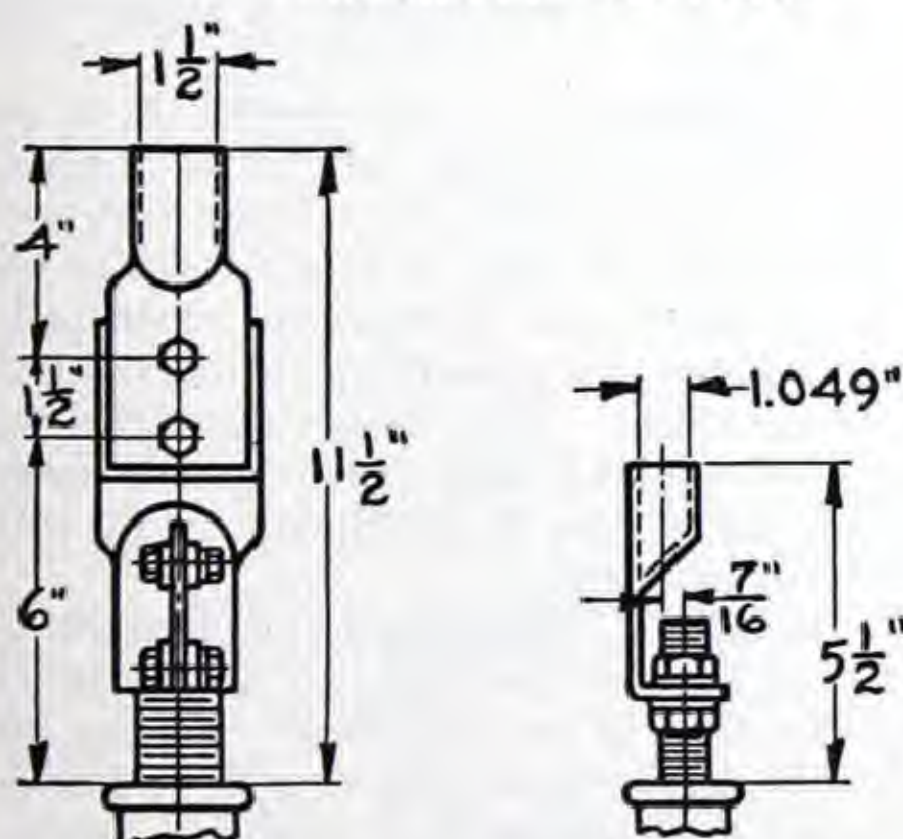
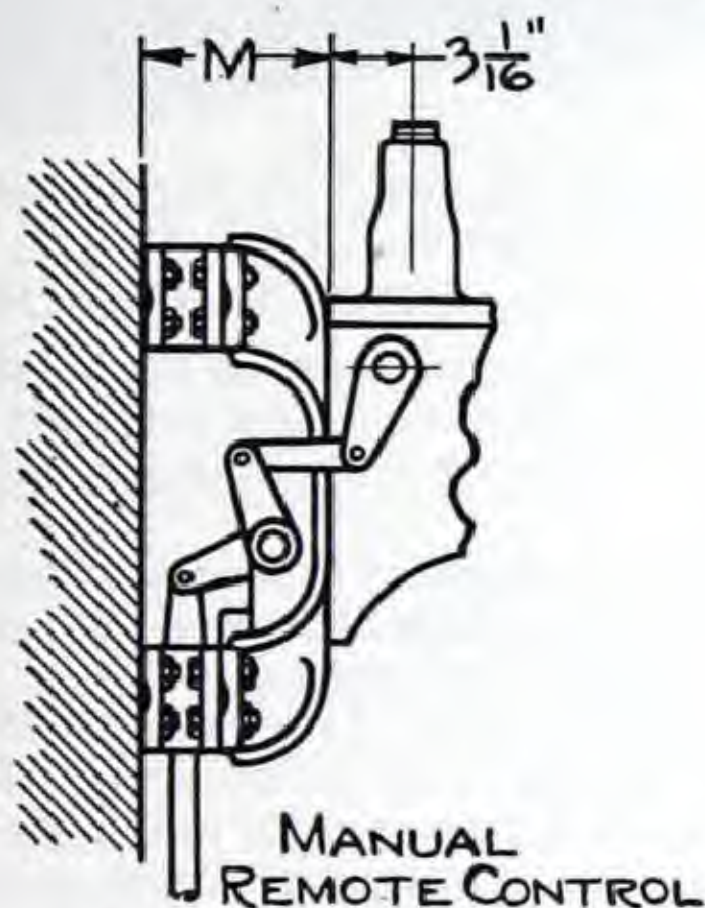
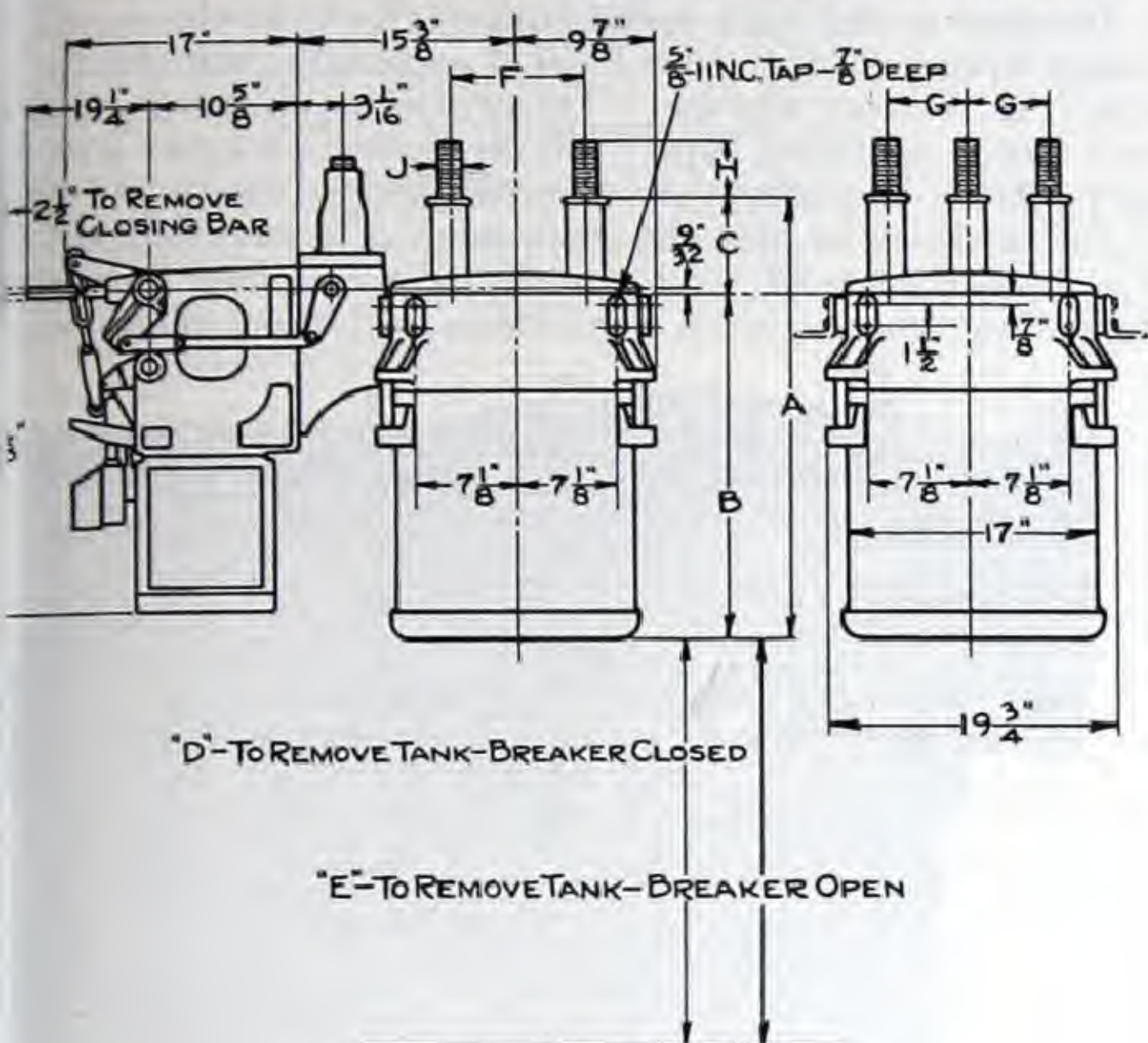
†Will close and break 200 amperes at 125 volts, D.C. or 100 amperes at 250 volts D.C. All control relays are from connected and enclosed. Specify voltage.

NOTE: The hesitating type is so designed that the contacts will remain closed for a short duration after the energy has been cut off from the holding-in coil. In general, this time lag is sufficient to insure proper closing of the oil breaker. The function of the trip-free feature on the Type JHL-7 is to prevent the circuit breaker from being held closed upon short circuits or heavy overloads.

CONDIT OIL CIRCUIT BREAKERS

Type DR-20 and Type DR-40

GENERAL DIMENSIONS—FOR REFERENCE ONLY



TERMINAL DETAILS

	Amp.	A	B	C	D	E
20	600	31 3/4	24 15/16	6 13/16	12	18
	1200	31 3/4	24 15/16	6 13/16	12	18
	2000	31 5/8	24 15/16	6 11/16	12	18
40	600	33 3/4	26 15/16	6 13/16	14	20
	1200	33 3/4	26 15/16	6 13/16	14	20
	2000	33 5/8	26 15/16	6 11/16	14	20
	Amp.	F	G	H	J	M
20	600	9 1/2	5 3/4	3	3/4-16	7 1/2
	1200	9 1/2	5 3/4	4	1 1/2-12	7 1/2
	2000	9	5 1/2	6	2 1/4-12	7 1/2
40	600	9 1/2	5 3/4	3	3/4-16	7 1/2
	1200	9 1/2	5 3/4	4	1 1/2-12	7 1/2
	2000	9	5 1/2	6	2 1/4-12	7 1/2

CONDIT OIL SWITCHES AND CIRCUIT BREAKERS

Pole Line Oil Disconnects and Circuit Breakers

FLAT SURFACE OR CROSS-ARM MOUNTING
NON-AUTOMATIC
MANUALLY OPERATED

Type	Rated Volts	Rated Amps. (60 cyc.)	(25 cyc.)	Poles	Gals of Oil per Tank	*App. Wt.
Y-1	2,500	1,500	1,700	2	8	1,100
Y-1	2,500	1,500	1,700	3	8	1,400
Y-1	2,500	1,500	1,700	4	8	1,800
Y-1	2,500	2,000	2,250	2	8	1,200
Y-1	2,500	2,000	2,250	3	8	1,500
Y-1	2,500	2,000	2,250	4	8	1,950
Y-1	2,500	2,500	3,000	2	8	1,450
Y-1	2,500	2,500	3,000	3	8	1,675
Y-1	2,500	2,500	3,000	4	8	2,150
Y-2	2,500	4,500	5,500	3	17 1/4	3,800

Type	Panel Frame Non-Automatic List No.	Price	Manual Remote Non-Automatic List No.	Price	Solenoid Operated List No.	Price
Y-1	29261Y	\$582.00	29271Y	\$600.00	29281Y	\$700.00
Y-1	31361Y	682.00	31371Y	700.00	31381Y	800.00
Y-1	32461Y	882.00	32471Y	900.00	32481Y	1,000.00
Y-1	29261Y	762.00	29271Y	780.00	29281Y	880.00
Y-1	31361Y	882.00	31371Y	900.00	31381Y	1,000.00
Y-1	32461Y	1,082.00	32471Y	1,200.00	32481Y	1,300.00
Y-1	29261Y	982.00	29271Y	1,000.00	29281Y	1,100.00
Y-1	31361Y	1,132.00	31371Y	1,150.00	31381Y	1,250.00
Y-1	32461Y	1,482.00	32471Y	1,500.00	32481Y	1,600.00

Y-2 Not furnished On application 35382Y 2,600.00

*Approximate shipping weight in pounds solenoid operated. For manually operated breakers deduct 250 lbs.

PRICES INCLUDE:

Manual Remote: Switch unit mounted on pipe supports and A.C. Universal No. 3 oil, non-automatic face plate for panel mounting, three hangers and bell cranks with rod ends for 3/4 inch pipe.

Solenoid Operated: Switch unit mounted on pipe supports and A.C. Universal No. 3 oil, non-trip free solenoid operator for 48 volts, 125 volts or 250 volts D.C. operation, control relay and 4-stage type Q-7 auxiliary switch.

Motor Operation: On application.



Type Y-1, 3P., S.T., 2000 Amperes, 2500 Volts, 60 Cycles. Manually Operated

Manual and Electrical remote control automatic or non-automatic.

Type Y-1	1500-2500 Amperes.....	Maximum	Volts	2500
Type Y-2	4500 Amperes.....	Maximum	Volts	2500

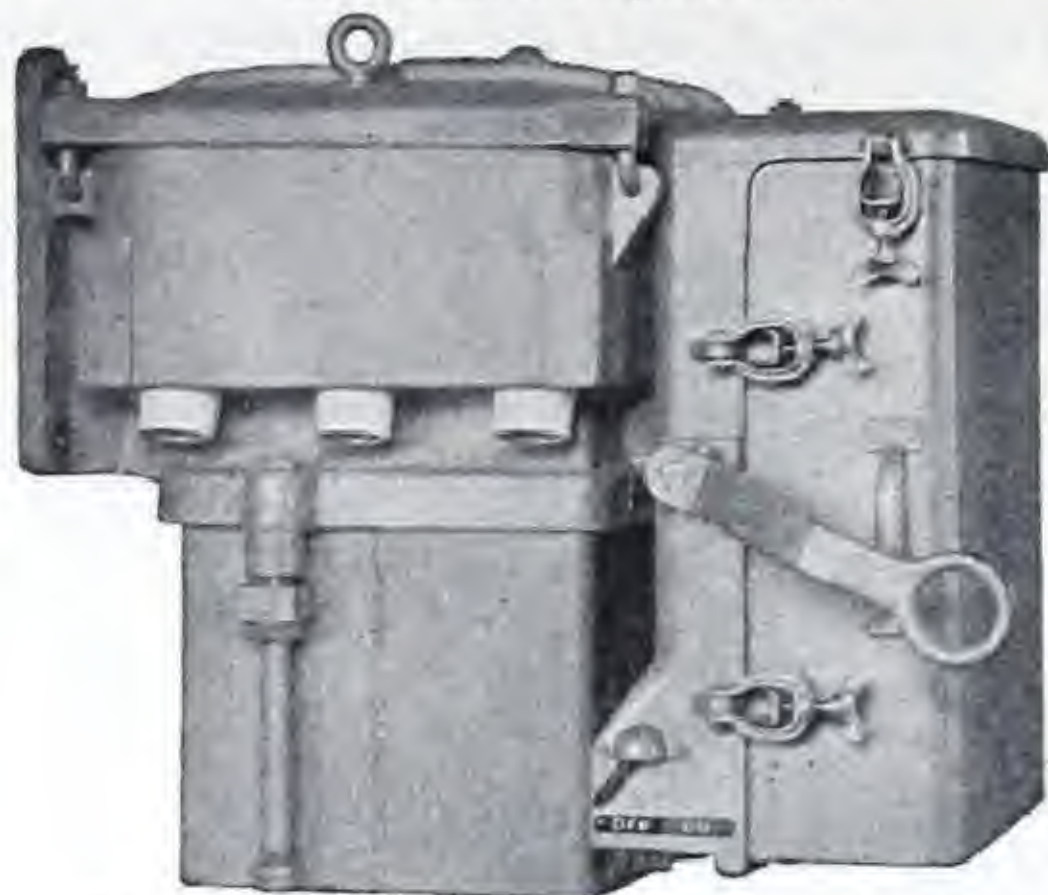
TYPE Y-1

Ruggedly constructed low-voltage oil circuit breaker having large ampere carrying capacity—extensively used for the control and protection of generators, motors, transformer banks, feeder circuits and as service entrance switches in central stations and industrial plants.

CONDIT OIL CIRCUIT BREAKERS

Type P-50

POLE LINE OIL SWITCHES AND CIRCUIT BREAKERS
200 and 400 Amperes—7500 Volts—Full Automatic and
Non-Automatic Manually or Electrically Operated—Isolated
Electrical Compartment



Type P-50 3 Pole 400 Amperes 7500 Volts
General

The type P-50 pole line oil switches and circuit breakers have been especially designed for overhead distribution systems for the sectionalizing of lines, switching of transformers and similar services where positive and safe operation is required without frequent adjustment or inspection. Because pole line switches are usually less adequately protected from line surges than station breakers, the P-50 has been designed with insulation characteristics far in excess of A.I.E.E. requirements.

The type P-50 pole line switches and circuit breakers are of sturdy weatherproof construction furnished for cross-arm or framework mounting, manually or electrically operated, non-automatic or full automatic, for 200 and 400 amperes at 7500 volts, two and three pole, single throw.

The type P-50 is not furnished double throw. Where double throw operation is required, two single throw breakers can be furnished equipped with a special mechanical interlock.

Operators

Manual Operation Non-Automatic. A handle is provided which is directly connected to the mechanism through a stuffing box. The handle carries a position indicator. Provision is made for locking the handle in the closed or open position. An overhanging sleet cover protects the handle from all weather. Where manual operation from ground is desired, a special operating handle and fitting (but not including interconnecting pipe) with provision for locking in closed or open position can be furnished at a small additional charge.

Manual Operation Full Automatic. The type P-50 when furnished full automatic is equipped with a mechanically trip-free mechanism mounted in a weatherproof housing. A handle is provided which is directly connected to this mechanism through a stuffing box. A position indicator readily visible is mounted below the handle. Space is provided in the housing for three transformer trip coils with or without time delay and a shunt trip coil if desired. An under voltage attachment, self resetting, for instantaneous or time delay may also be furnished (when furnished only three trip coils may be used). Up to three bushing current transformers can be furnished.

Electrical Operation. For electrical operation the type UC-30 Universal motor operator is furnished for either A.C. or D.C. control. It requires no rectifier. The type UC-30 is a high speed operator directly applied to the oil circuit breaker through a mechanism which may be either mechanically or non-mechanically trip free. It will close the circuit breaker in approximately 8 cycles.

The type UC-30 may be furnished for either A.C. or D.C. tripping. Space is provided for three trip coils with or without time delay and a shunt trip coil if desired. An undervoltage attachment, self-resetting, for instantaneous or time delay may also be furnished. (When furnished not more than three trip coils can be used.)

Standard operating voltages may be 220 volts A.C., 25 or 60 cycles, or 125 volts D.C.

CONDIT OIL CIRCUIT BREAKERS

Type P-50

(Continued)

Automatic Throwover Service

Because of the high speed characteristic of the type UC-30 motor operator, the type P-50 is especially suitable for automatic throwover service. Throwover equipment consists of two motor operated type P-50 oil circuit breakers and necessary relays. The relays are mounted inside the control cabinets of the breakers so that the equipment is in two compact units. Throwover time of from 10 to 18 cycles can be obtained, depending upon system conditions and class of service.



Type P-50 Service Restorer 3 Pole 400
Amperes 7,500 Volts.

TYPE P-50 SERVICE RESTORER

The type P-50 Service Restorer is an outstanding application of the type P-50 in combination with the type UC-30 motor closer and type A-5 reclosing relay for automatic reclosing service.

It is an extremely compact reclosing equipment built and mounted as a unit. In spite of its small size, it offers the usual timed intervals between reclosures with provision for lockout after two or more openings. Provision for the first reclosure to be instantaneous may be included at additional charge. This instantaneous feature may be cut in or cut out at will.

The type P-50 service restorer may also be arranged without a reclosing relay but suitable for a single instantaneous reclosing and lockout.

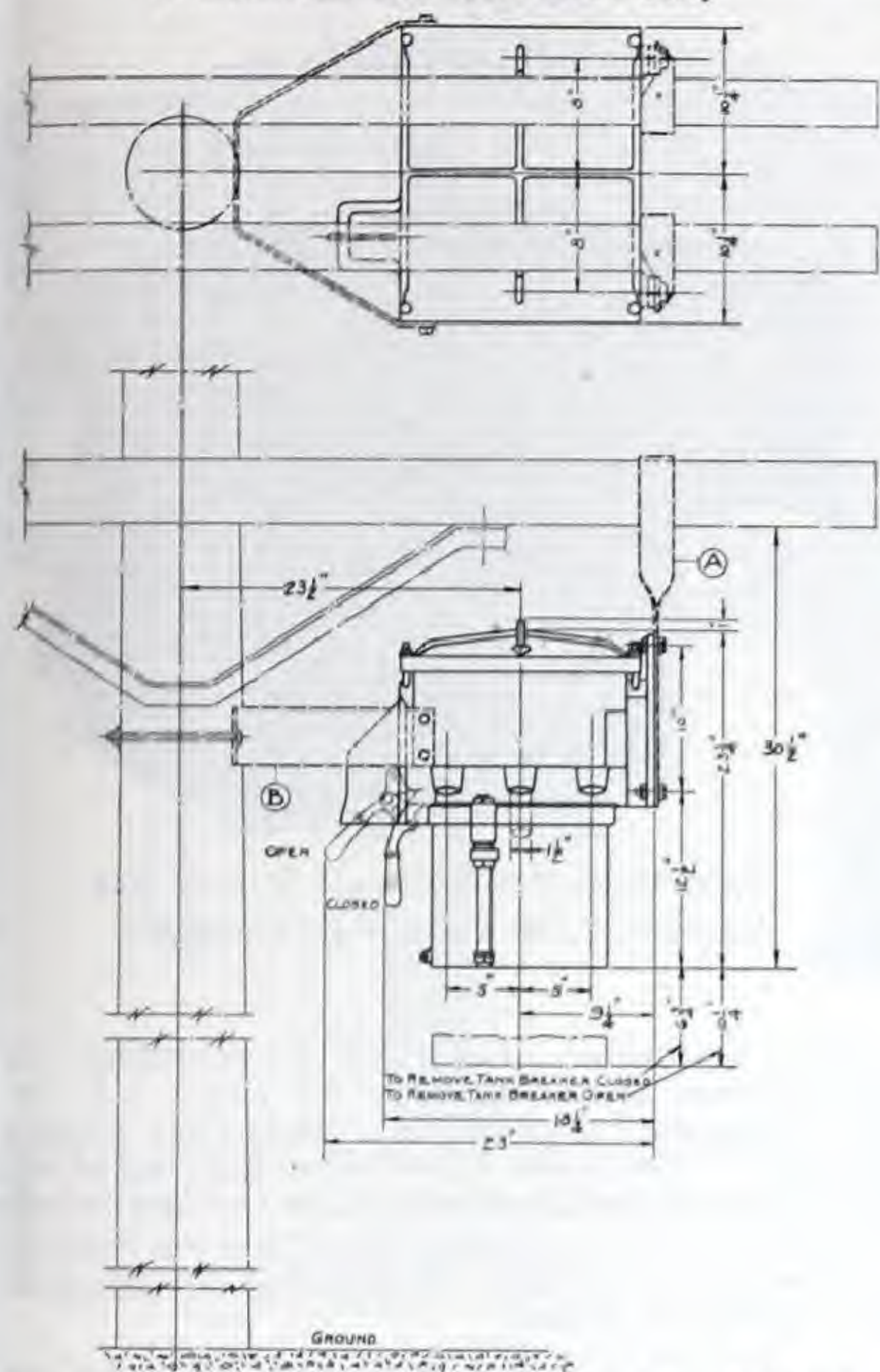
The reclosing equipment is mounted in a weatherproof cabinet. When the cover of the cabinet is removed, it leaves the equipment accessible from three sides and bottom.

The type A-5 reclosing relay is much smaller than the conventional relay of this type. It consists essentially of a small motor of shaded pole type operating through a reduction gear unit to a timing drum. The first timed reclosure may be any time from five seconds up. Subsequent timed reclosure may be arranged at option of purchaser. The relay has lockout and bell alarm features.

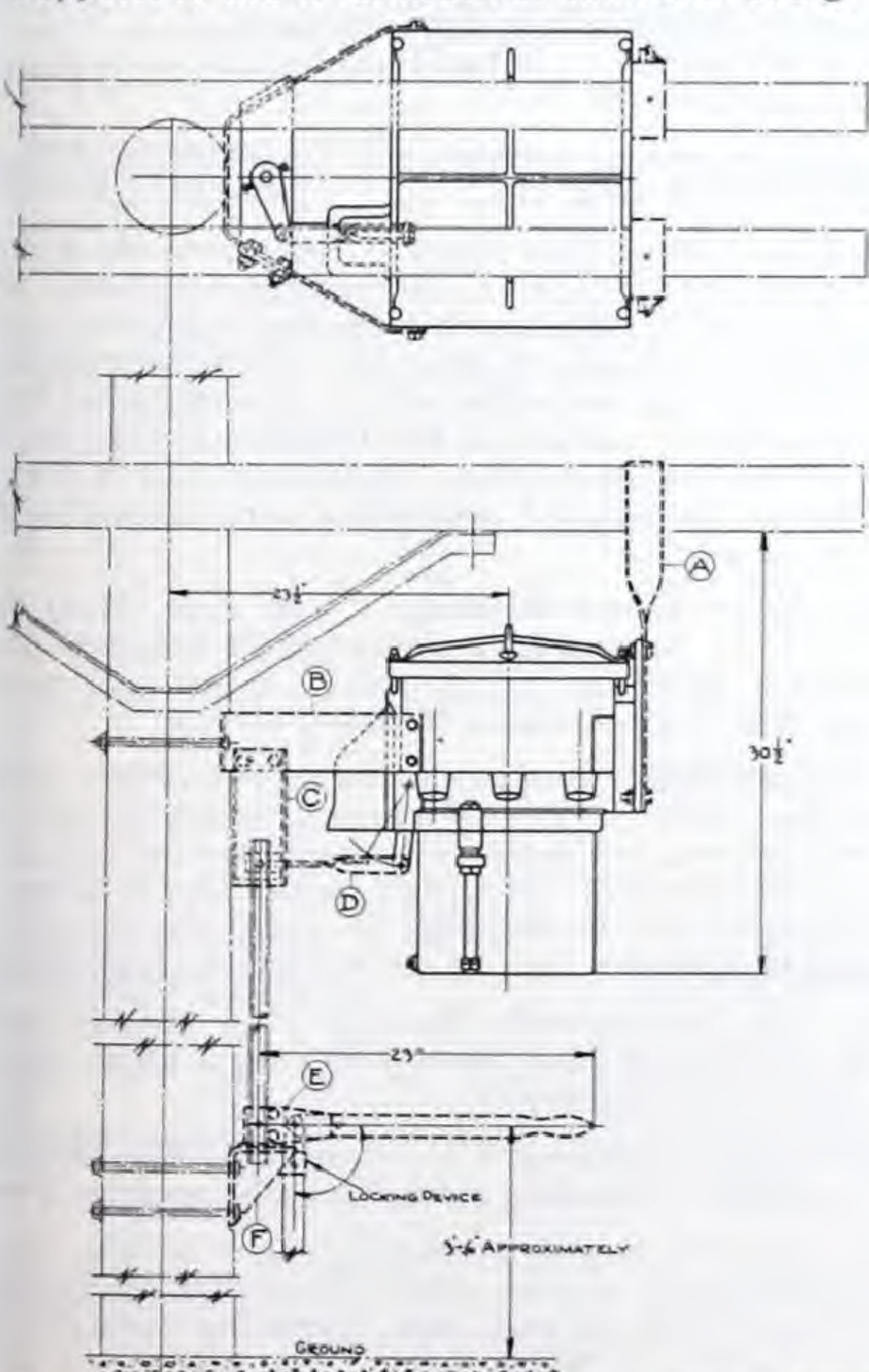
Operation (including instantaneous feature). On first opening of the oil circuit breaker, an auxiliary switch closes the circuit of the UC-30 motor closer causing instantaneous reclosure. At the same time the motor of the A-5 reclosing relay is energized and through centrifugal force distends small centrifugal governor. This action opens a contact which takes the control away from the auxiliary switch which caused the first reclosure. As long as the motor is operating the governor balls are held distended so that the first reclosure circuit is kept open. On the second opening of the oil circuit breaker the motor continues to revolve turning a timing drum until the peg for the first timed reclosure operates the reclosing contacts. Successive reclosures can be had at any time interval as desired for a total timing of three minutes. Each time interval is variable by simply setting pegs at various angular positions around the periphery of a disc.

Whether the breaker remains closed after any reclosure or is open after the last reclosure, the timing drum of the relay will continue to revolve until, at the end of its three-minute time cycle, it reaches the lockout position, when if the breaker is open it will stop. But if the breaker is closed, the relay will pass through the lockout position and stop at zero position ready for another duty cycle.

CONDIT OIL CIRCUIT BREAKERS
Type P-50 Pole Line Oil Switches
MANUALLY OPERATED NON-AUTOMATIC
 Dimensions For Reference Only



Type P-50 3-Pole Single Throw Pole Line Oil Switch
 Supports A and B furnished at additional charge



Type P-50 Pole Line Oil Switch showing special handle for
 Remote Manual Operation
 Supports A, B, C, D, E and F furnished at additional charge

CONDIT OIL CIRCUIT BREAKERS

**Pole Line Oil Disconnects and Circuit
 Breakers**

Flat Surface or Cross-Arm Mounting — Non-Automatic — Manually
 Operated

Type	Rated Volts	Rated Amps.	Gals. Oil 2&3 Pole
P-15	5000	200	1 3/4
	5000	300	1 3/4
P-50	7500	200	
	7500	400	

Two Pole		Three Pole		Four Pole	
Type	List Price	App. Wgt. in Lbs.	List Price	App. Wgt. in Lbs.	List Price
P-15	\$66.00	110	\$78.00	125	\$107.00
P-15	72.00	110	86.00	125	117.00
P-50	74.00	205	88.00	235	On application
P-50	90.00	230	105.00	260	On application

Type P-15. Price includes cable terminals and oil. Inside diameter of entrance bushings 3/4 inch for 200 amperes and 1 inch for 300 amperes.

Type P-50. Price includes cable terminals, oil, and tank guide rods. The inside diameter of standard cable entrance bushing is 1 1/2 inches.

Note: Rubber covered stranded cables with weather-proof braid are furnished in standard lengths, properly connected and insulated for connection to the line wires. Price on application.

ATTACHMENTS AND ACCESSORIES

For Motor Operated, Automatic Throwover and Automatic Reclosing Oil Circuit Breakers. Price on application.

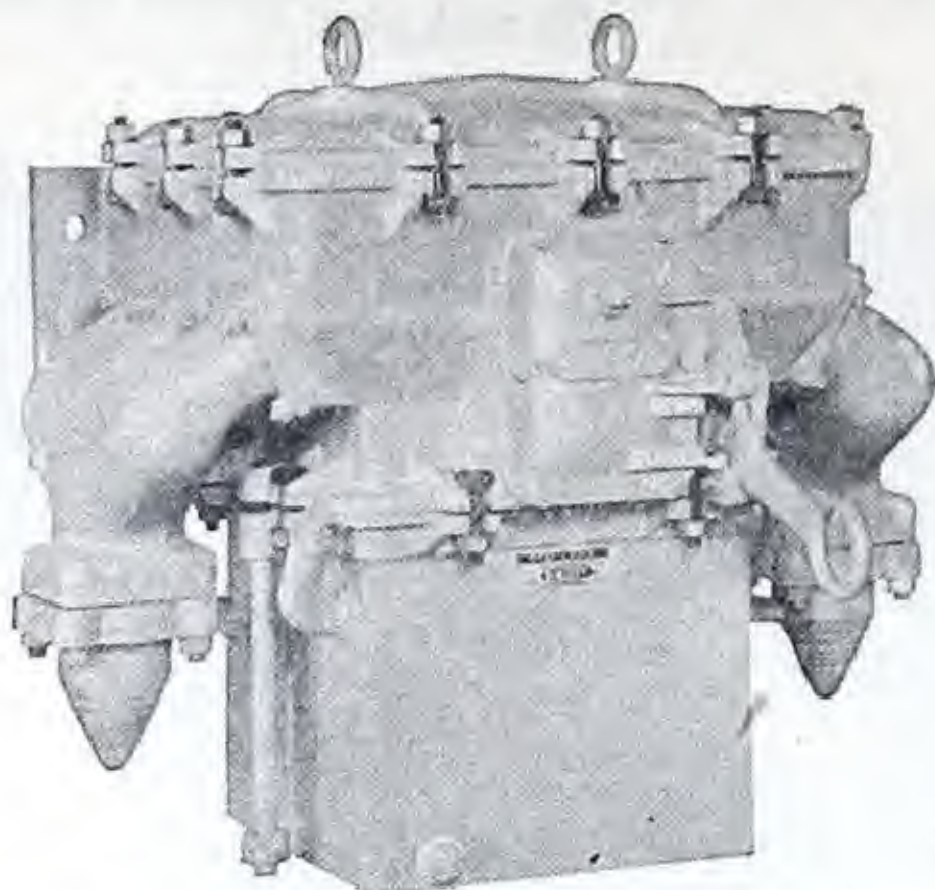
Description	Approx. Ship. Wgt.	List Price
Automatic front with one instantaneous type transformer trip coil (has provision for four coils) and necessary equipment to make switch automatic.....	275	\$90.00
Additional trip coils, each.....	3	6.00
Time delay trip coil, each.....	10	11.00
**Bushing type current transformer, single ratio.....	1 transformer 15 2 transformers 30 3 transformers 45	20.00 40.00 80.00
Instantaneous undervoltage attachment.....	110 volts 7 220 volts 7 440 volts 7 550 volts 7	31.00 31.00 31.00 31.00
Time delay undervoltage attachment.....	110 volts 8 220 volts 8 440 volts 8 550 volts 8	62.00 62.00 62.00 62.00
Oil gauge.....	..	4.00
Remote control handle.....	..	20.00
Frame.....	75	50.00

**Bushing type current transformers having only one primary turn are limited in their application on low values of primary currents. For applications below 200 amperes, refer to factory.

CONDIT OIL CIRCUIT BREAKERS

Type M-50

SUBWAY OIL SWITCHES AND CIRCUIT BREAKERS



Type M-50, 3 Pole, Single Throw, Non-Automatic, with 3 Conductor Cable Bells, Special Tank Rods and Special Handle for Rope Operation.

General: The type M-50 subway oil switches and circuit breakers have been especially designed for underground distribution systems, for the sectionalizing of lines, switching of transformers, and similar services where positive and safe operation is required without frequent adjustment or inspection. Because subway switches are subject to severe surge conditions, the type M-50 has been designed with insulation characteristics considerably in excess of the A.I.E.E. requirements.

They are furnished manually or electrically operated for 200 and 400 amperes at 7500 volts, 2, 3 and 4 pole single throw and 2 and 3 pole double throw, non-automatic or full automatic.

The type M-50 subway oil switches and circuit breakers are of sturdy water-tight construction furnished for wall mounting in subway or manhole. They are furnished with either single or multi-conductor cable sleeves, both of which are of cone-shaped construction, making them readily adaptable by cutting for the particular size of cable used. The cone of the single conductor sleeve ranges from $\frac{7}{8}$ " to $1\frac{1}{2}$ " inside diameter and the cone of the multi-conductor sleeve ranges from $1\frac{5}{8}$ " to $2\frac{3}{4}$ " inside diameter.

Operators: Manual Operation Non-Automatic — For manual operation a handle is provided which is directly connected to the mechanism through a stuffing box. The handle carries a position indicator which is readily visible. Provision is made for locking the handle in open or closed position. The double throw switch has two handles which may or may not be interlocked. Standard equipment includes the interlock. A special handle for rope or hook stick operation, can be furnished when specified.

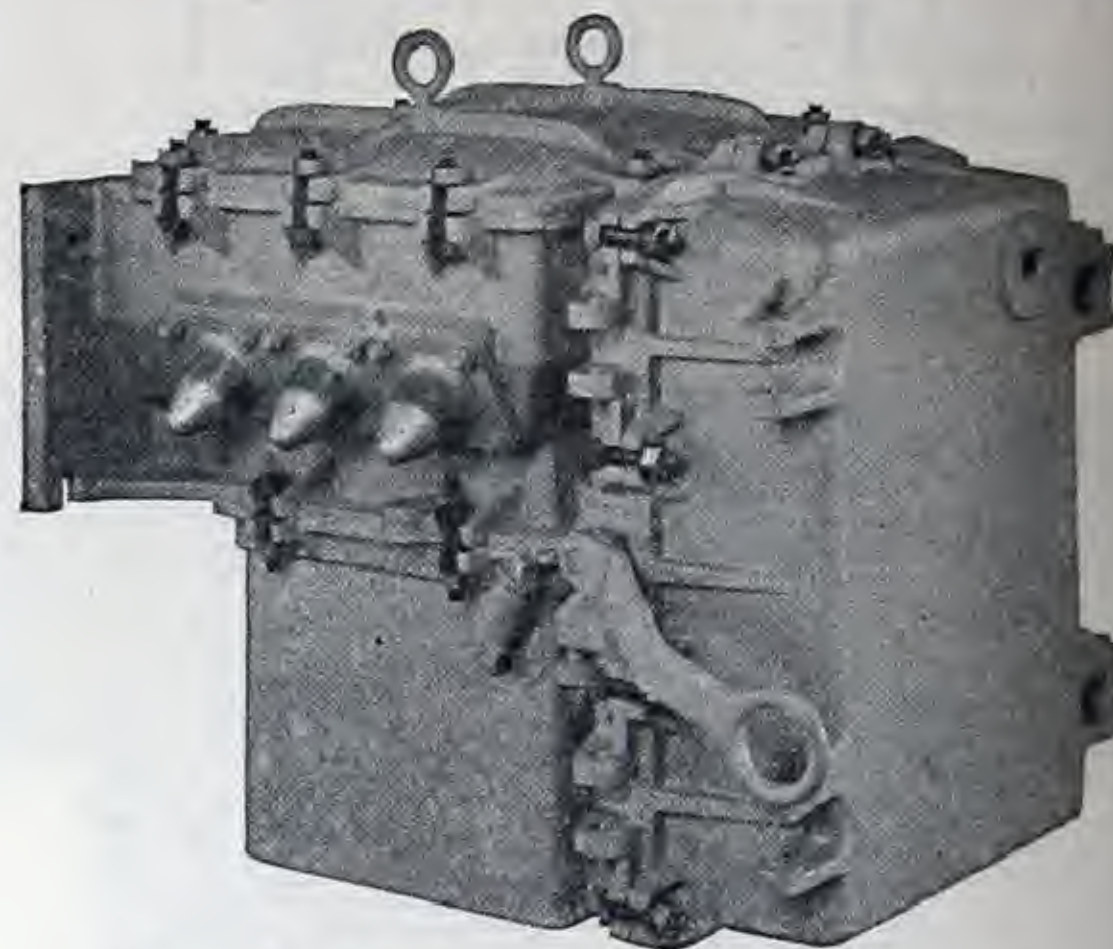
Manual Operation Full Automatic—The type M-50 when furnished full automatic is equipped with a mechanically trip free mechanism, mounted in a watertight housing with hinged cover. A handle with provision for rope or hook stick operation is provided which is directly connected to this mechanism through a stuffing box. A position indicator is provided readily visible through a window. Space is provided in the housing for three transformer trip coils with or without time delay and a shunt trip coil if desired. An under-voltage attachment, self-resetting, for instantaneous or time delay may also be furnished (when furnished, only three trip coils may be used). Up to three bushing current transformers can be furnished.

Bushing current transformers, having the equivalent of only one primary turn, are limited in their application on low values of primary current. Below 200 amperes for time delay tripping and 150 amperes without time delay, they require careful consideration in their application. Such applications should be referred to the factory.

CONDIT OIL CIRCUIT BREAKERS

Type M-50

(Continued)



Type M-50, 3 Pole, Single Throw, 400 Amperes, 7,500 Volts, Full Automatic.

Electrical Operation. For electrical operation the type UC-30 Universal motor operator, for either A.C. or D.C. control, is furnished mounted in a water-tight housing with hinged cover. The type UC-30 is a high speed operator directly applied to the oil circuit breaker through a mechanism which may be either mechanically or non-mechanically trip free. It requires no rectifier. It will close the circuit breaker in approximately 8 cycles.

The type UC-30 may be furnished for either A.C. or D.C. tripping. Space is provided for 3 trip coils with or without time delay and a shunt trip coil if desired. An undervoltage attachment, self-resetting, for instantaneous or time delay may also be furnished. (When furnished not more than three trip coils can be used).

Standard operating voltages may be 220 volts A.C., 25 60 cycles, or 125 volts D.C.

Automatic Throw-Over Service. Because of the high speed characteristic of the type UC-30 motor operator, the M-50 is especially suitable for automatic throw-over service. Throw-over equipment consists of two motor operated type M-50 circuit breakers and necessary relays. The relays are mounted inside the control housings of the breakers so that the equipment is in two compact units. Throw-over time of from 10 to 18 cycles can be obtained, depending upon system conditions and class of service.

Type M-50 Service Restorer. The type M-50 Service Restorer is an outstanding application of the type M-50 combination with the UC-30 motor closer and type A-5 reclosing relay for automatic reclosing service.

It is an extremely compact reclosing equipment, built and mounted as a unit. In spite of its size, it offers the usual time intervals between reclosures with provision for lockout at two or more openings. Provision for the first reclosure to be instantaneous may be included at additional charge. The instantaneous feature may be cut in or cut out at will.

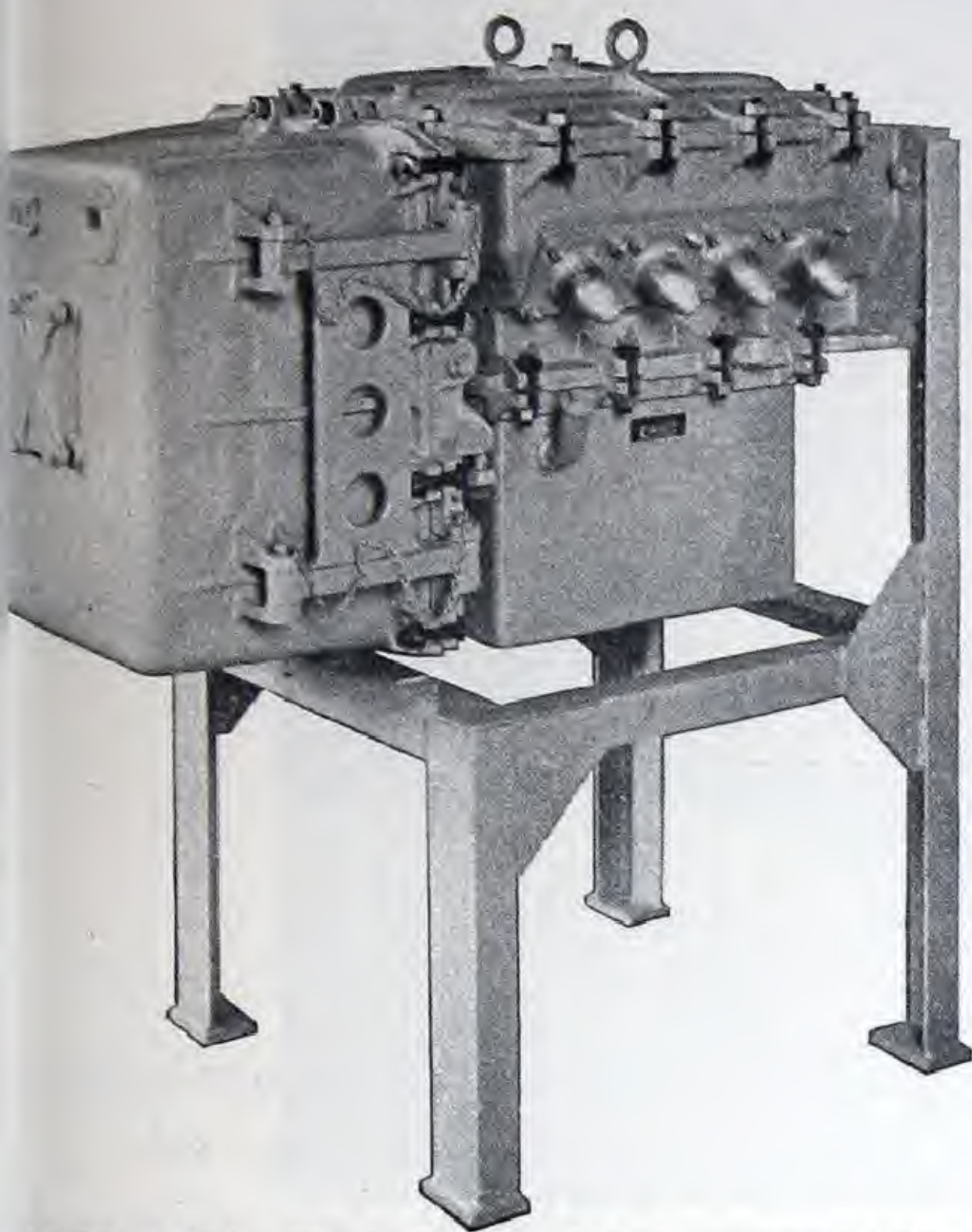
The type M-50 Service Restorer may also be arranged without a reclosing relay but suitable for a single instantaneous reclosing and lockout.

The reclosing equipment is mounted in the same watertight housing as furnished for electrically operated breakers.

The type A-5 reclosing relay is much smaller than conventional relay of this type. It consists essentially of a small motor of shaded pole type, operating through a reduction gear unit to a timing drum. The first timed reclosure may be any time from five seconds up. Subsequent time reclosures may be arranged at option of purchaser. The relay has lockout and bell alarm features.

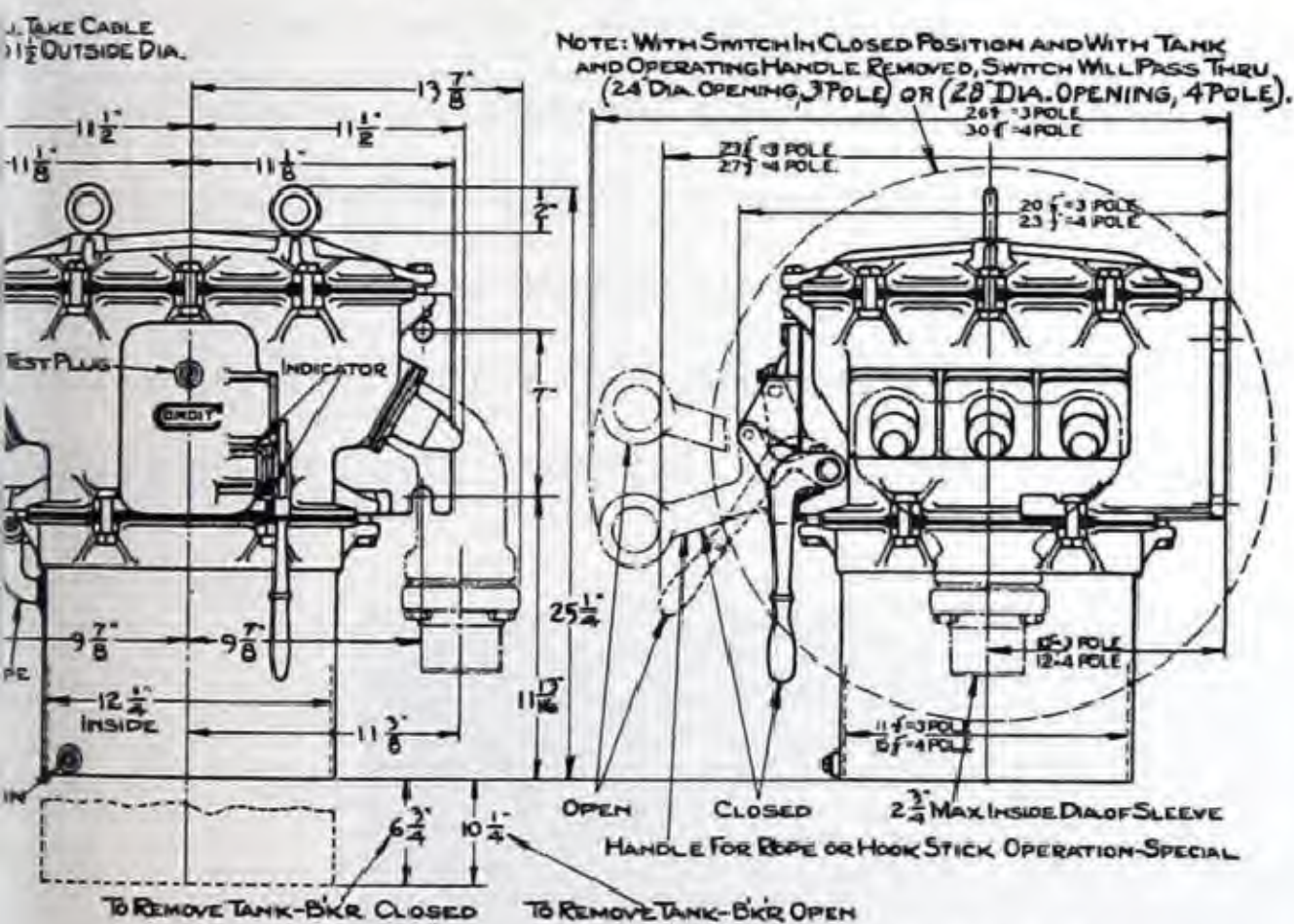
CONDIT OIL CIRCUIT BREAKERS

Type M-50
(Continued)

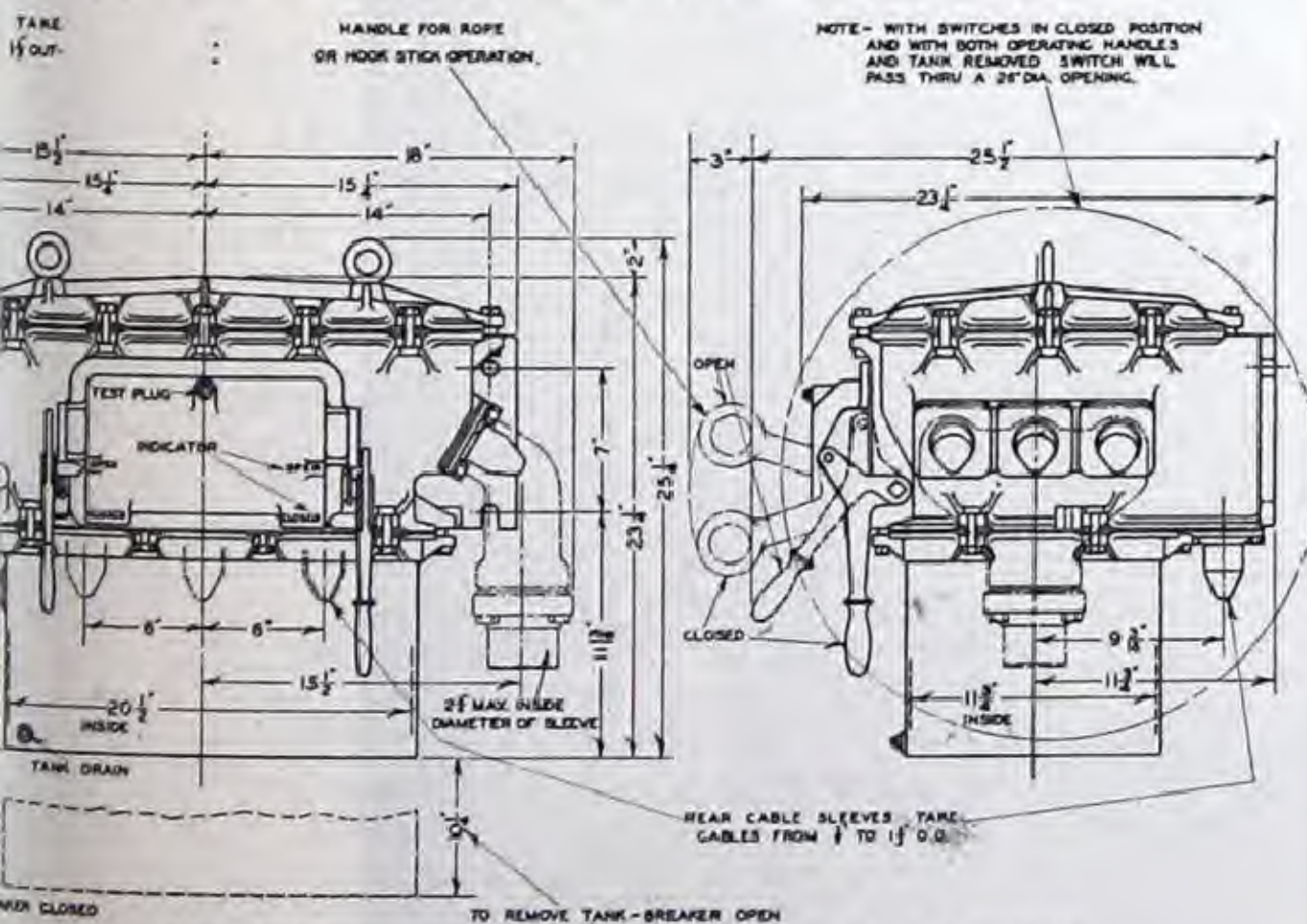


M-50, 4 Pole, Single Throw, 200 Amperes, 7500 Volts, Motor Operated on Special Mounting Framework.

DIMENSIONS
TYPE M-50 SUBWAY OIL SWITCHES
Manually Operated Non-Automatic
For Reference Only



Type M-50 Single Throw Subway Oil Switch



Type M-50 Double Throw Subway Oil Switch

CONDIT OIL CIRCUIT BREAKERS

Type M-50

SUBWAY OIL DISCONNECTS AND CIRCUIT BREAKERS

Flat Surface Mounting—Non-Automatic—Manually Operated
(Single Conductor Cable Sleeves)*

Type	Rated Volts	Rated Amps.	Gals. Oil 2 & 3 Pole
M-50	7500	200	5½
	7500	400	5½
M-50	7500	200	9
	7500	400	9

Type	List Price	Two Pole App. Wgt. in Lbs.	List Price	Three Pole App. Wgt. in Lbs.	List Price	Four Pole App. Wgt. in Lbs.
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Single Throw						
M-50	113.00	330	122.00	360	200.00	425
M-50	127.00	355	137.00	385	220.00	455

Double Throw						
M-50	\$226.00	590	\$244.00	630	On application	
M-50	254.00	615	274.00	655	On application	

Type M-50. Price includes cable sleeves for single conductor cable, cable terminals, oil. (Cable sleeves are cones ranging from 1½" to 1½" inside dia.)

*For additional price for multi-conductor cable sleeves see below.

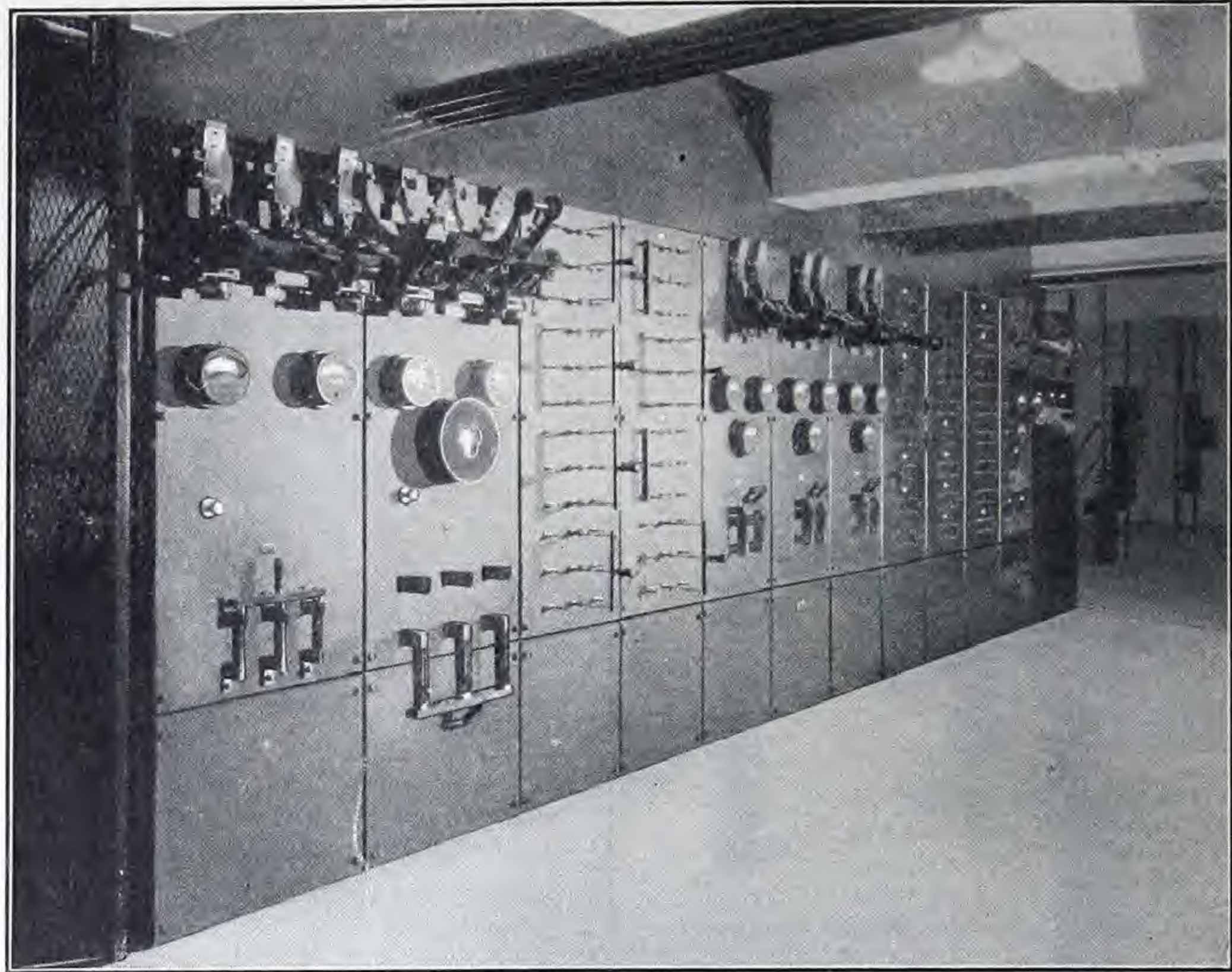
ATTACHMENTS AND ACCESSORIES

For Motor Operated, Automatic Throwover and Automatic Reclosing Oil Circuit Breakers. Price on application.

Description	Approx. Ship. Wgt.	List Price
Automatic front with one instantaneous type transformer trip coil (has provision for four coils) and necessary equipment to make switch automatic.....	400	\$110.00
Additional trip coils, each.....	3	6.00
Time delay trip coil, each.....	10	11.00
**Bushing type current transformer, single ratio.....	1 transformer 15 2 transformers 30 3 transformers 45	20.00 40.00 80.00
Instantaneous undervoltage attachment.....	110 volts 7 220 volts 7 440 volts 7 550 volts 7	31.00 31.00 31.00 31.00
Time delay undervoltage attachment.....	110 volts 8 220 volts 8 440 volts 8 550 volts 8	62.00 62.00 62.00 62.00
Tank guide rods.....	5	7.00
Oil gauge.....	..	4.00
Multi-conductor cable sleeve (cable sleeves are cones ranging from 1½" to 2¾" inside dia.) both sides.....	60	18.00
Frame.....	75	50.00

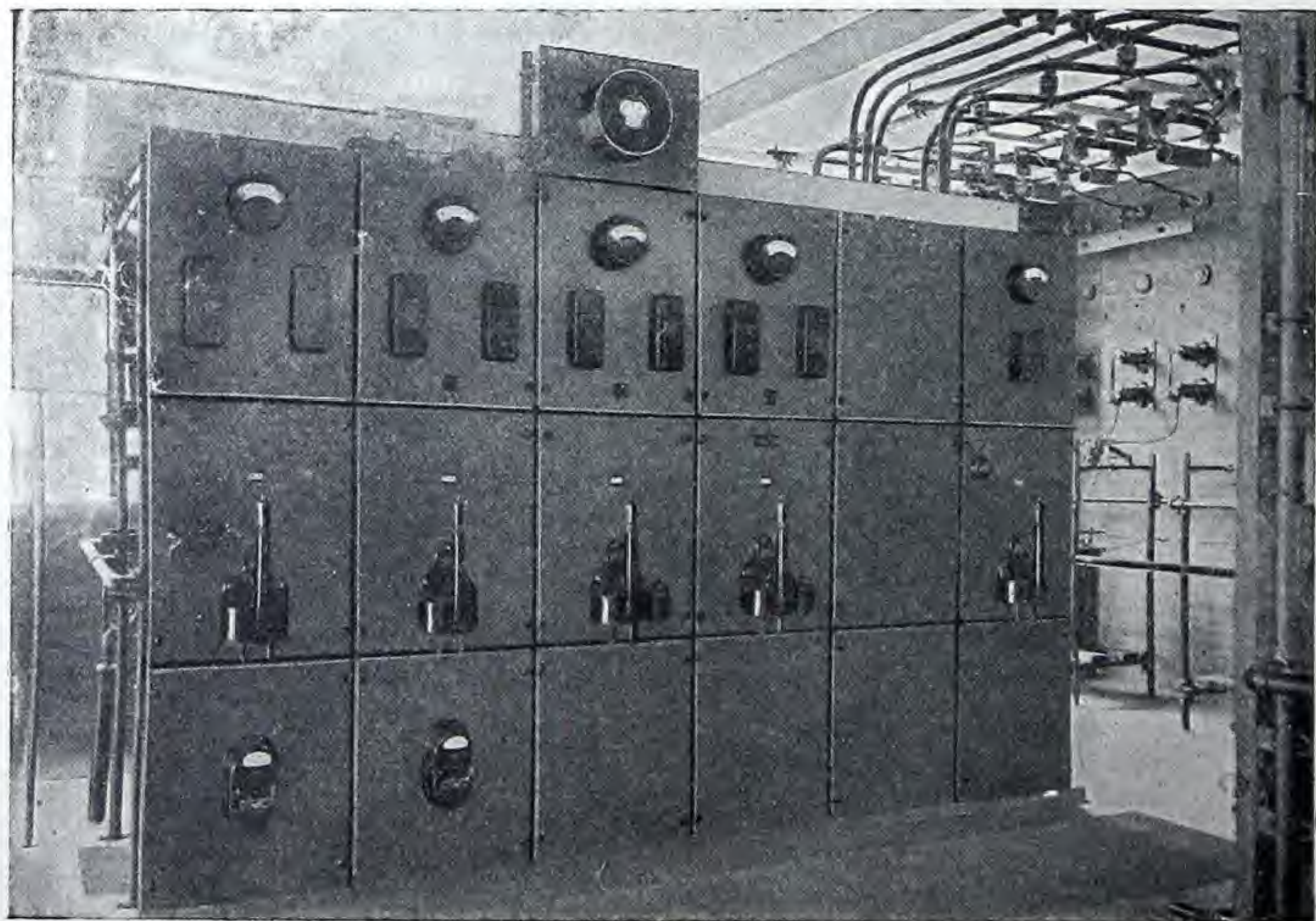
**Bushing type current transformers having only one primary turn are limited in their application on low values of primary currents. For applications below 200 amperes, refer to factory.

POWER SWITCHBOARDS

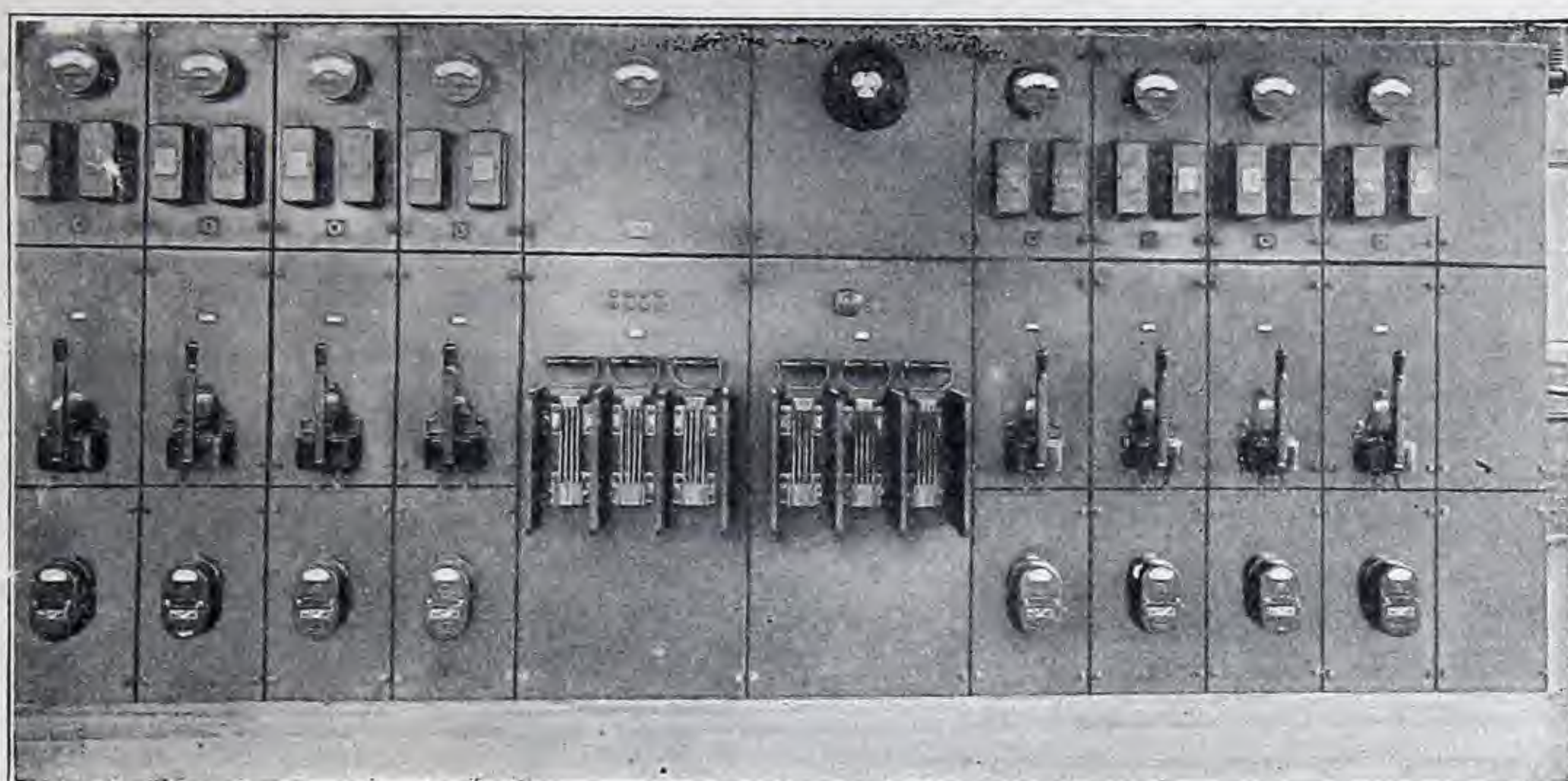
**Power Switchboards**

Several representative power switchboards are illustrated in these pages, namely "A six-panel substation switchboard," "A twelve-panel power and light control switchboard for a large steam railway terminal station" and "A twelve-panel distribution switchboard." A very large number

of power switchboards have been furnished including some very extensive applications and we are in a position to build switchboards to meet various exacting requirements. Every switchboard can be supplied from the small individual control board to the very largest station switchboard.



POWER SWITCHBOARDS



A Typical Distribution Switchboard

is out of the question to give a standardized
g of this apparatus because almost every
hboard has some individual requirement of
n or modification over previous designs.
fications or requirements will be given care-
consideration and suitable switchboards

designed to meet these conditions and quotations
made with reasonable promptness.

The great importance of the performance of the
apparatus and instrument equipment is given
particular consideration and equipment of out-
standing merit is used to ensure the greatest
degree of accuracy and dependability.

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given
through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.
Motor Controls.

Condit Electrical Mfg. Corp.
Oil Circuit Breakers.

Ferranti Electric Ltd.
Transformers, Surge Absorbers.

J. P. Tubular Heater Co.
Electric Heating Systems.

Sangamo Electric Limited,
Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,
Cutouts and Disconnects.

Telegraph Condenser Co.
Power Static Condensers.

Weston Electric Instrument Corp.
Indicating Instruments of all kinds.
Radio Test Equipment.

Mather & Platt Ltd.
Motors and Generators, All Types,
A. C. and D.C. Complete line of
Centrifugal Pumps.

A. Reyrolle & Co. Limited.
Metal Clad Switchgear.

Ilg Electric Ventilating Co.
Ventilating Fans and Blowers.

REYROLLE METAL CLAD SWITCHGEAR

The enormous increase in the capacity of power stations and the interconnection of supply systems make the problem of safe and adequate control one of ever growing importance. The greater demand for electric power has brought with it a corresponding complication in the plant to be handled by the operating departments of power companies, and this in itself has increased the difficulty of securing freedom from technical faults. Even with the most highly skilled staff occasional inadvertent mishaps may cause interruption of supply and other serious dislocations, and it is therefore becoming more and more essential to adopt the only sound policy of using gear that is as mistake-proof as it can possibly be made.

Switchgear of the metal-clad type developed by A. Reyrolle & Company Limited, Hebburn-on-Tyne, England, has been so widely recognized as offering the completest security yet achieved against accidents, mistakes, failure of service, and loss of life, that experienced engineers responsible for the design and lay-out of the most important power stations in Great Britain and Ireland, in the Dominions and the Colonies, and in Europe and the East, have no hesitation in preferring it to all other types.

This switchgear is in successful use at present for voltages up to 132,000, and is built in various sizes up to 1,500,000 Kva rupturing capacity. All the conductors, including the bus-bars, are adequately insulated and completely enclosed in grounded metal enclosures, and the spaces between them and the inside walls of the enclosures are completely filled with solid insulating compound or oil. The switchgear is made up in self-contained units capable of being built together into complete switchboards, and each unit has amongst its integral parts essential accessories such as current transformers, potential transformers, dividing boxes to take incoming and outgoing cables, and disconnecting devices. Interlocks are provided to make a wrong sequence of operation impossible, and, generally, the construction is such as to prevent anyone from touching a live conductor accidentally, or from coming within arcing distance of it.

All live parts are completely protected against contact with any foreign substance, or with insects, vermin, or other animals. The possibility of short circuits between conductors, or faults between a conductor and earth, is reduced to an absolute minimum, but even if one should occur its effects are limited and confined to its immediate neighbourhood, so that all spreading of the arc and damage to adjacent equipment is prevented. Since there are no cells or compartments for transformers or disconnecting switches, or for separating the phases from each other, there is no throwing out of hot gases, flame, or hot oil. The interlocking devices provided, as already mentioned, to prevent all chance of error in the handling of Reyrolle switchgear by making a wrong sequence of operation impossible, are, in addition, so designed and constructed that it is equally impossible for the switchgear to become locked in such a way as to prevent its proper operation.

The switchgear is made up in self-contained units capable of being built together into complete switchboards, and each unit has amongst its integral parts essential accessories such as current transformers, potential transformers, dividing boxes to take incoming and outgoing cables and disconnecting devices.

REYROLLE METAL CLAD SWITCHGEAR

COST

The cost of Reyrolle switchgear should not be compared with that of ordinary circuit-breakers or ordinary switch panels. Such a comparison is obviously an unfair one for the reason that in Reyrolle metal-clad installations the bus-bars, the current transformers, the potential transformers and the disconnects are all incorporated in the design. Furthermore, building costs are very much reduced in Reyrolle installations because of the extraordinary compactness of the gear. All cell structures for transformers, disconnects, etc., or for the separation of bus-bars, are eliminated. The switch-house resolves itself into a simple shelter for the metal-clad gear.

SUMMARY OF PROMINENT POINTS

Some of the advantages obtained by using Reyrolle switchgear are as follows:

1. Human life is safeguarded.
2. Property is protected against damage.
3. The plant is exceedingly compact.
4. Overall initial expenditure on plant and buildings is small.
5. Erection is easy and inexpensive.
6. Operation is simple and low in cost.
7. The possibility of error in operation is negligible.
8. Continuity of service is secured.
9. Maintenance expenses are small.

In order to protect human life it must be impossible for anyone to make accidental contact with, or come within arcing distance of, a live conductor. In a complete Reyrolle metal-clad switchgear installation, no live conductors are exposed or accessible at any point. All the conductors, including the bus-bars, are enclosed within substantial grounded metal coverings, and these coverings are such as to prevent the throwing out of flame or the escape of gases in quantities at points where mixture with the surrounding air might result in an explosion.

RUPTURING CAPACITIES

Up to 1,500,000 Kva.

VOLTAGE RATINGS

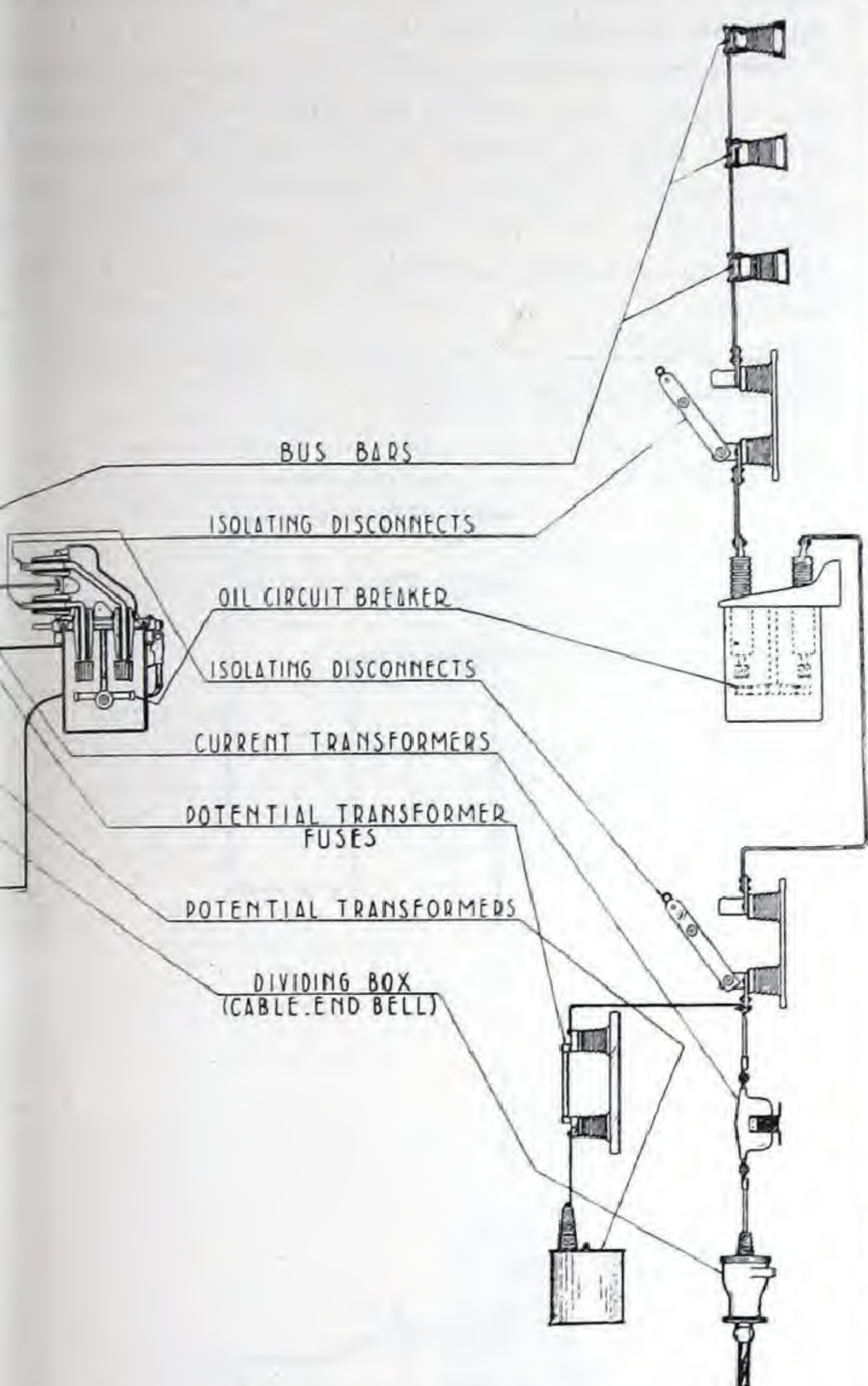
Up to 132,000 Volts.

CURRENT RATINGS

Up to 4,000 Amperes.

REYROLLE METAL CLAD SWITCHGEAR

Horizontal Drawout Switchgear



Horizontal Draw-Out Switchgear.

I. GENERAL DESCRIPTION

A unit of Reyrolle switchgear installations is a three-phase circuit-breaker with its mountings and all accessories. The unit contains within itself the main oil-immersed circuit-breaker, bus-bars, disconnecting devices, instrument transformers, cable dividing boxes, and all necessary minor fittings. The live conductors included in this assembly are either immersed in oil or solidly embedded in insulating compound, the whole is enclosed within earthed metal casings, which form the exterior covering.

Operation is provided by the withdrawal in a horizontal position of the oil-immersed circuit-breaker, automatic locking-off doors being provided to cover the orifices. Cooperation is ensured by positive mechanical interlocks.

The component parts of each unit may conveniently be grouped, for descriptive purposes, under two headings:—

1. The fixed portion, which incorporates the bus-bars, the instrument transformers, the cable dividing boxes, and the supporting framework.
2. The removable portion, which includes the oil-immersed circuit-breaker and the necessary operating mechanism.

II. FIXED PORTION

1. Bus-bars:

The three bus-bars are of high-conductivity laminated copper adequately insulated and solidly compounded into a single metal chamber.

Cast in one with the bus-bar chamber are three tubular projections housing the main isolating sockets, which are deeply recessed into the supporting orifice bushings and are connected to their respective bus-bars by laminated copper strip.

Each bus-bar chamber is completely erected to jig in the factory, and solidly filled with insulating compound before dispatch.

Mechanical stresses produced in the bus-bar assembly by short-circuits in the supply system are definitely provided against, each bar being adequately supported by substantial insulating separators.

When duplicate bus-bars are required, two similar chambers are provided in each panel, mounted one above the other, and it is possible, in ways described later, to connect the circuit-breaker to one or the other set of bus-bars.

An indicator is fitted to show which set is in use.

When two or more units are erected in line to form a continuous switchboard, inter-unit bus-bar connections are made by means of copper straps interleaved with the bus-bar laminations and bolted up solidly. Enclosure of these connections is effected by means of compound-filled steel band joints.

REYROLLE METAL-CLAD SWITCHGEAR

Horizontal Drawout Switchgear

2. Transformer Chamber:

The transformer chamber is normally mounted below the bus-bar assembly and carries a set of tubular orifice insulators and isolating sockets similar to those fitted in the bus-bar chamber.

The current transformers are mounted in the main body of the chamber, which is compound-filled. The primary conductors extend through insulators in the chamber into the cable dividing box.

When required, a potential transformer is mounted in front of the current transformer chamber and housed in an oil filled sheet-metal case. Primary connections to the potential transformer are made by means of plug-type dust-filled fuses enclosed in separate receptacles. These fuses make connection with the cable side of the panel, and their removal entirely isolates the potential transformer from the system. They are of the resistance type and are fully capable of dealing with any faults that may occur in the potential transformer.

3. Cable Dividing Box:

The in-coming and out-going cables terminate in cast-metal dividing boxes bolted to the underside of the transformer chambers. Each box is split vertically, and is of ample size to allow the necessary connections to be conveniently made. At the bottom of it there are brass universal glands to which the lead cable coverings are attached by means of a plumbed joint. When armoured cable is used, clamps are supplied to bond and finish off the ends of the armouring.

4. Framework:

The component parts of the unit are carried on two massive side standards. The upper faces of these, which are machined, provide a track for the rollers carrying the oil-immersed circuit-breaker. Easy movement during the process of withdrawal is secured by means of a hand-lever attached to the top plate and operating through a ratchet and pinions engaging with racks fixed to the frame standards.

5. Locking-Off Doors:

To prevent accidental contact with live conductors, the orifice mouths of the bus-bar and transformer chambers are fitted with automatic doors arranged to cover the orifices completely when the circuit-breaker is racked out. On its replacement, the doors open and fold into the space between the chambers. The motion is transmitted from the circuit-breaker to the doors through brass rods operating in guide tubes and turning blocks. Padlock plates are fitted to allow the doors to be definitely secured in the closed position, and so to protect any men who may be working on the cables, should the circuit be accidentally reconnected.

III. REMOVABLE PORTION

The three-phase oil-immersed circuit-breaker is built as one complete unit with a single-heavy steel tank supported from a cast steel top plate.

Above the top plate there are three hoods through which the main conductors pass from the fixed contacts in the tank to the plug disconnects engaging with the sockets already described in the section dealing with the fixed portion of the gear.

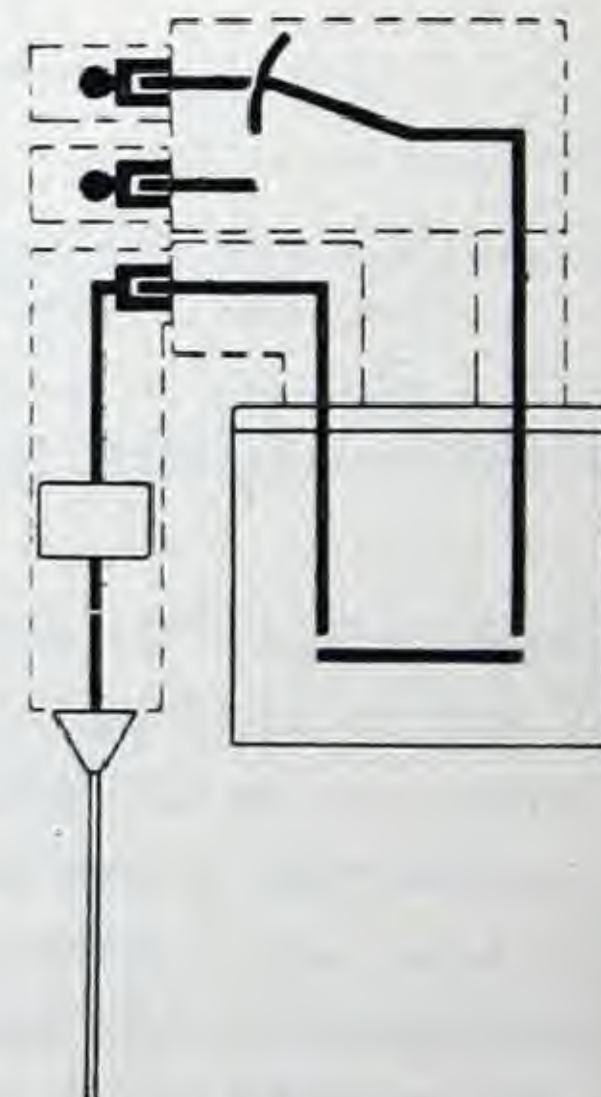
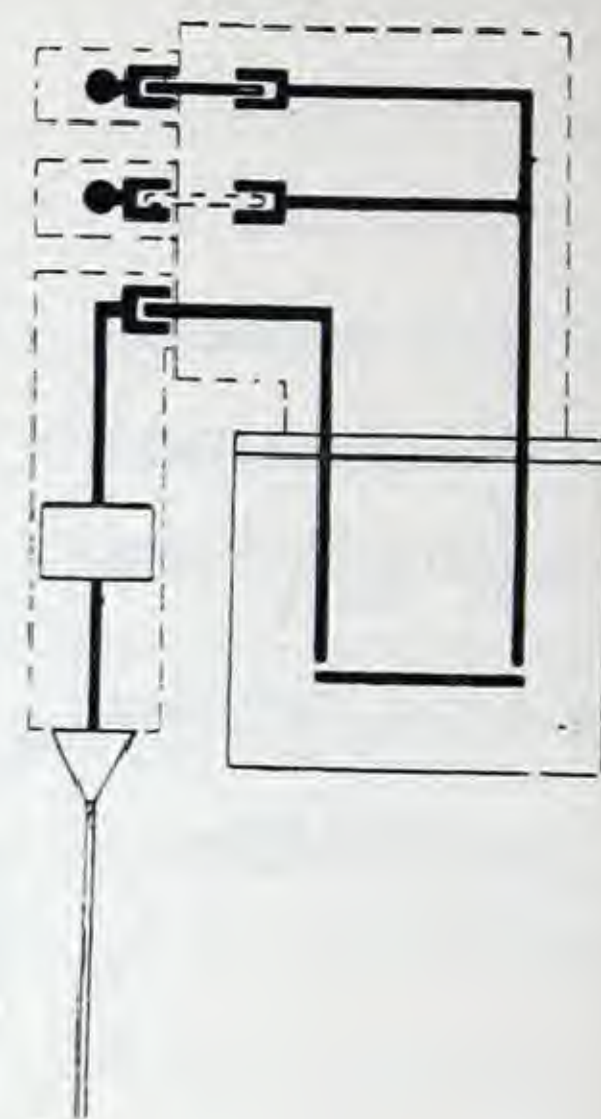
The operating mechanism forms a complete unit and is mounted on the top plate of the circuit-breaker, the necessary electrical control connections being made through secondary sockets and plugs attached to the fixed and moving portions respectively.

REYROLLE METAL-CLAD SWITCHGEAR

Horizontal Drawout Switchgear

The coupling members between the operating mechanism and the moving contacts are mounted in two insulating tubes, which also house powerful kick-off springs to accelerate the initial opening movement of the switch contacts. dash-pots are also fitted to come into operation towards the end of the travel and bring the moving parts to rest without injurious mechanical shock.

The arcing contacts are of the finger type, well proportioned and sprung. Two breaks per phase in series are provided and the average velocity of the moving contacts is high. This, together with the great mechanical strength of the tank and supports, provides a rupturing capacity with a considerable factor of safety above the rated value, as has been fully corroborated by tests carried out at the Reyrolle short-circuit testing plant and by long experience of switchgear in actual operation on large systems.



The selection devices enabling the circuit-breaker to be connected to either set of bus-bars are simple and effective. The circuit-breaker is provided with one set only of removable plug contacts, which may be inserted in either the upper or the lower positions in the hoods, and thus connect to the desired set of bus-bars. Alternatively, selection can be obtained by oil-immersed change-over switches mounted in the hoods.

REYROLLE METAL CLAD SWITCHGEAR

Horizontal Drawout Switchgear

(Continued)

IV. GENERAL FEATURES

Interlocking:

Simple mechanical interlocks make it impossible:

1. To plug the removable portion in when the circuit-breaker contacts are in the closed position.
2. To close the circuit-breaker when the removable portion is not plugged fully in.
3. To withdraw the removable portion when the circuit-breaker contacts are in the closed position.
4. To remove the oil tank before the removable portion is withdrawn.

Other interlocks incorporated in each unit provide the following safeguards:

5. The racking-in attachment controls a locking bar, which, when the carriage is plugged home, automatically locks it firmly in position. The circuit-breaker cannot be closed until the lock is secure, and, once closed, the lock cannot be released until the circuit-breaker is reopened.
6. The withdrawal of the circuit-breaker for disconnecting draws the locking-off doors automatically over the orifices of the bus-bar and transformer chambers, thus keeping the conductors completely covered whether the removable portion is plugged in or withdrawn.
7. When the circuit-breaker is disconnected, the doors may be padlocked to prevent unauthorized handling. When men are working on the line this precaution affords valuable protection to life.

2. Instruments and Relays:

When it is desired that instruments and relays should be mounted on the metal-clad unit, an instrument bracket and a swing relay frame are provided. The former is carried above the bus-bar assembly and the latter is attached to the main frame standards below the circuit-breaker. The instruments and relays are back-connected, and the terminals and wiring are protected by sheet-metal covers. The swinging of the relay frame gives easy access to the wiring.

3. Secondary Wiring:

All external secondary wiring on the switchgear for metering, protective, and control circuits is enclosed throughout in metallic tubing and ducts.

Where a separate control board is provided, the secondary circuits are carried in a multicore cable. To receive this at the switchgear end, a dividing box with a terminal board protected by a sheet-metal cover is attached to the frame standard.

4. Manufacture:

To secure interchangeability, all parts are assembled in the factory in jigs built to a high degree of accuracy.

The standard unit construction greatly reduces the labour required on site for erecting the gear and putting it into commission.

Switchboards are built up complete in the factory, the main component parts being afterwards separated for dispatch. Erection on site thus involves only fixing the frame standards and bolting the transformer and bus-bar chambers to them, making inter-unit connections between the bus-bars, and attaching the cables.

METAL-CLAD SWITCHGEAR

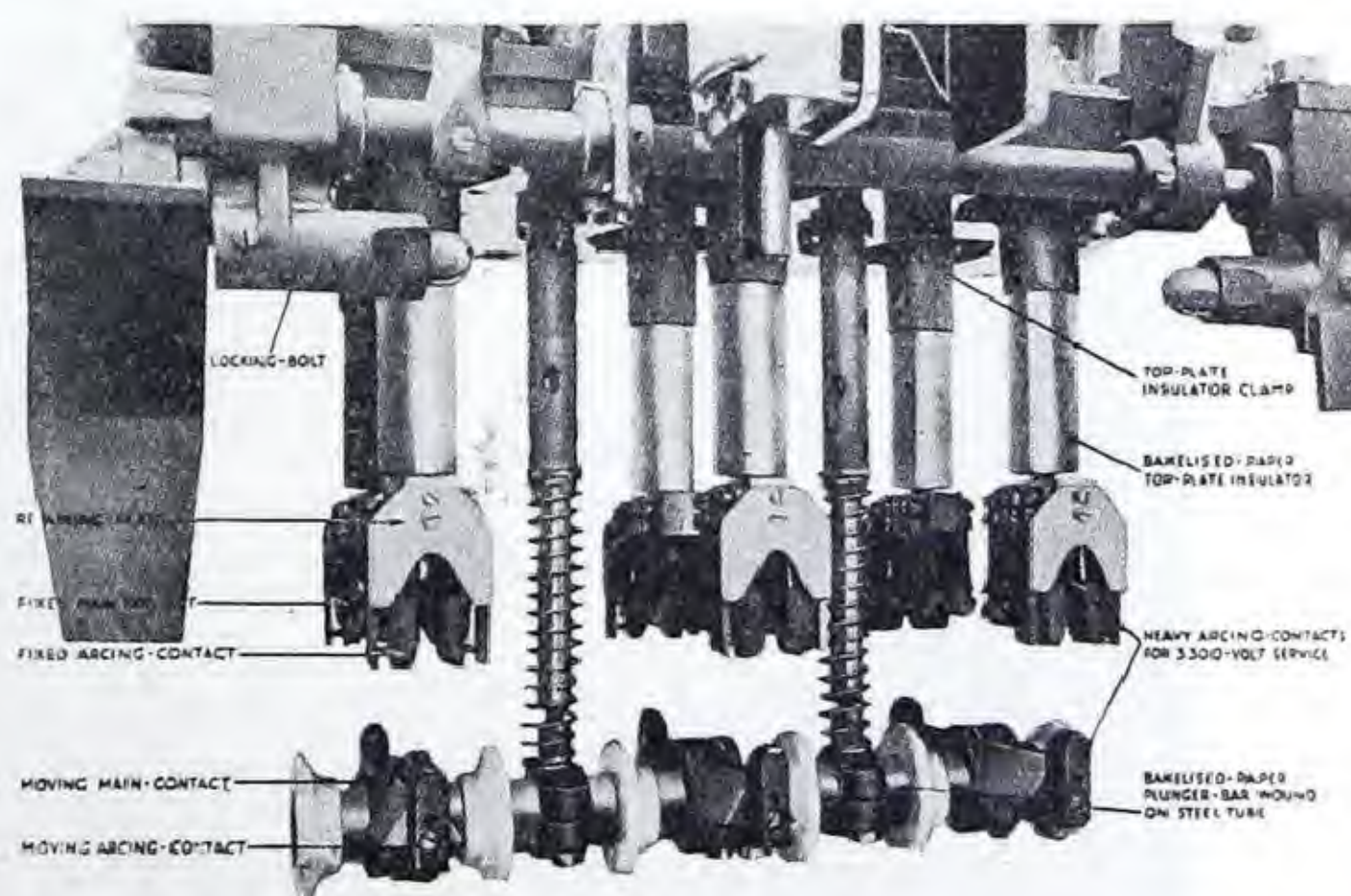
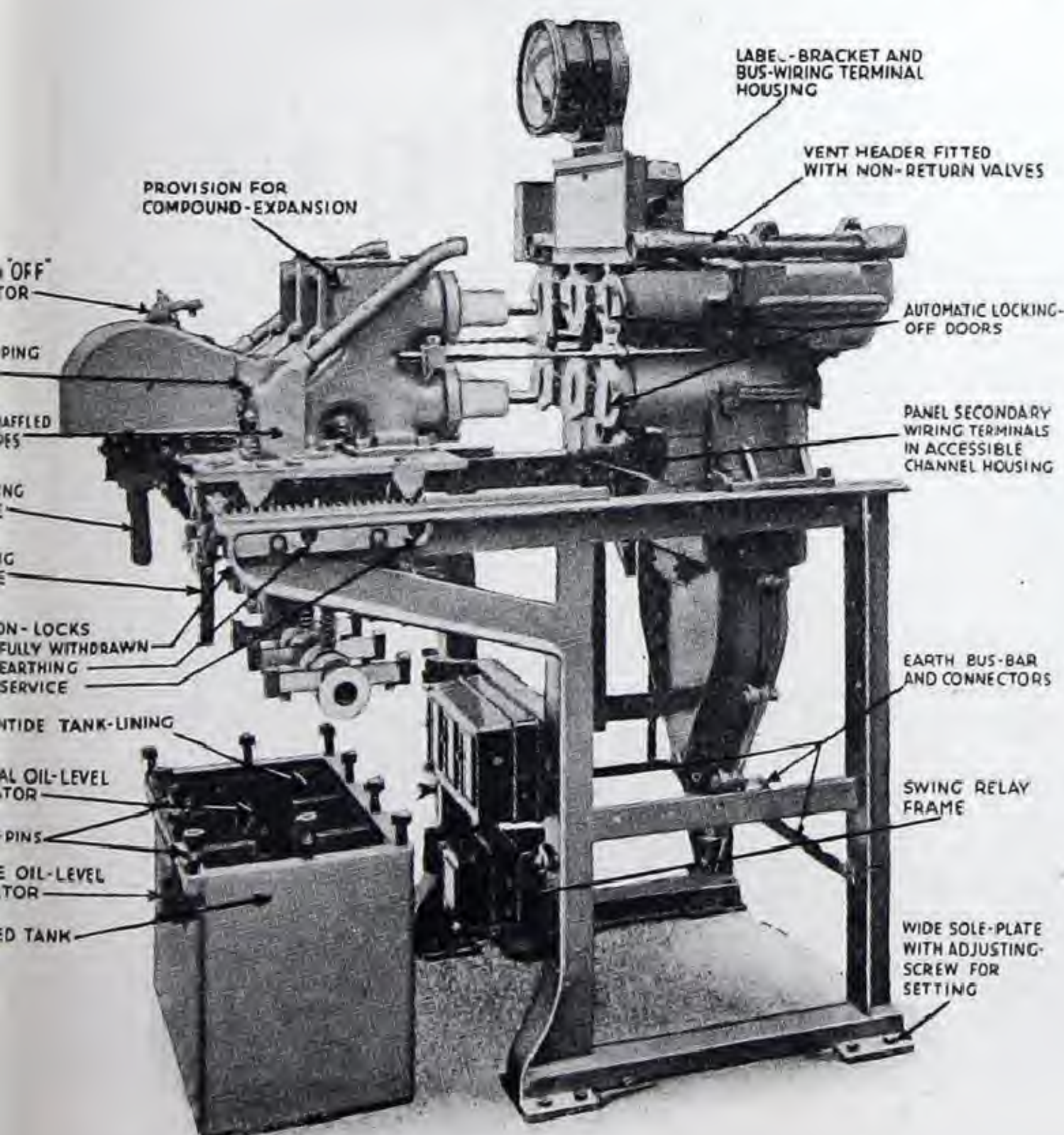
HORIZONTAL-DRAW-OUT TYPE

CLASS "C"

Up to 15,000 Volts

WITH COMPOUND-FILLED BUS-BAR CHAMBERS

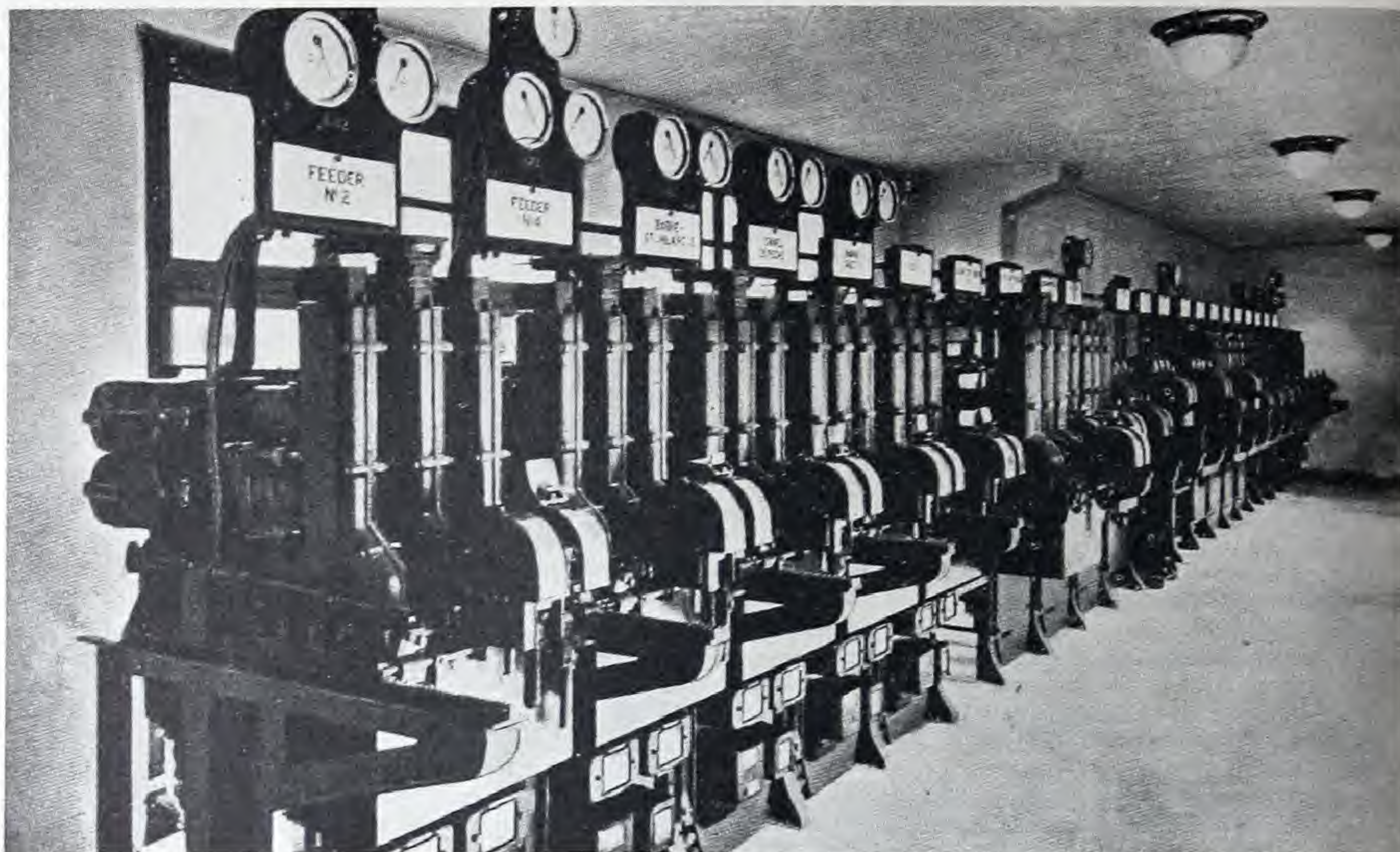
- Illustrated and described in pamphlet No. 382



Typical Class "C" Metal-Clad Drawout Switchgear.

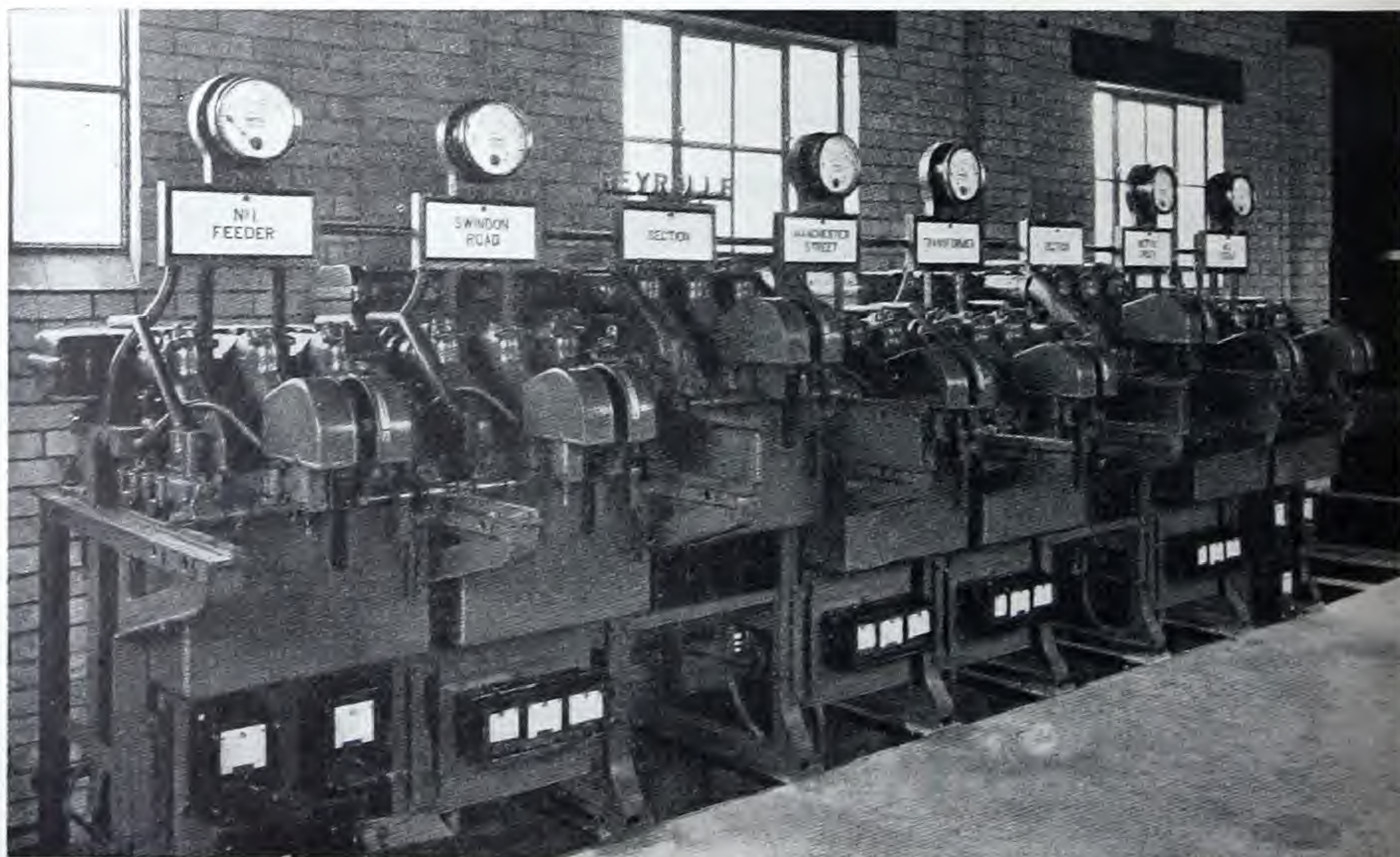
Typical Contact-Assembly of Class "C" Oil Circuit Breaker.

REYROLLE METAL-CLAD SWITCHGEAR
Type "C1" Metal-Clad Switchgear



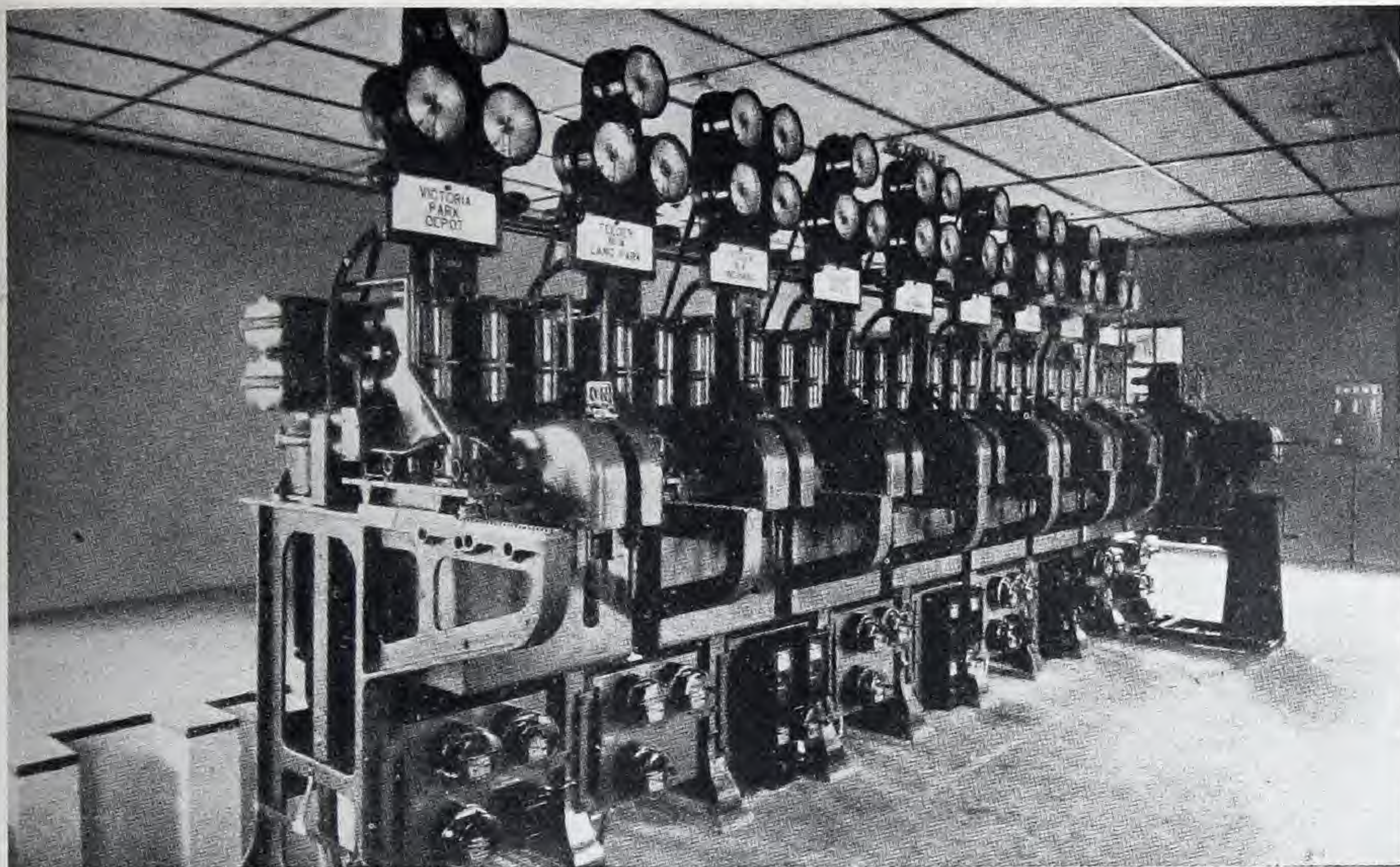
Rupturing Capacities up to 100,000 Kva.
Voltage Ratings up to 15,000 Volts.
Current Ratings up to 800 Amperes.

Type "C2" Metal-Clad Switchgear



Rupturing Capacities up to 150,000 Kva.
Voltage Ratings up to 15,000 Volts.
Current Ratings up to 800 Amperes.

REYROLLE METAL-CLAD SWITCHGEAR—Type "C3" Metal-Clad Switchgear



aturing Capacities up to 200,000 Kva. Voltage Ratings up to 15,000 Volts. Current Ratings up to 1,200 Amperes.

Horizontal-Draw-Out Type

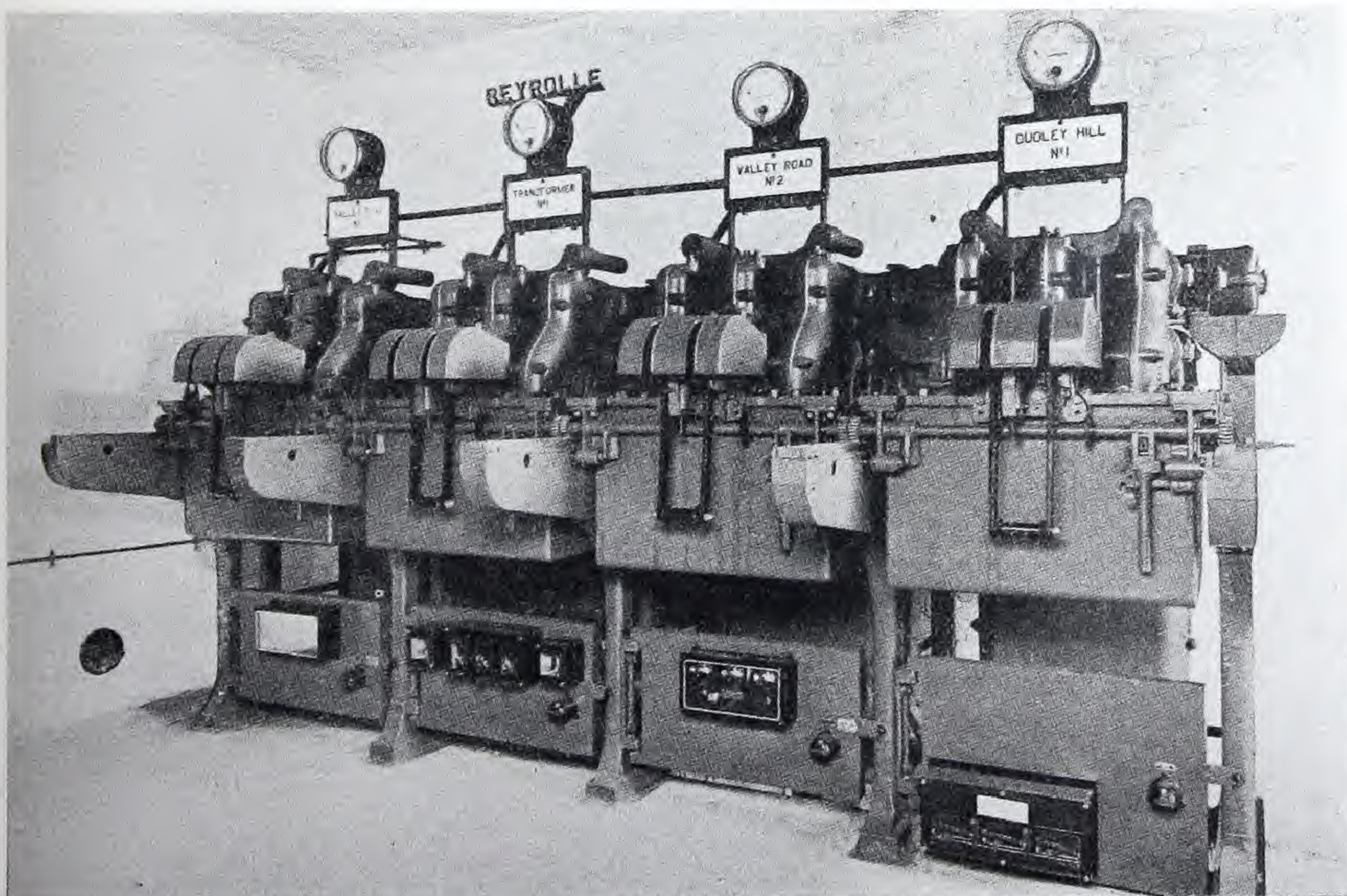
CLASS "B"

o 15,000 Volts.

With Compound-Filled Bus-Bar Chambers.

Illustrated and Described in Pamphlet No. 388.

Type "B2" Metal-Clad Switchgear

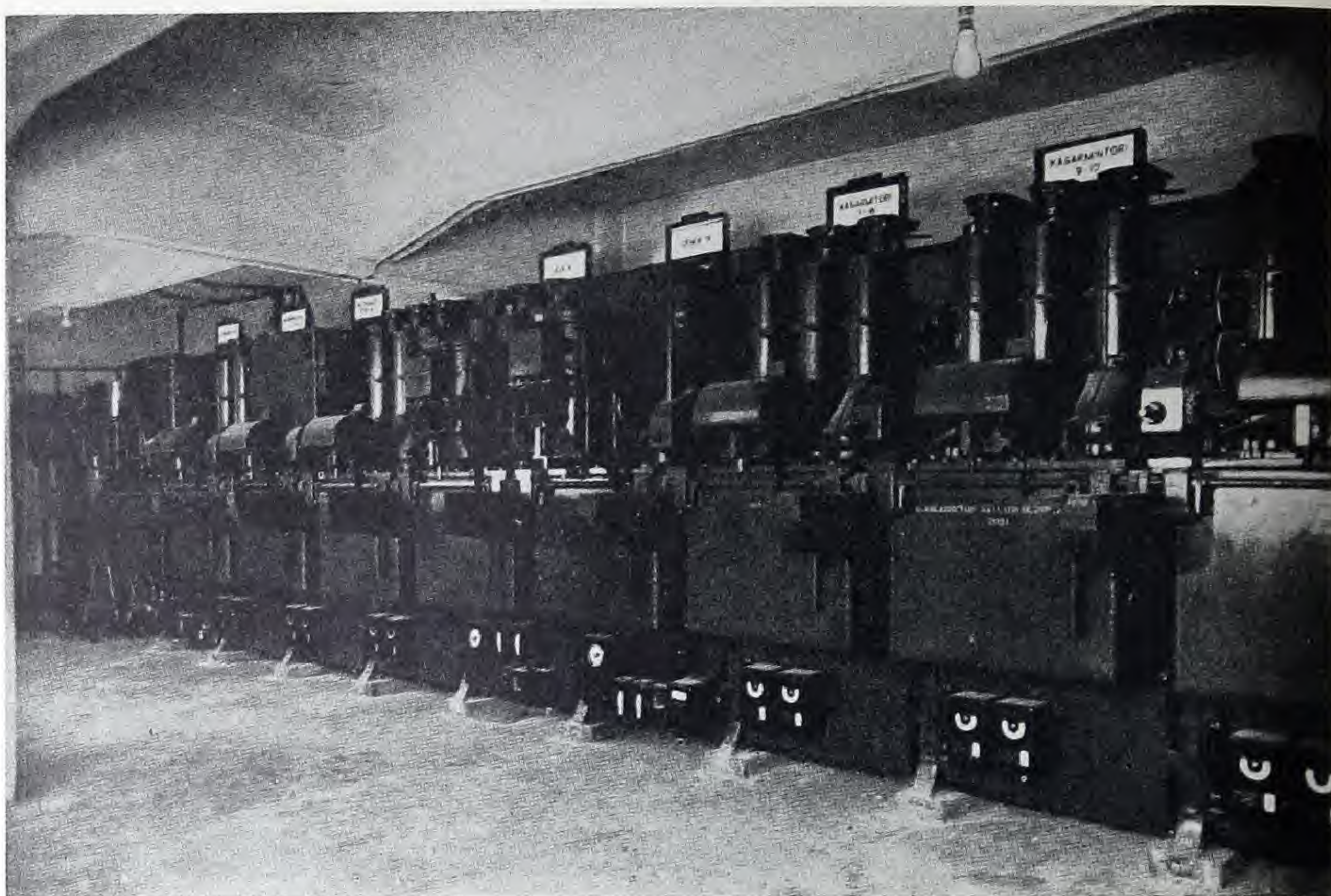


aturing Capacities up to 250,000 Kva.

Voltage Ratings up to 15,000 Volts.

Current Ratings up to 1,200 Amperes.

REYROLLE METAL-CLAD SWITCHGEAR—Type "B4" Metal-Clad Switchgear



Rupturing Capacities up to 350,000 Kva.

Voltage Ratings up to 15,000 Volts.

Current Ratings up to 2,000 Amperes

Horizontal-Draw-Out Type

Type "AFT" Metal-Clad Switchgear

CLASS "A" Up to 25,000 Volts. With Compound-Filled Bus-Bar Chambers Illustrated and Described in Pamphlet No. 31

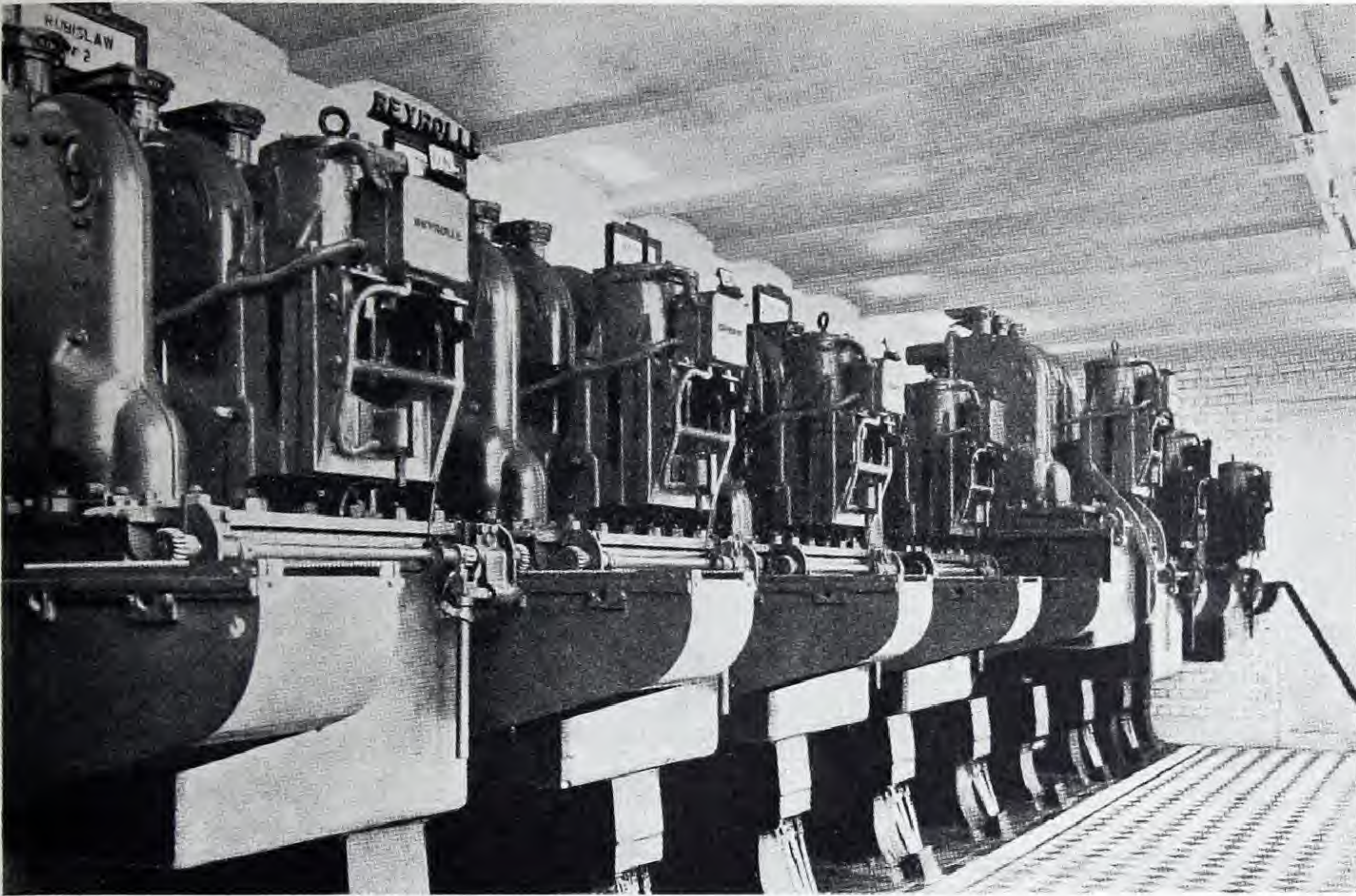


Rupturing Capacities up to 250,000 Kva.

Voltage Ratings up to 25,000 Volts.

Current Ratings up to 400 Amperes

REYROLLE METAL-CLAD SWITCHGEAR—Type “A4” Metal-Clad Switchgear

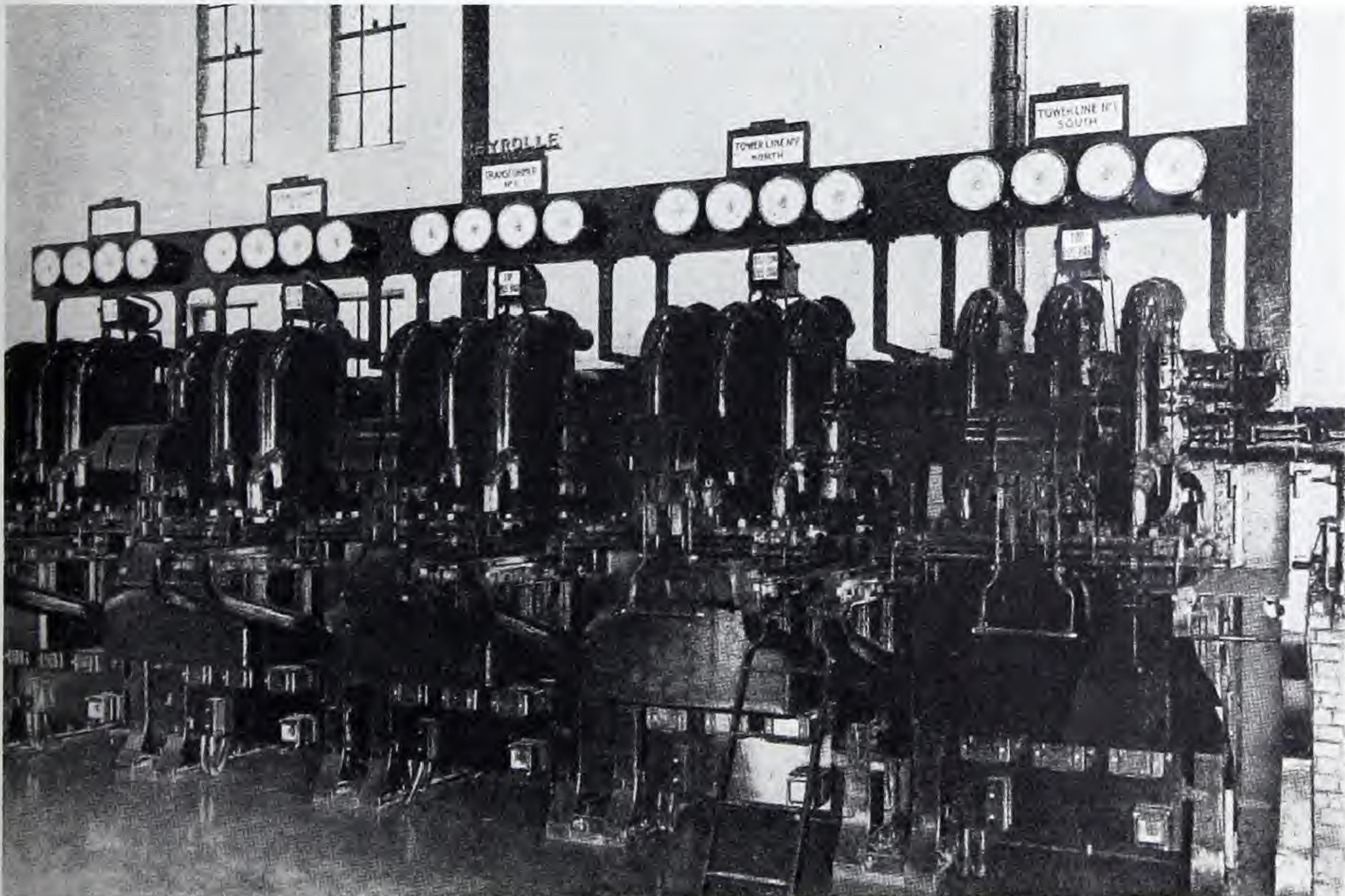


Storing Capacities up to 350,000 Kva.

Voltage Ratings up to 25,000 Volts.

Current Ratings up to 600 Amperes.

Type “A2” Metal-Clad Switchgear



Storing Capacities up to 500,000 Kva.

Voltage Ratings up to 25,000 Volts.

Current Ratings up to 2,400 Amperes.

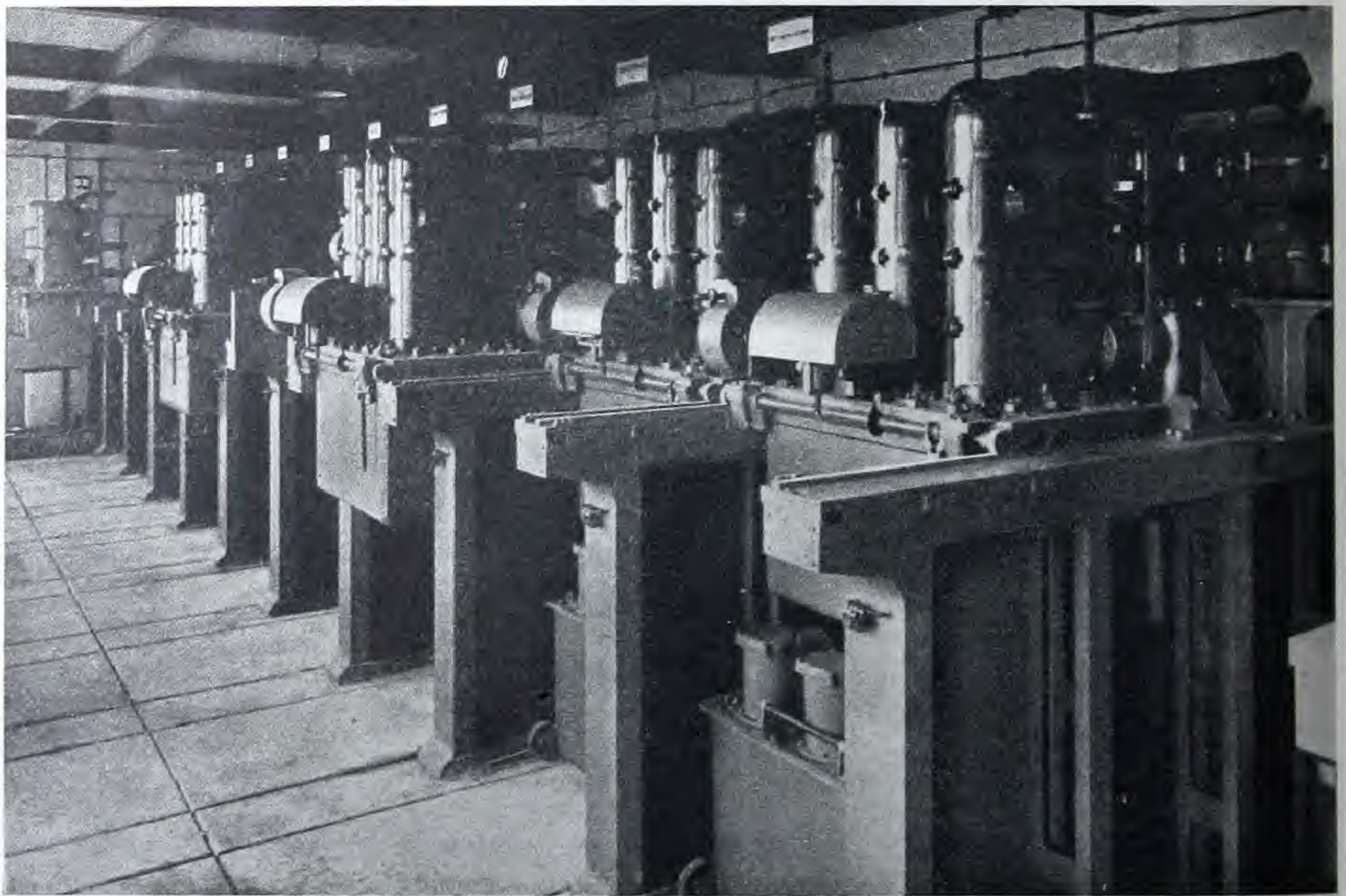
REYROLLE METAL-CLAD SWITCHGEAR**Horizontal-Draw-Out Type**

CLASS "AR"

Up to 37,000 Volts

With Compound-Filled Bus-Bar Chambers

Illustrated and Described in Pamphlet No. 721

Type "AR1" Metal-Clad Switchgear

Rupturing Capacities up to 500,000 Kva.

Voltage Ratings up to 37,000 Volts

Current Ratings up to 800 Amperes.

REYROLLE METAL-CLAD SWITCHGEAR—Horizontal-Draw-Out Type

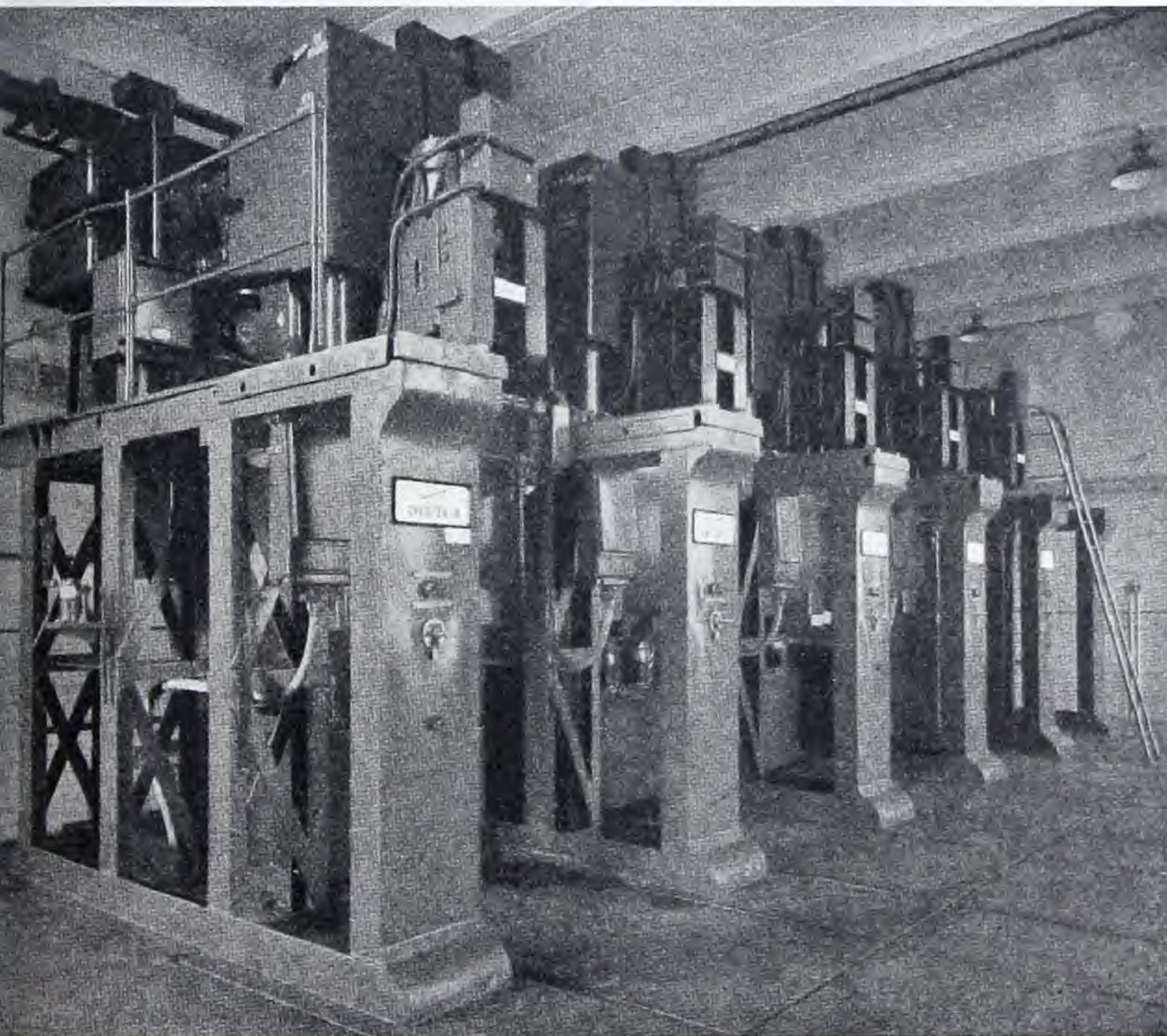
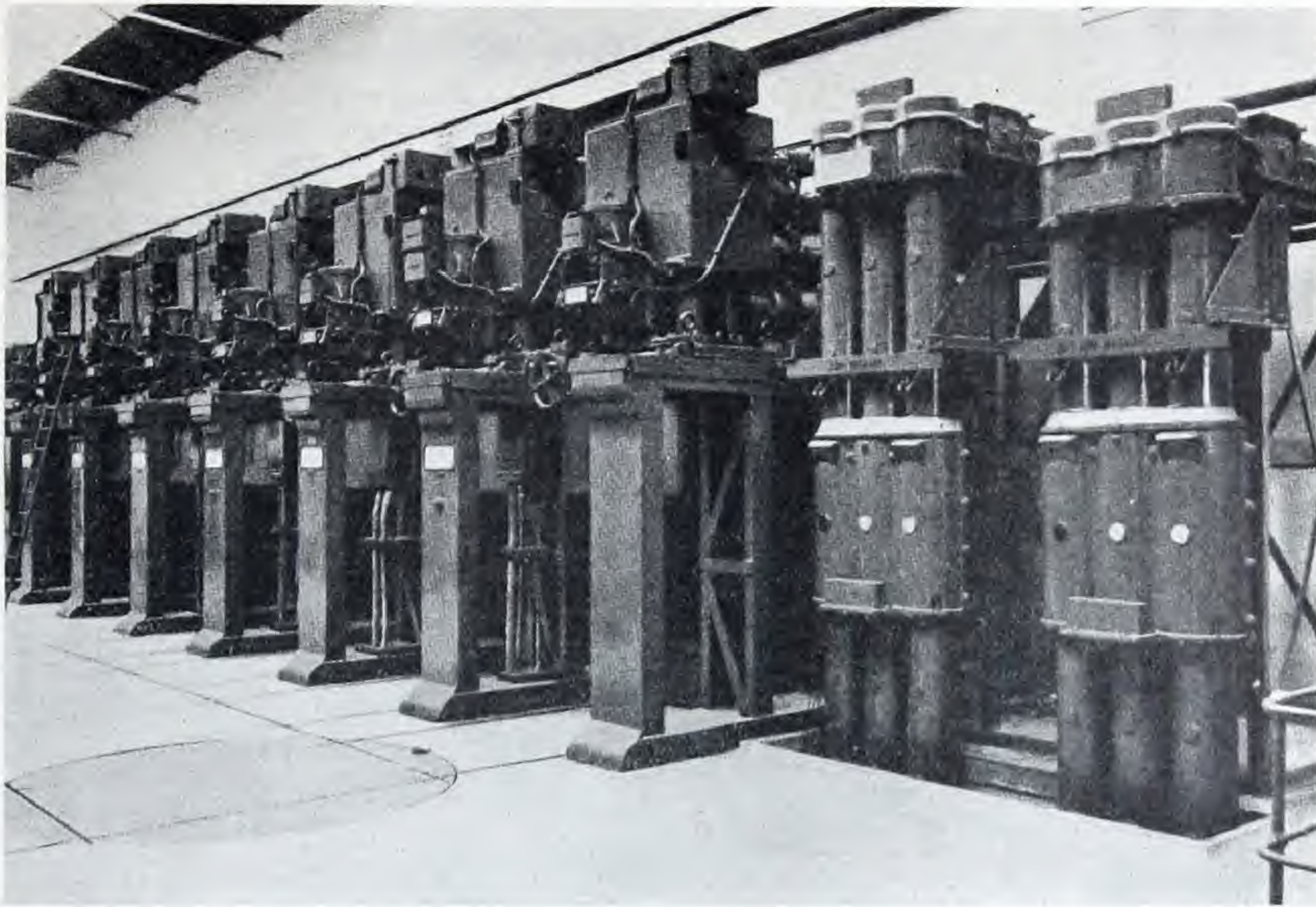
Interrupting Capacities up to 750,000 Kva. Voltage Ratings up to 15,000 Volts. Current Ratings up to 3,000 Amperes.

CLASS "R"
up to 37,000
Volts

With
Impound-Filled
Bus-Bar
Chambers

Illustrated and
described in
 pamphlet No.
 000

ype "R5"
etal-Clad
witchgear



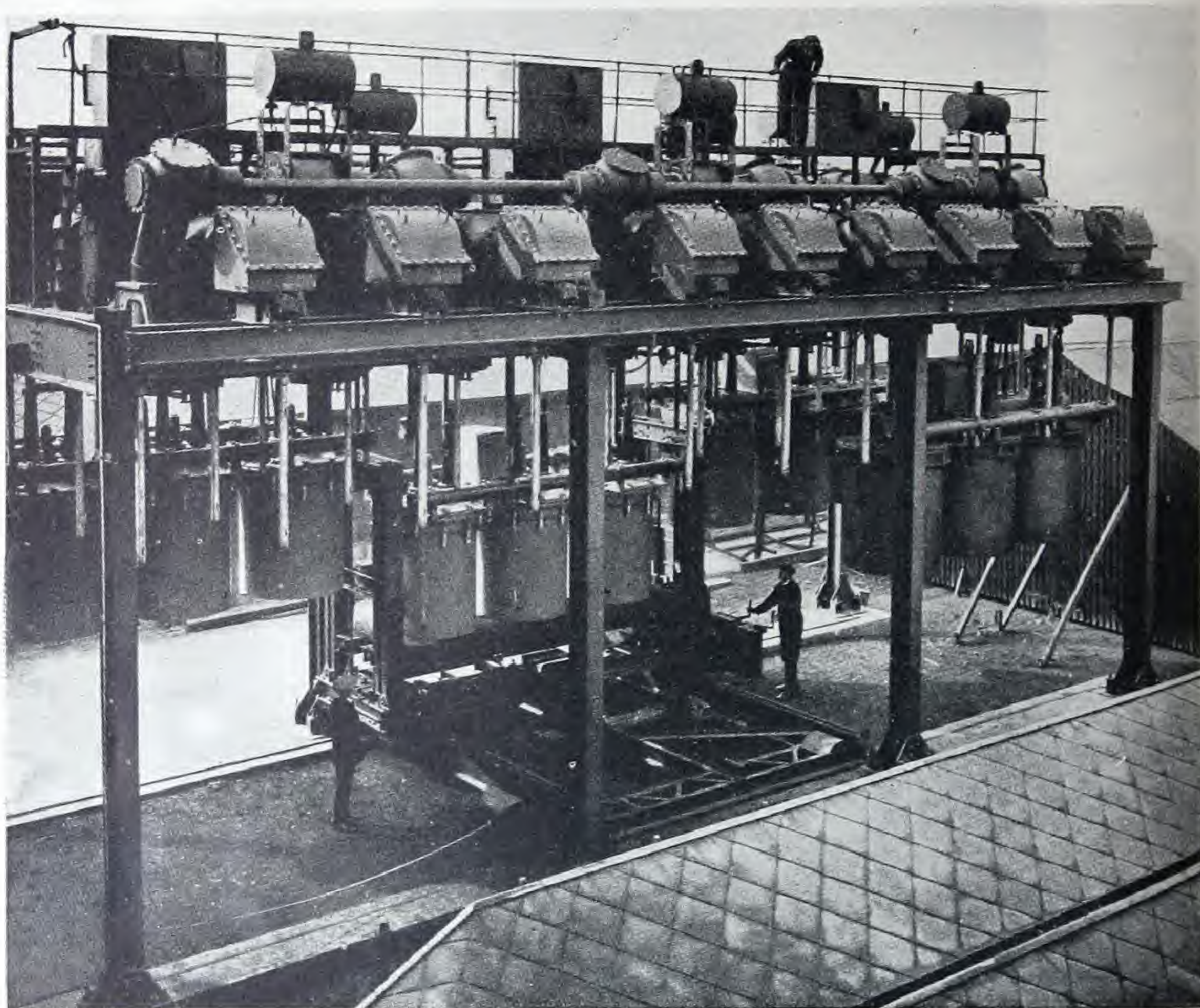
Type "RST"
Metal-Clad
Switchgear

REYROLLE METAL-CLAD SWITCHGEAR—High Voltage Type

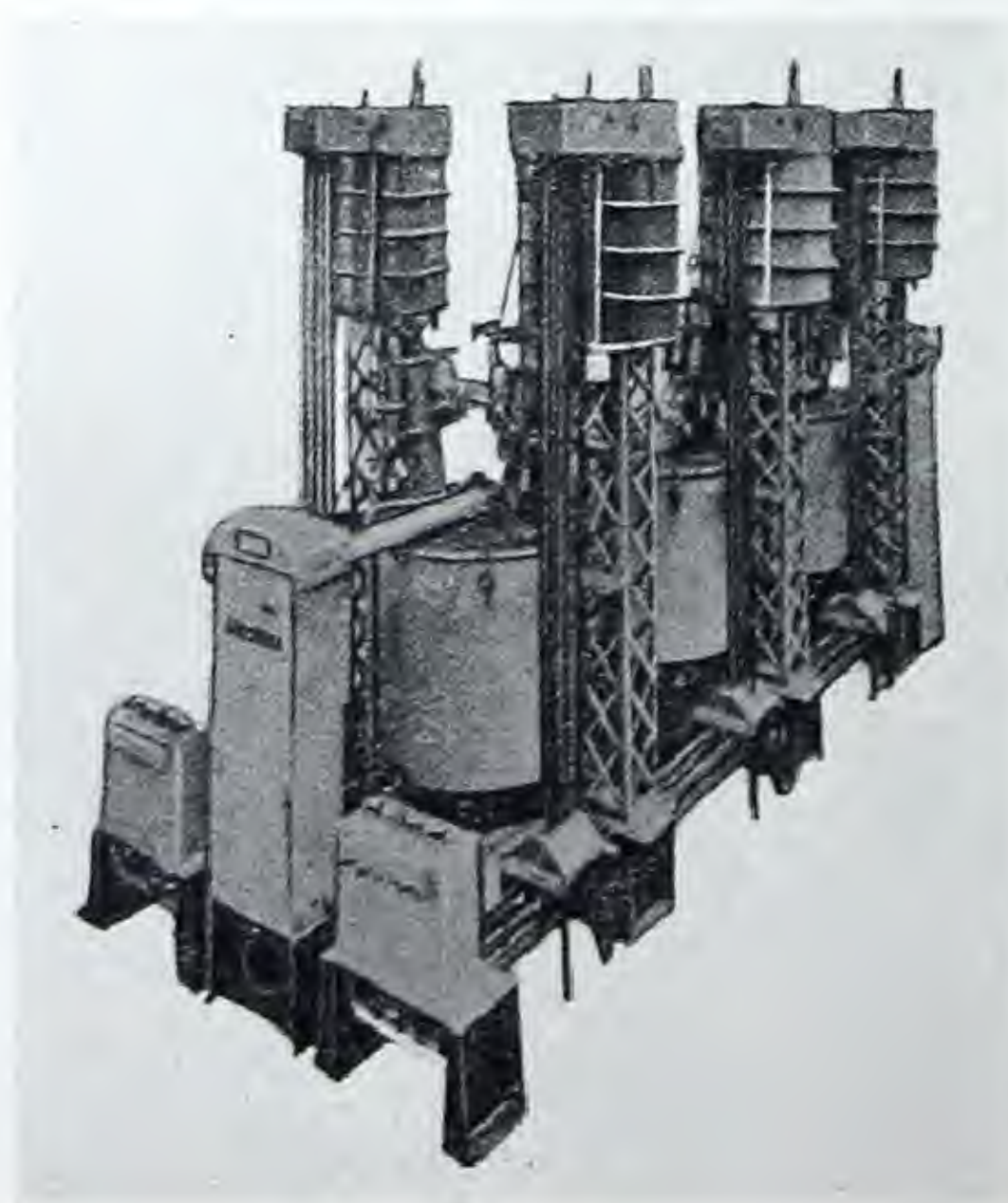
Fully illustrated and Described in Pamphlet No. 834

For Voltages up to 6,600 Volts

Type "NS"



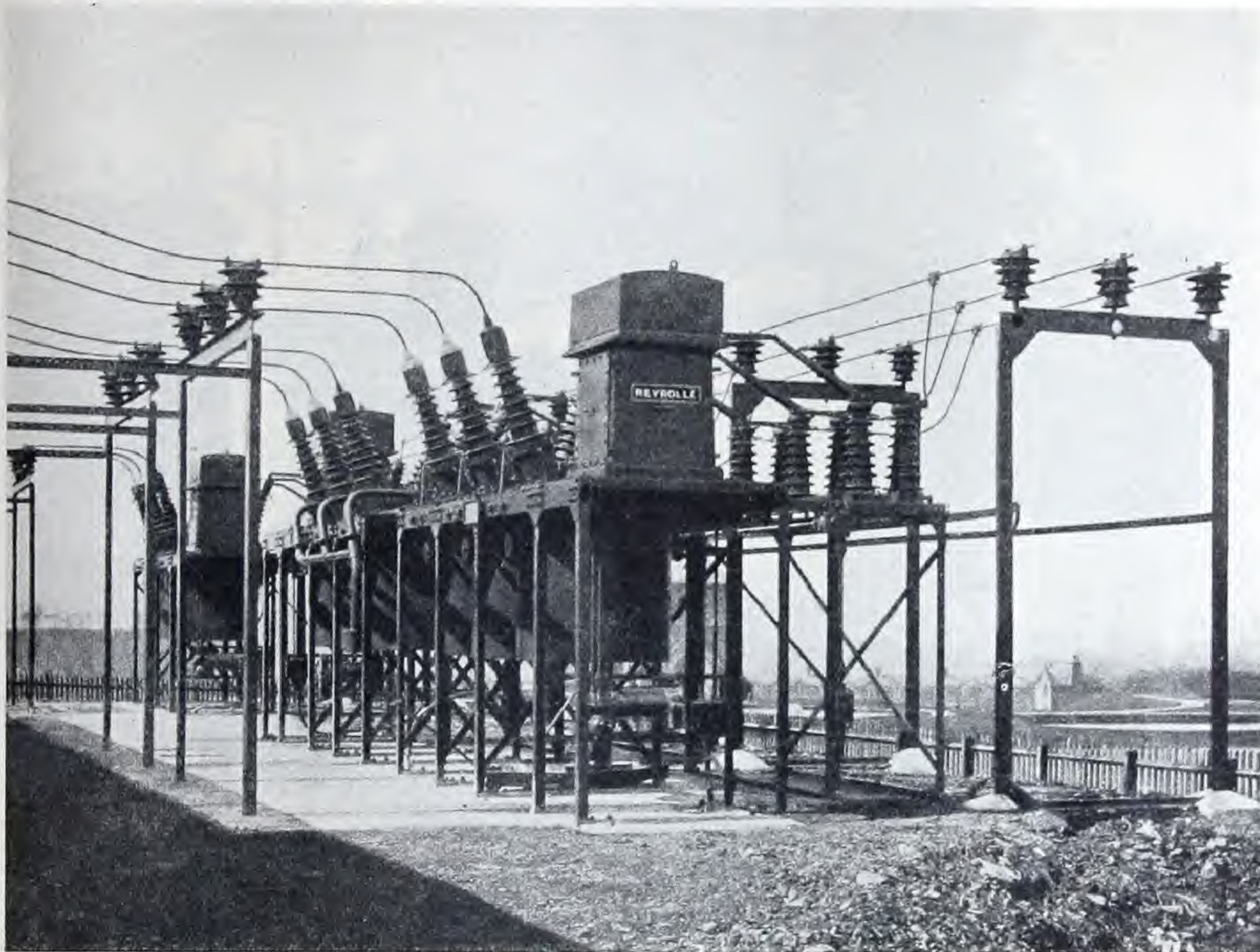
For Voltages up to 132,000 Volts.



REYROLLE METAL-CLAD SWITCHGEAR
Outdoor Oil Circuit Breakers

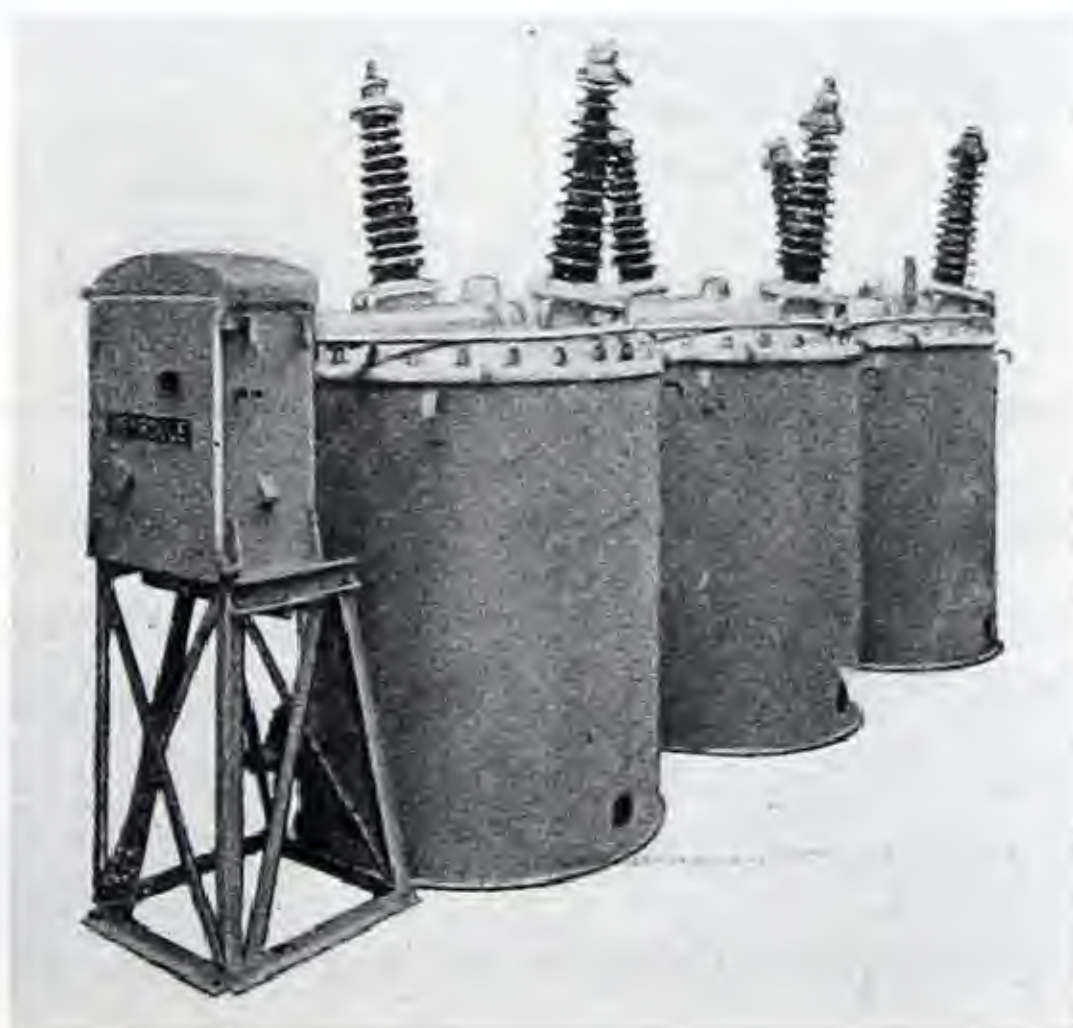
Class "ON"

For Voltages up to 66,000 Volts.



Class "V"

For Voltages up to 132,000 Volts.

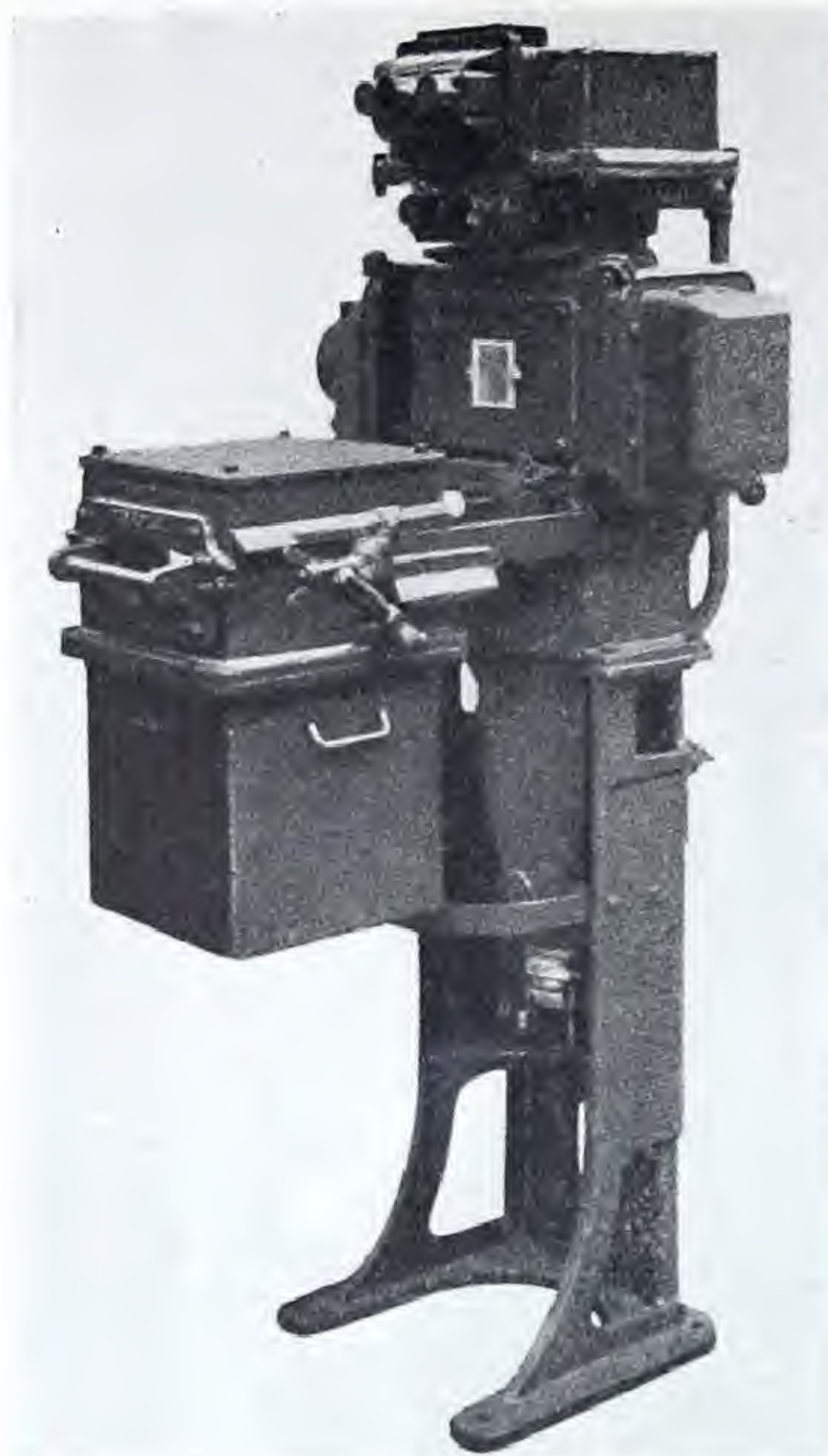


REYROLLE METAL CLAD SWITCHGEAR

Draw-out Pillar-Type

Class "E" and Class "F"

FOR MINING AND INDUSTRIAL SERVICE



TYPE "F"

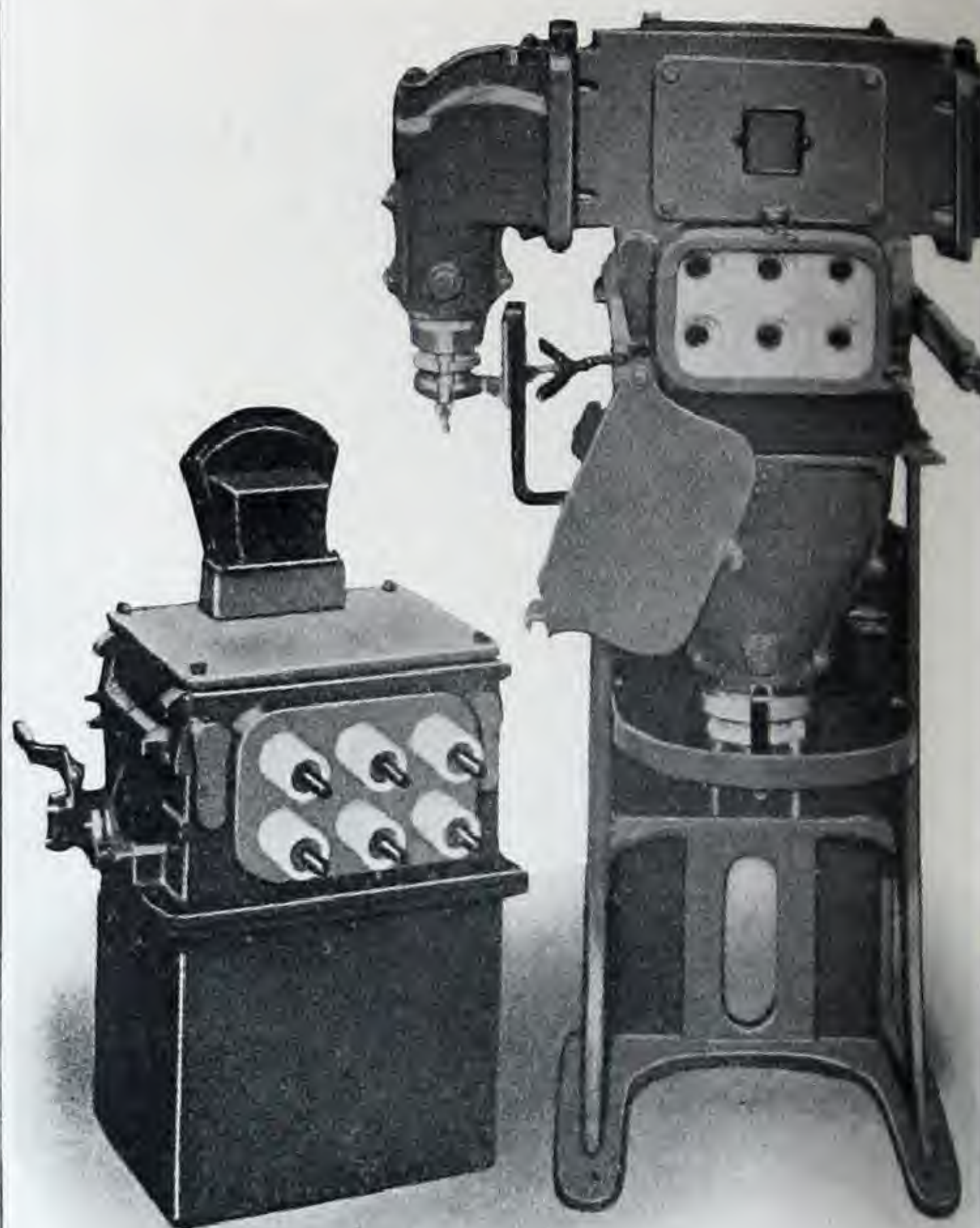
Reyrolle pillar-type switchgear, which is constructed on the well-known Reyrolle metal-clad principle, has been established in practice for over a quarter of a century, and has been further proved by some years of short-circuit testing at a testing-station. Although primarily intended for mining and industrial service, it has been used extensively for small sub-stations and kiosks, for which it is particularly useful because of its compactness. It is dust-proof, damp-proof, and vermin-proof; it is safe and simple to operate; and it is easy to erect and maintain. It complies with the British Government's Regulations for Factories and Mines, and has been certified flameproof by the Mines Department at Buxton.

REYROLLE METAL-CLAD SWITCHGEAR

Draw-out Pillar-Type

Class "E" and Class "F"

FOR MINING AND INDUSTRIAL SERVICE



TYPE "E2"

The pillars are self-contained, and may be used as single units, or a number may be assembled together to form a complete switchboard. They consist of two main portions, namely the fixed portion, including a bus-bar chamber, a plug-in chamber, and connectors, and the removable portion including an oil-immersed circuit-breaker, current transformers, and the operating mechanism.

The simplicity of the fixed portion is an important feature; it contains no moving parts requiring adjustment, the moving parts being included in the removable portion. All routine inspection, adjustment, and maintenance can therefore be done in perfect safety on site or in the workshop after the removable portion has been withdrawn from the fixed portion.

Grounding facilities have received especial consideration, and a self-contained internal grounding switch can be fitted when required.

Types and Ratings. Pillar-type switchgear is classified and rated as follows:

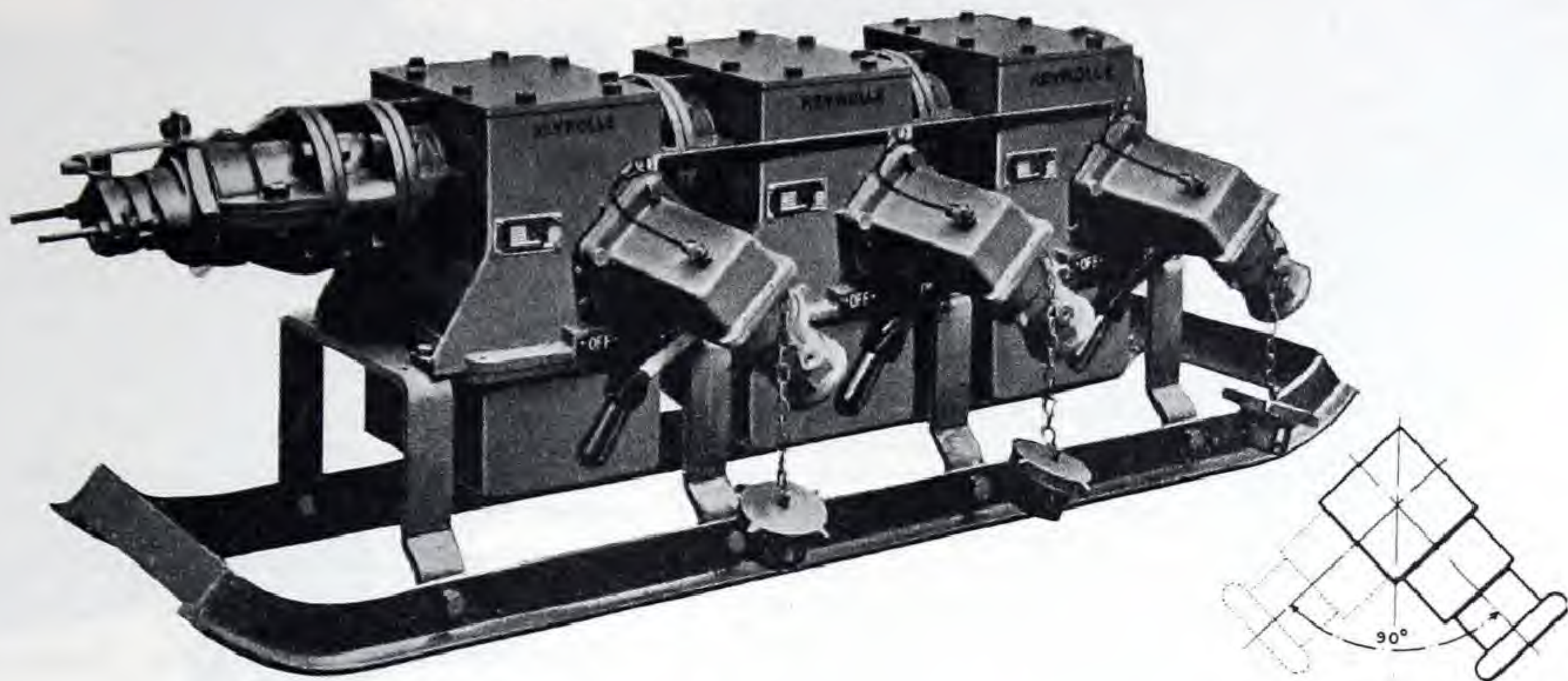
- Type "F" 200 amperes up to 3,300 volts.
- Type "E" 400 amperes up to 3,300 volts.
- Type "E1" 200 amperes up to 6,600 volts.
- Type "E2" 600 amperes up to 3,300 volts.

Dwarf pedestals, having a reduced overall height are available for use where headroom is limited.

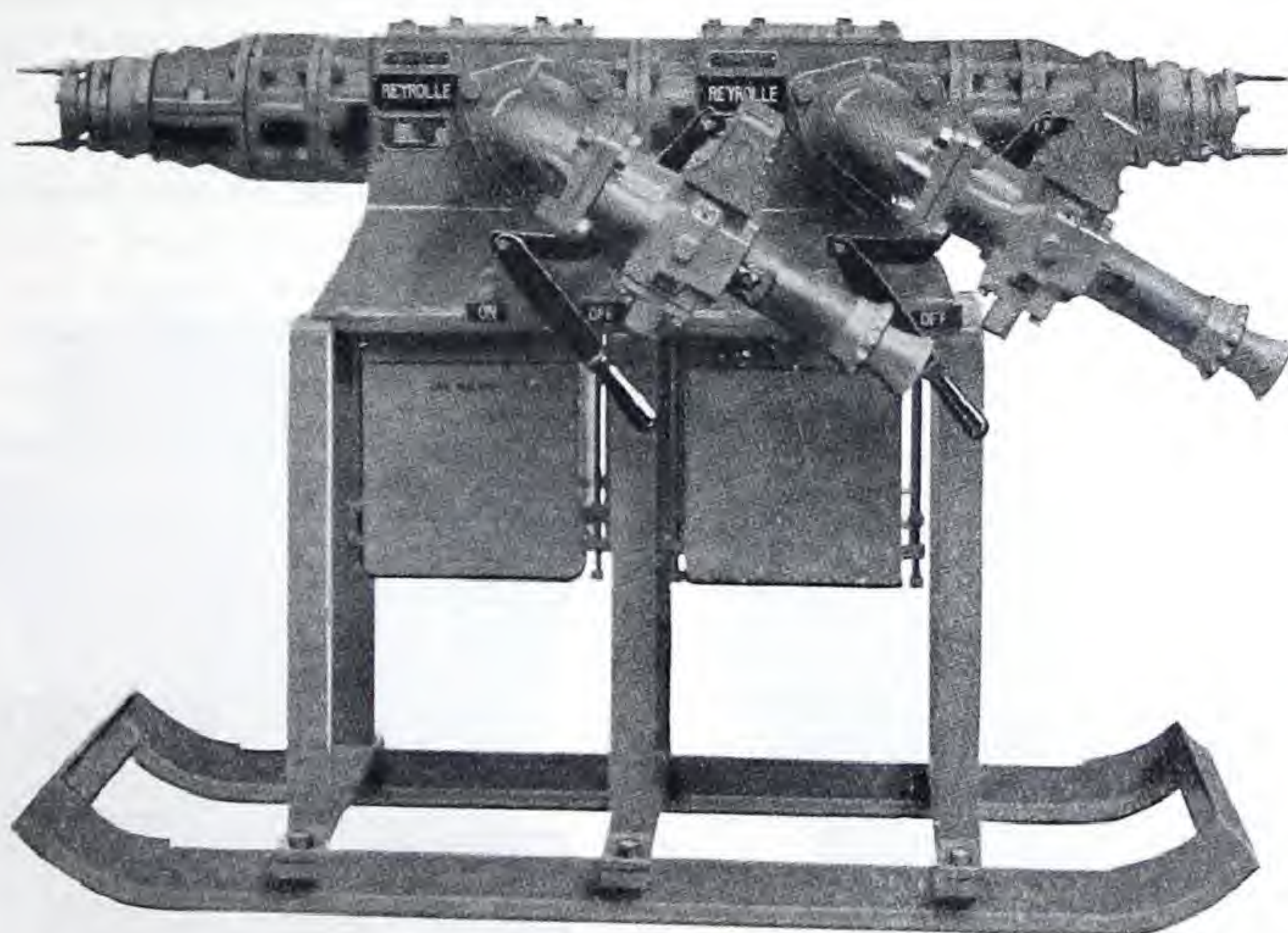
REYROLLE METAL-CLAD SWITCHGEAR

Flameproof Mothergate or Portable Distribution Switchgear

Type "MK" — 60 Amperes, 660 Volts



Type "MK1" — 100 Amperes, 660 Volts



DETACHABLE CABLE DIVIDING BOXES "FLIT-PLUGS"

60 and 100 Amperes
660 and 3,300 Volts



MATHER & PLATT MOTORS

For Over 100 Years

In fact since 1820, when the Company was founded by the great-grandfather of the present chairman, Mather & Platt products have enjoyed a world-wide reputation for sound design, stability and reliability.

Mather & Platt entered the field of electrical engineering as early as 1882, when the inventive ability of Thos. A. Edison and the scientific attainments of Dr. John Hopkinson and Dr. Edward Hopkinson were combined to produce the first electrical generators which can rightly be said, in the true technical sense, to have been designed. These early Mather & Platt machines marked a definite advance and as the record of the ensuing half century is one of steady development and progress, the reputation of Mather & Platt in the electrical industry to-day stands unsurpassed.

In the design of the alternating current induction motors described in this catalogue, this reputation has been maintained and enhanced by simple, sound and sturdy design, coupled with that careful attention to detail so essential to the production of a machine which the purchaser can install with confidence. The user will have a motor of well tried design and one produced by shop methods which embody the specialized experience of half a century.

In developing this line of Mather & Platt A.C. induction motors, the special requirements of the Canadian user have been kept in mind. The machines comply in all respects with the appropriate British Standard Specification, and in addition, so far as technical performance is concerned, meet the requirements of the National Electrical Manufacturer's Association. The air passages are simple in form, not easily choked, and a notable feature is the ease with which the type of enclosure can be modified to meet special conditions without alteration to the frame or end brackets.

Again, the methods of insulation and impregnation employed in Mather & Platt induction motors are the result of long experience in overcoming the difficulties of the most severe operating and climatic conditions all over the world: in textile factories, collieries, chemical works, and other situations where absolute reliability under arduous conditions is of vital importance.

These are a few of the features, described in greater detail in the following pages, which give the Mather & Platt machines a particular appeal to the Canadian user.

Special pamphlets describing in detail the products listed in the following pages will be sent on application.

For the electrical equipment of collieries, mines and quarries; rolling mills; cotton, woollen, jute, linen and other textile mills; bleach, print, dye and finishing works; artificial silk factories; chemical works, gas works, generating stations, pumping stations, etc.

A.C. Single-phase generators, two-phase generators, three-phase generators: all sizes.

A.C. Geared generators for driving from steam turbines through gearing.

A.C. Vertical waterwheel generators, all sizes.

A.C. Low voltage generators for electric furnace work.

Fly-wheel type alternators.

A.C. Polyphase induction motors, low and high voltage, in small, medium and large sizes.

A.C. Vertical polyphase induction motors in all sizes.

A.C. Polyphase induction type synchronous motors.

A.C. Single-phase and polyphase synchronous motors of the salient pole type.

A.C. 3-phase commutator motors.

D.C. Dynamos and motors in all sizes.

D.C. Geared generators, for driving from steam turbines through gearing.

D.C. Vertical dynamos and motors.

D.C. Low voltage generators for electro-chemical processes.

D.C. Traction generators and motors.

Totally-enclosed motors, A.C. and D.C.

Totally-enclosed fan-cooled motors.

A.C. loom motors.

Flame-proof A.C. and D.C. motors.

Special motors for coal cutters and conveyors.

Rotary converters, with patented self-synchronizing device.

Motor converters.

Motor generators.

Details of the above machines will be sent on application.

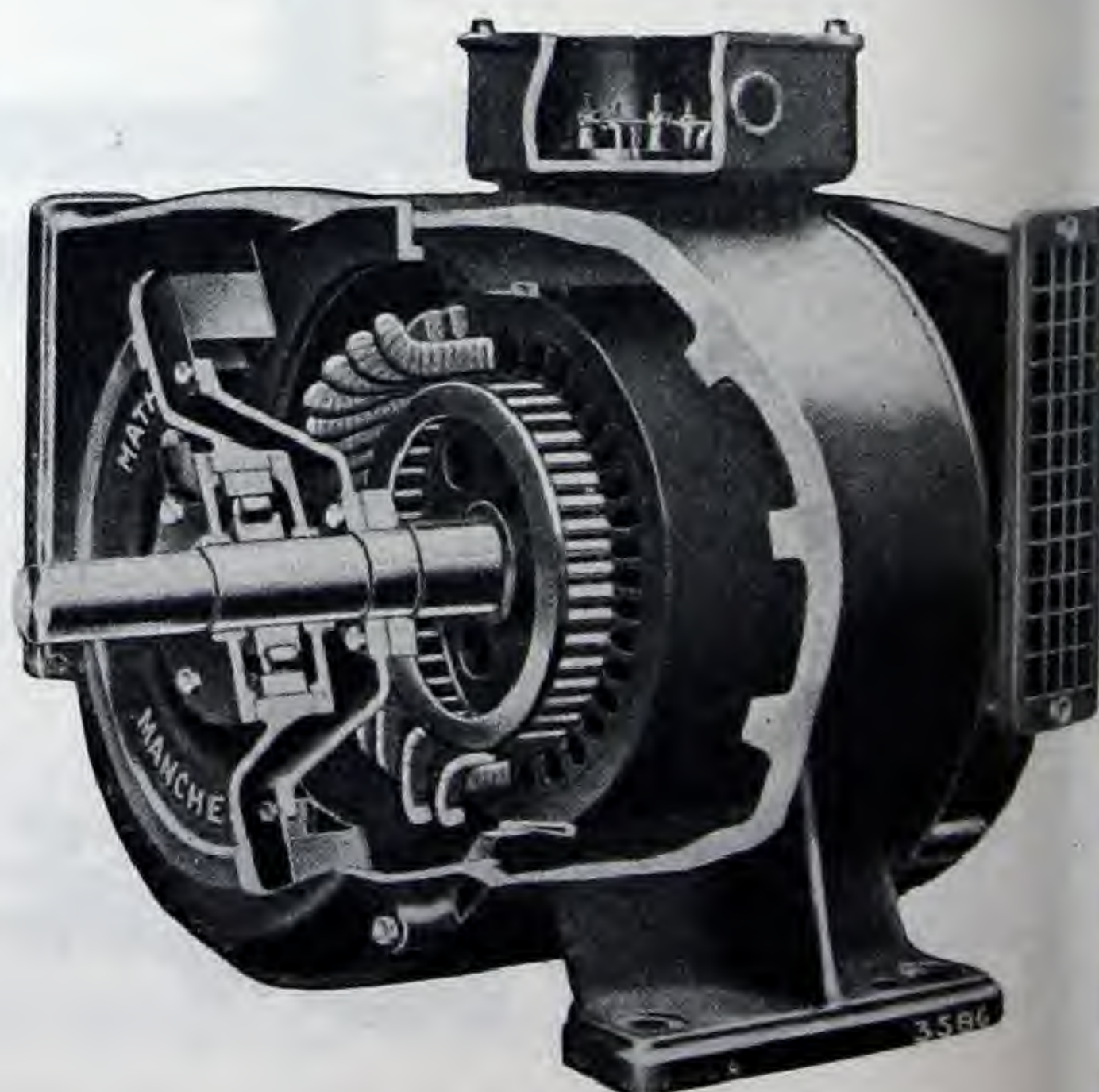
MATHER & PLATT MOTORS

"L" Type Motor

GENERAL DESIGN AND VENTILATION

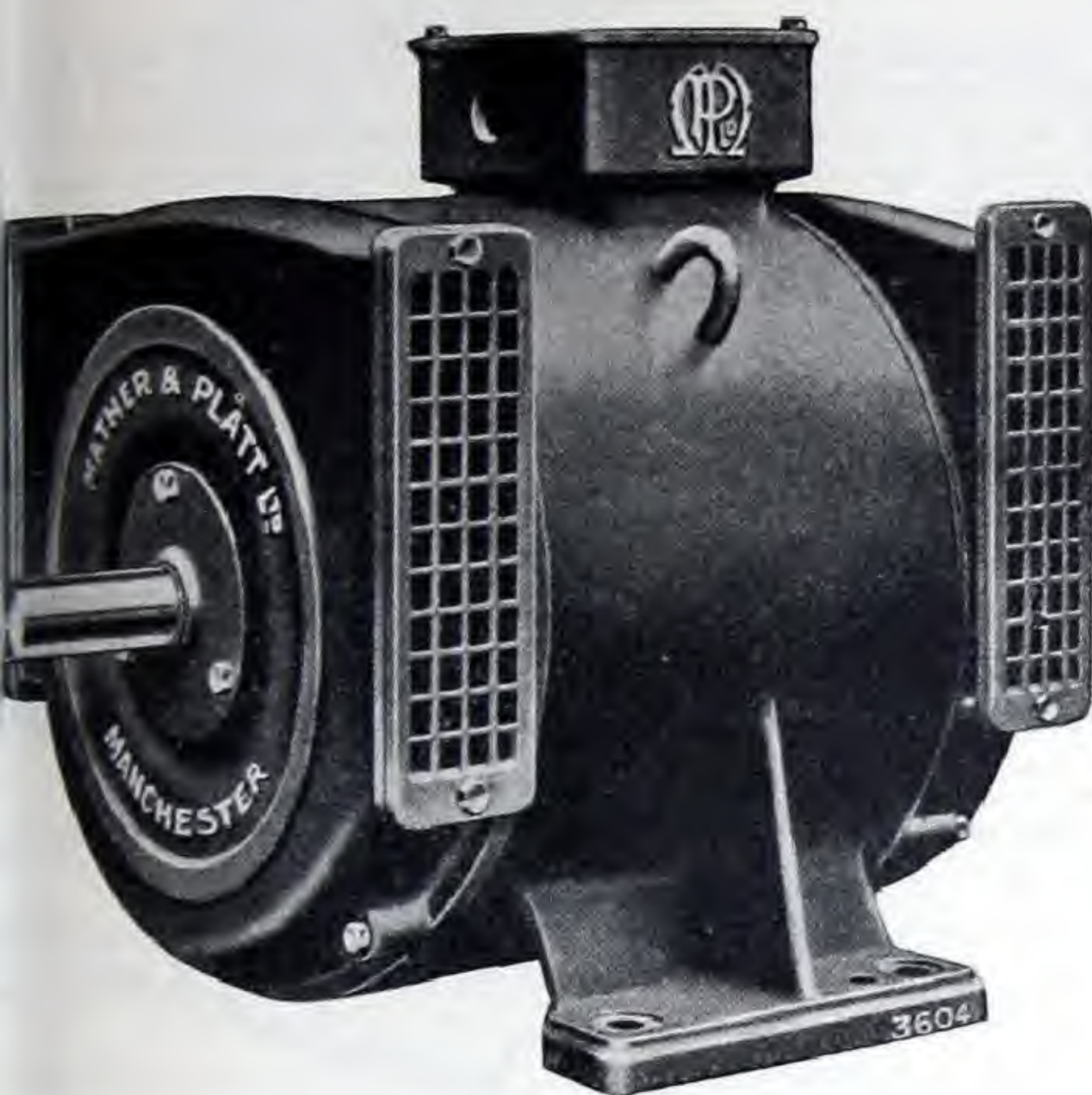
LO-L14

The stator frame in all cases forms a complete enclosing cylinder without openings of any kind, so that the stator core and windings are entirely shielded. The ventilating air enters through vertical orifices in the front end bracket and is expelled through similar openings in the driving end bracket so that there are no horizontal openings into which dust can fall. Ample cooling is ensured by the use of a strong welded fan having double back-to-back blades. This fan is carried on the shaft inside the back end bracket and draws a scientifically directed stream of air through large axial channels behind the stator core, and also, where necessary, through axial passages in the rotor core. Radial vent ducts, which are necessarily small and easily choked, are thus avoided and only axial passages of large size are used for cooling purposes. These will operate efficiently without choking in many situations where radial vents quickly lose their effectiveness to a dangerous extent. In extreme cases the axial passages can be quickly and easily cleaned without removing the rotor or even disconnecting the drive. In addition to these advantages, which have enrolled many staunch supporters of Mather & Platt motors amongst the maintenance staffs of chemical works and textile factories, this design is unique in the facility with which, without an alteration to the main standard parts, it is possible to modify the type of enclosure.



MATHER & PLATT MOTORS

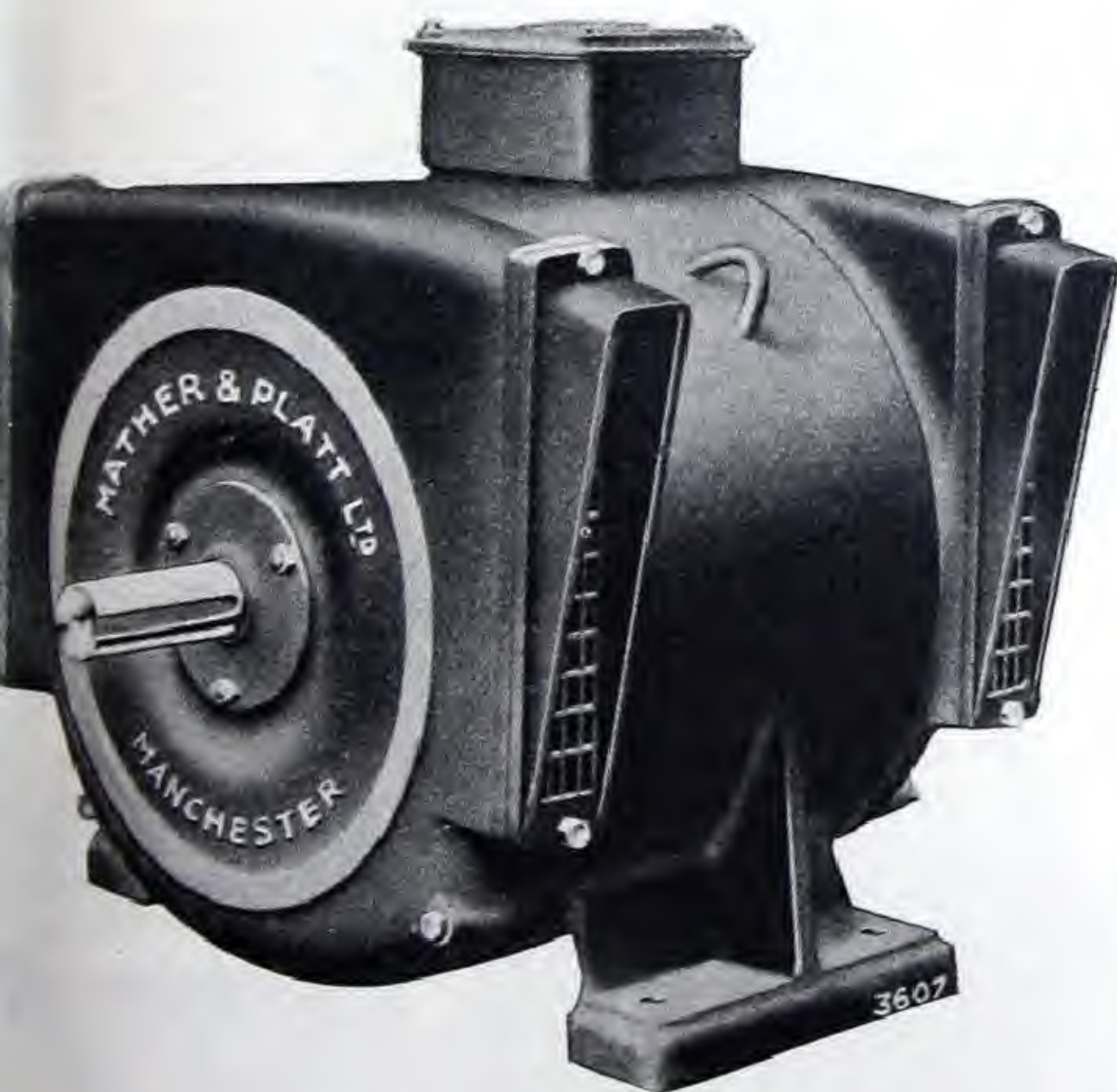
"L" Type Motor



TYPES OF ENCLOSURE

Screen-Protected Type

Unless otherwise specified, general purpose motors are supplied of the Screen Protected Type. The two vertical air intake orifices at the front end are protected by screens of stout perforated metal, the openings in which do not exceed $\frac{1}{2}$ sq. inch in area. The two air outlets at the back end are also guarded by similar screens, so that the windings and the fan are completely shielded against accidental contact.



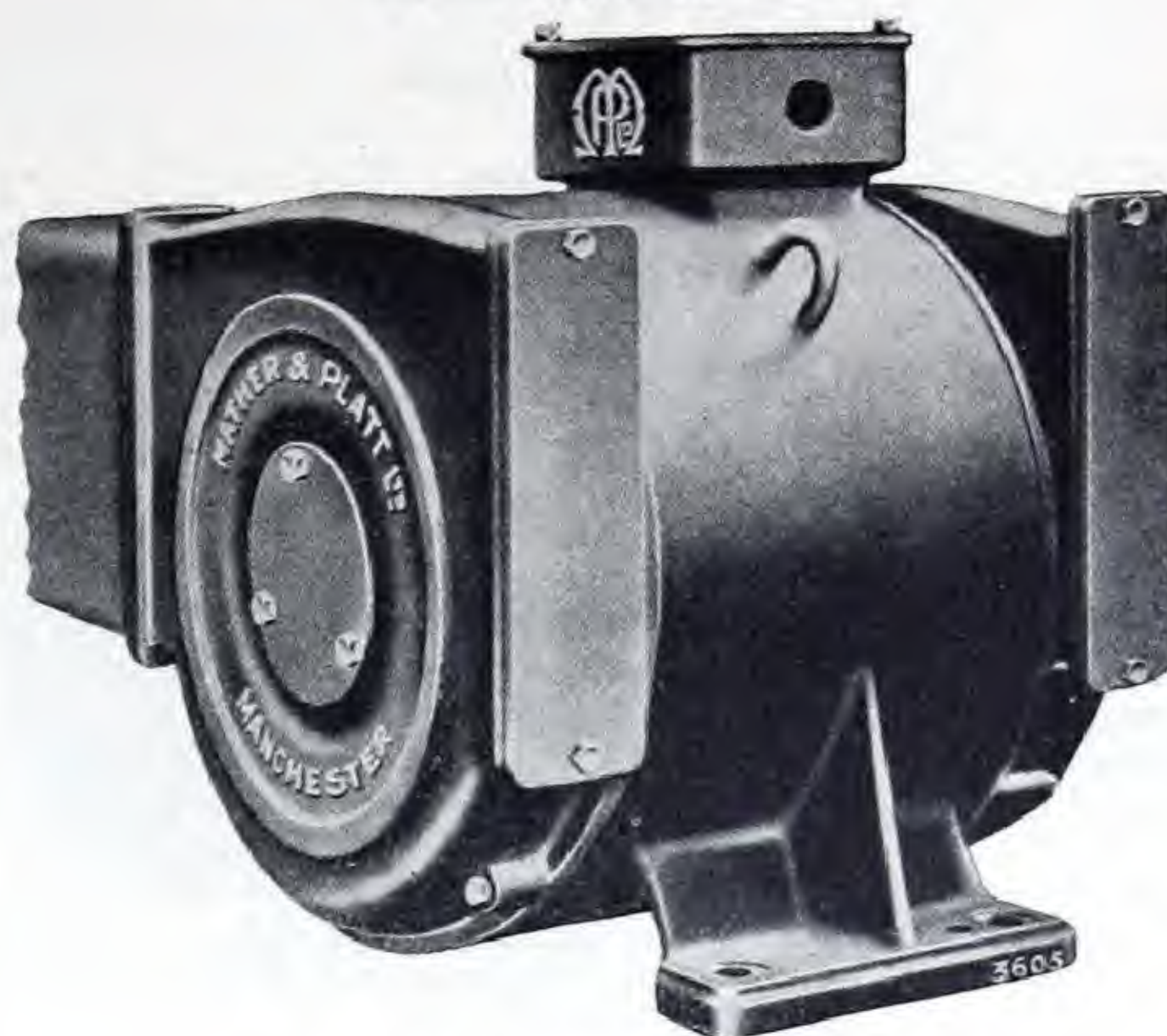
Drip-Proof Type

When it is required to protect the vertical air orifices to a greater extent against falling water or dirt, cowls or louvres can be fitted to the orifices. The normal arrangement of the Drip-Proof Type is shown.

For certain conditions there is a demand for a greater degree of protection against splashing water than is afforded by the standard Drip-Proof Type. This is met by the Plug-Proof Type, in which special deep cowls are employed rendering the entry of splashing water much more difficult.

MATHER & PLATT MOTORS

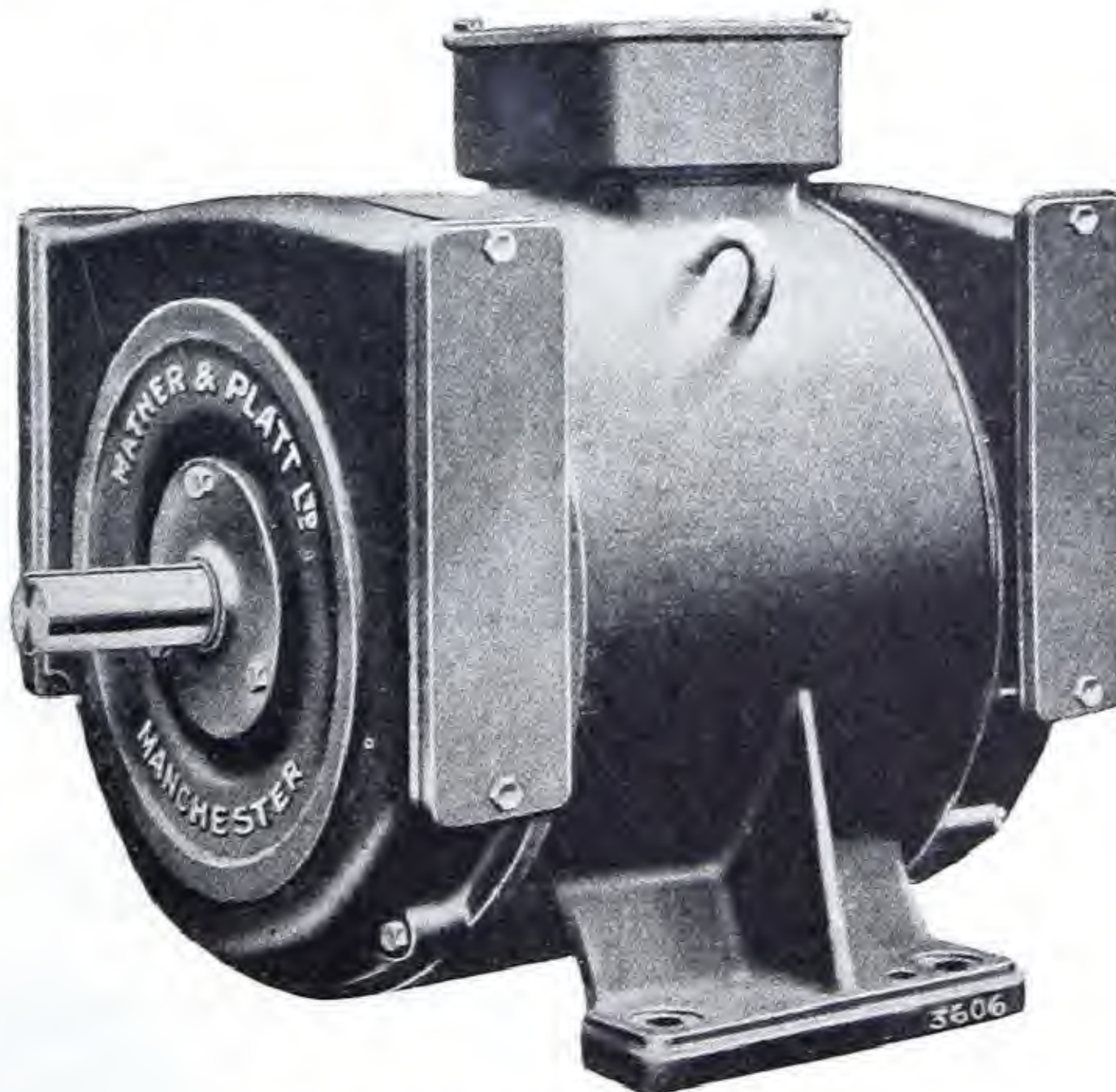
"L" Type Motor



TYPES OF ENCLOSURES

Pipe-Ventilated Type

There are many difficult applications in which the nature of the fluff, dust or fumes in the neighbourhood of the motor would render a totally enclosed motor necessary, and even such a motor sometimes unsatisfactory. In these cases it is often practicable to bring a supply of relatively clean air to the motor. The Mather & Platt motor is conveniently adapted to pipe ventilation in this way. One of the air intake orifices at the front end is closed by a plate, and the other is arranged with an adapter as required to suit the air intake pipe.



Totally Enclosed Type

The "L" type design permits the motor to be totally enclosed by simply closing all four orifices, and so far as mechanical construction is concerned, this is the only change necessary. It must be remembered, however, that the effect of totally enclosing any machine is to reduce the permissible continuous output considerably, and the majority of motors arranged for normal ventilation cannot usefully be operated (except on short-time ratings) as totally enclosed machines. In general, such machines must be specially wound to suit their specified duties, and in Mather & Platt totally enclosed motors the greatest possible care is taken to reduce the internal losses to the lowest possible figure without sacrifice of reliability.

MATHER & PLATT MOTORS

"L" Type Motor

CONSTRUCTION

Stator

The stator frame is a casting of strong and simple design, and the experienced foundryman will note that it is of a form which can be cast from a complete metal pattern in a simple two-part moulding box, and that no loose cores or core boxes whatever are used in its production. In this way accuracy, homogeneity and strength are ensured with rigidity just where it is most required. An unusually large number of internal ribs is provided, thus not only increasing the effective cooling surface of the ventilating channels, but also increasing the rigidity of the built up stator core and frame.

The stator core plates are of high-grade thin steel sheet, assembled under ample, but not excessive pressure and clamped between steel end rings. In the smallest machines the end rings themselves are fitted into recesses in the stator frame ribs, but in the larger frames the end rings are retained by circumferential steel keys. The core is carefully and accurately built, so that the after treatment is reduced to a minimum, in order to maintain the lowest possible losses and consequently high efficiency.

Stator Windings

At the risk of repetition, it must be emphasized here that the methods of winding and insulating Mather & Platt motors have been developed by long experience in encountering the most difficult conditions of service all over the world—in collieries, chemical works, paper mills, textile factories, bleaching and dyeing and printing works, and similar locations, where maintenance engineers learn, frequently by bitter experience, that it is necessary to know more than the price when buying a motor. No extravagant claims are made for Mather & Platt motors but is a proved fact that their name stands highest with discriminating engineers in works of this kind.

Success, which can be verified by reference to users, is attributed mainly to three things:—

1. There is no insulating material so good as mica. The best of the substitutes may be satisfactory in many cases, but where conditions are severe mica remains unequalled. That is why all Mather & Platt motors are insulated with mica.

2. The right place for moisture and dirt is outside the windings, and not inside them. All Mather & Platt windings are properly impregnated in vacuo with a tough, elastic, oil and moisture resisting varnish, which seals up the crevices.

3. The above features would be useless without the most careful workmanship throughout. Mather & Platt windings are assembled with the greatest care, under close supervision and are critically examined and tested at every stage of manufacture.

Rotor

In the smaller sizes the rotor core plates are built directly on to the shaft, and are clamped between stout end plates and retained by a ring shrunk on to the shaft.

In larger sizes the core plates are built on a hub which is pressed on and keyed to the shaft.

Rotor Windings

The conductors are bare copper bars, short circuited by copper end rings, to which they are united by autogenous welding.

Bearings

In Mather & Platt "L" type motors a roller bearing is fitted at the driving end, and a ball-bearing at the front end. The bearings are grease lubricated, and therefore require very little attention.

Terminals

The box with its cable entry can be turned round into any one of four positions at right angles without interfering with the winding connections or the terminals themselves.

MATHER & PLATT MOTORS

"L" Type Motor

Temperature Rise

Continuously rated motors are tested on full load at the works before dispatch for four hours (totally enclosed motors six hours), while short-time rated motors are similarly tested for their appropriate periods. The temperature rises recorded by thermometers applied to the hottest accessible surfaces at the conclusion of this test do not exceed the following values:—

(a) All types other than totally enclosed.

All insulated windings and cores in contact therewith..... 40° C. (72° F.)

Slip rings..... 55° C. (99° F.)

(b) Totally enclosed machines.

All insulated windings and cores in contact therewith..... 50° C. (90° F.)

Slip rings..... 55° C. (99° F.)

Overloads

The motors will withstand without injury the overloads specified.

(a) Continuously rated motors other than totally enclosed

25% for 2 hours for sizes of 10 h.p. per 1000 r.p.m. and upwards.

25% for 30 minutes for sizes below 10 h.p. per 1000 r.p.m. and down to 4 h.p. per 1000 r.p.m.

25% for 15 minutes for sizes below 4 h.p. per 1000 r.p.m. and down to 1 h.p. per 1000 r.p.m.

50% for 1 minute for all sizes.

100% for 15 seconds for all sizes.

(b) Continuously rated, totally enclosed motors.

50% for 1 minute for all sizes.

100% for 15 seconds for all sizes.

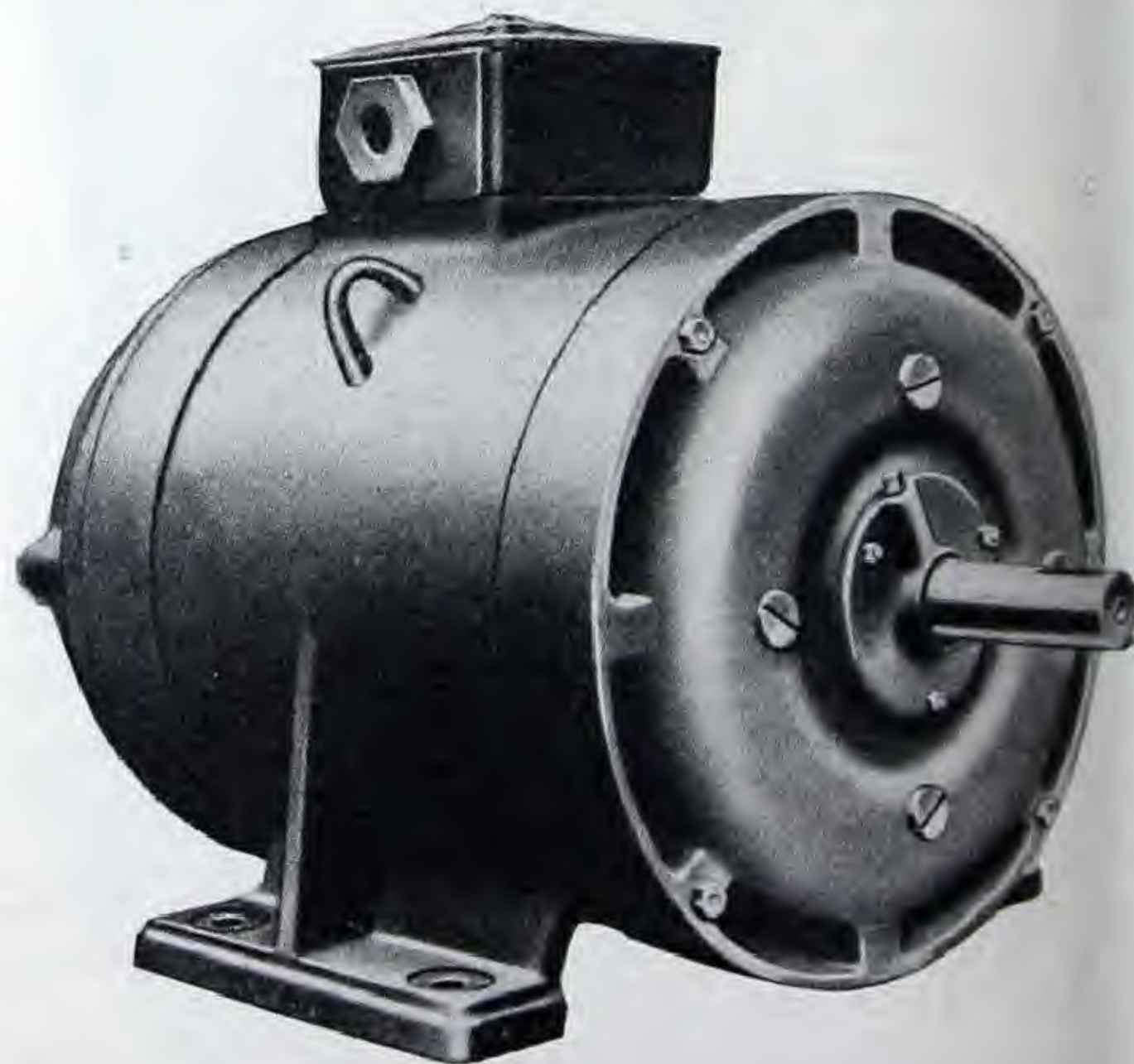
(c) Short-time rated motors. (Any type of enclosure.

100% for 30 seconds for all sizes.

Insulation Test

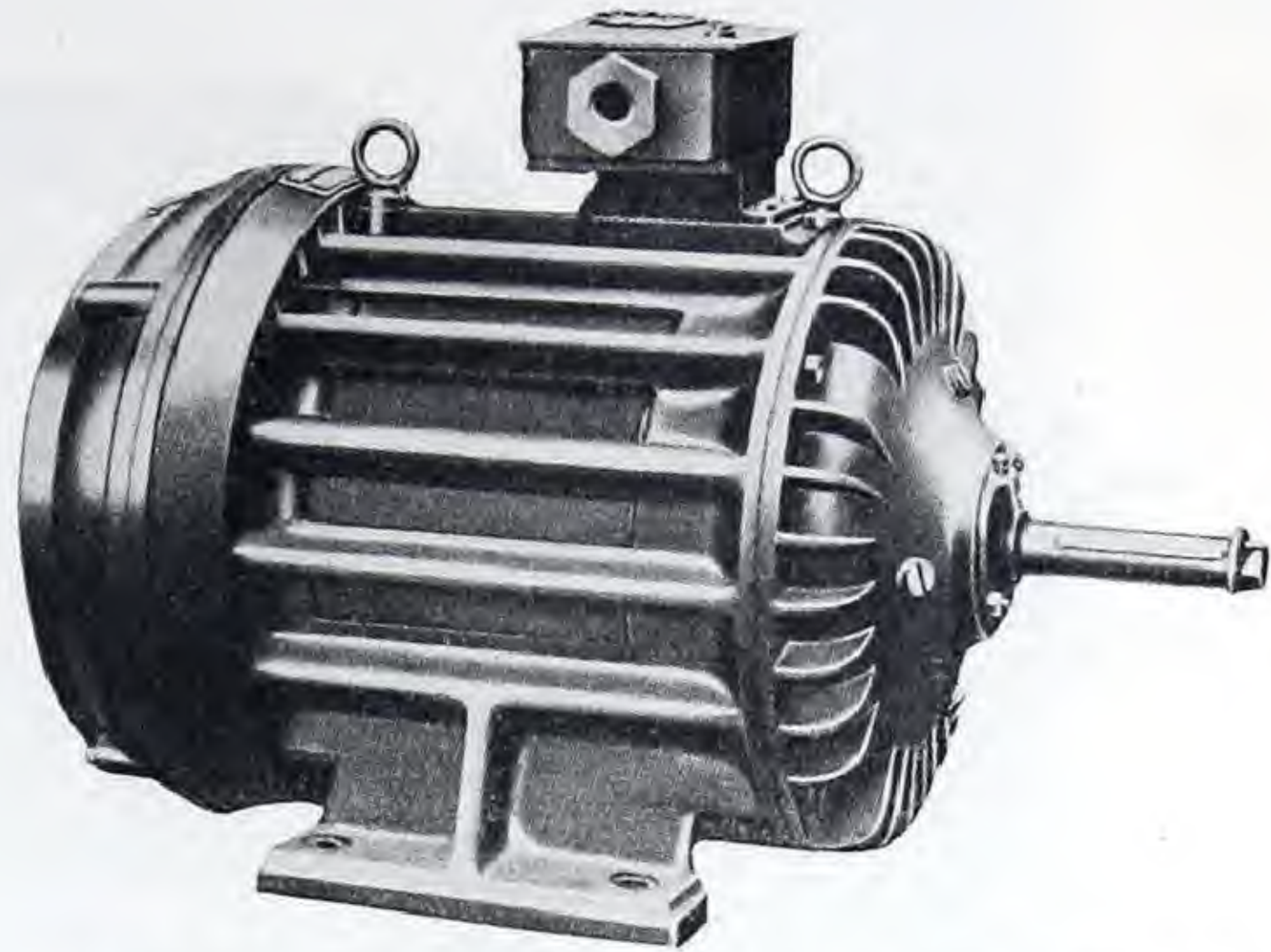
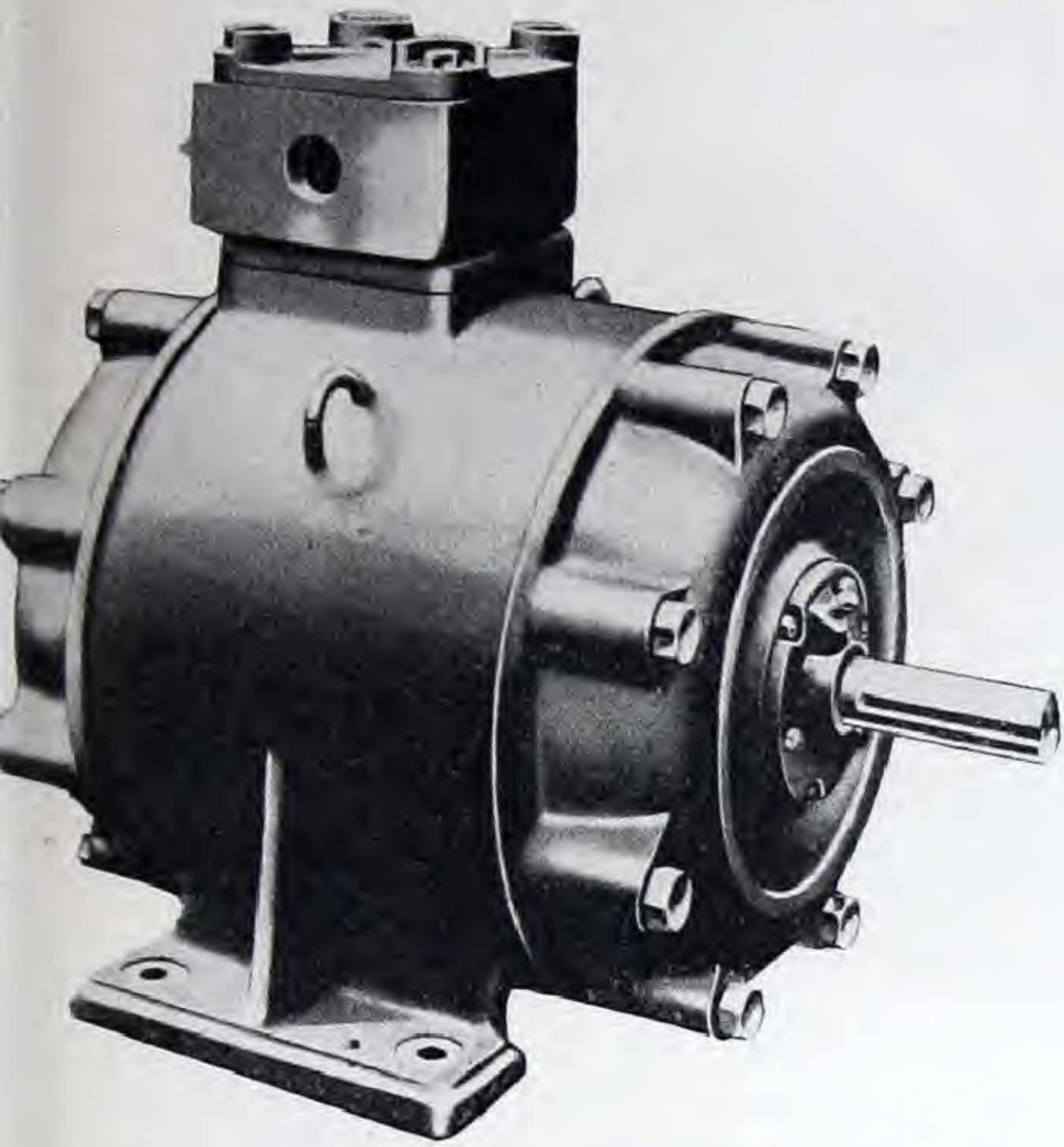
Immediately after the running test, all windings are subjected to an insulation test pressure (alternating) of twice the working voltage plus 1000 volts, with a minimum value (for motors of 3 b.h.p. and above) of 2000 volts.

SOME INDUCTION MOTORS OUTSIDE THE RANGE PREVIOUSLY DESCRIBED



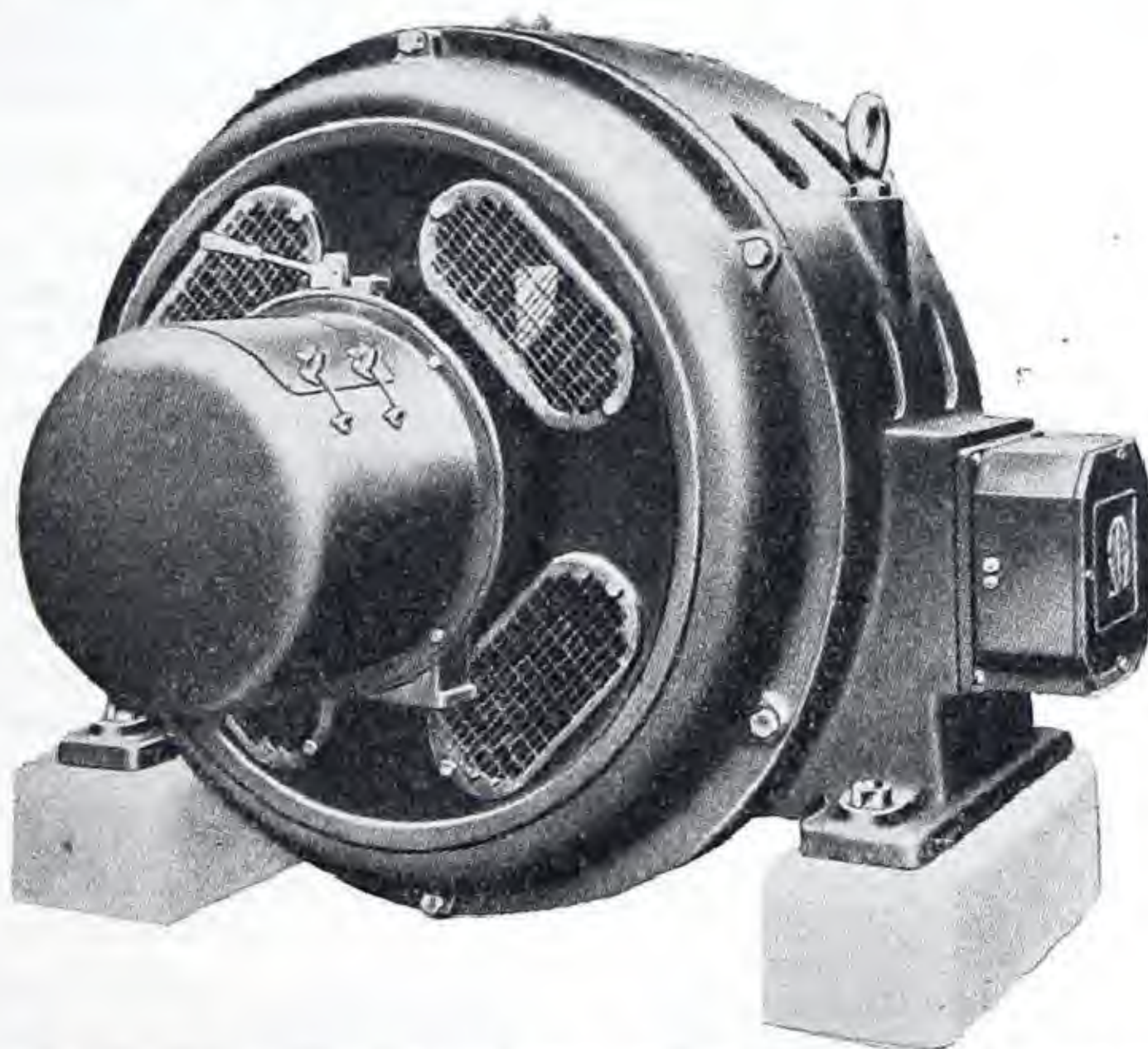
Totally Enclosed Frame-Ventilated Motor. All live parts are completely enclosed; cooling air passes between inner and outer shells.

MATHER & PLATT "L" TYPE MOTORS

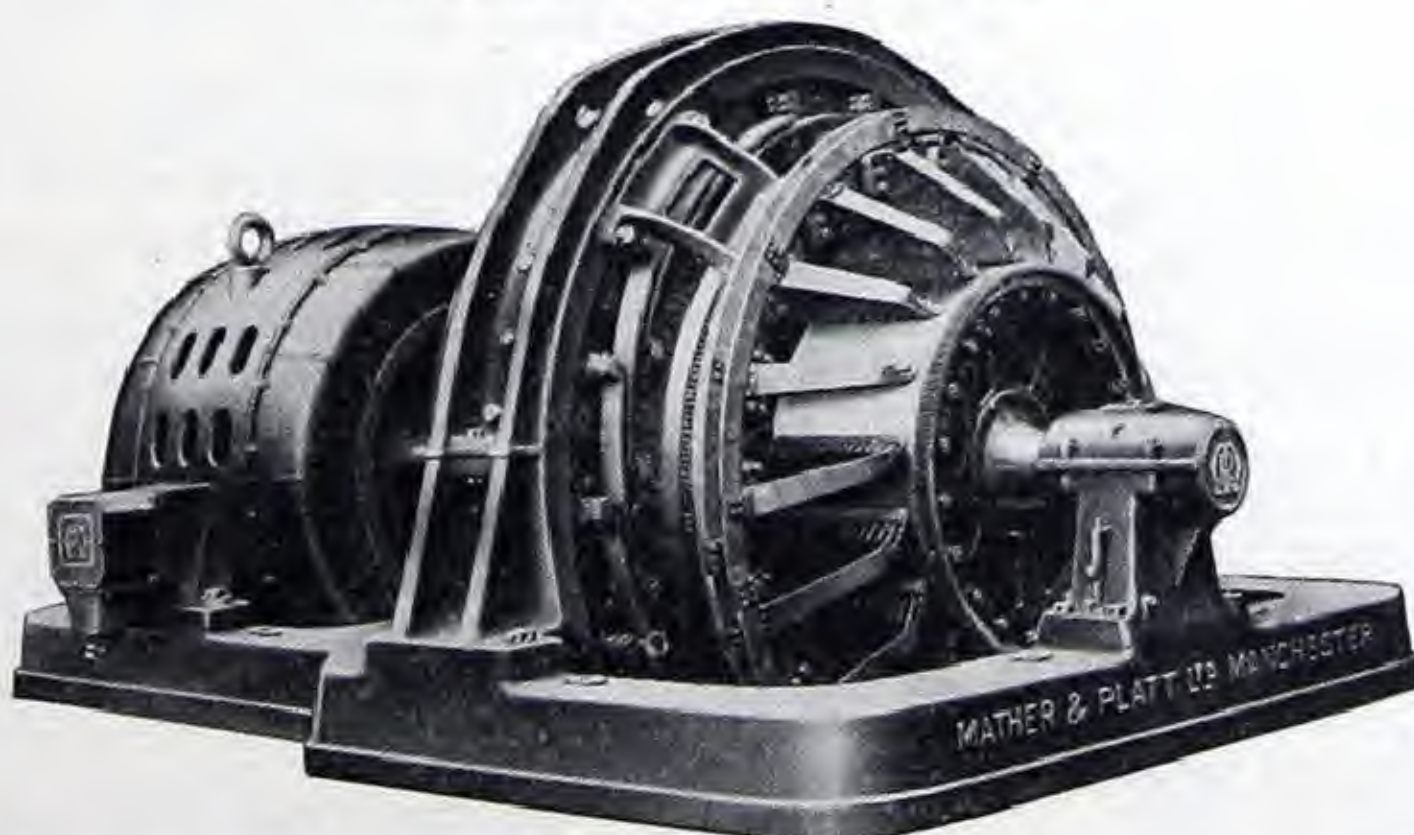


Surface Cooled Motor. All live parts are completely enclosed; easy to clean and suitable for dusty conditions.

Flame-Proof Totally Enclosed Motor for use in atmospheres likely to contain explosive gases or vapours.



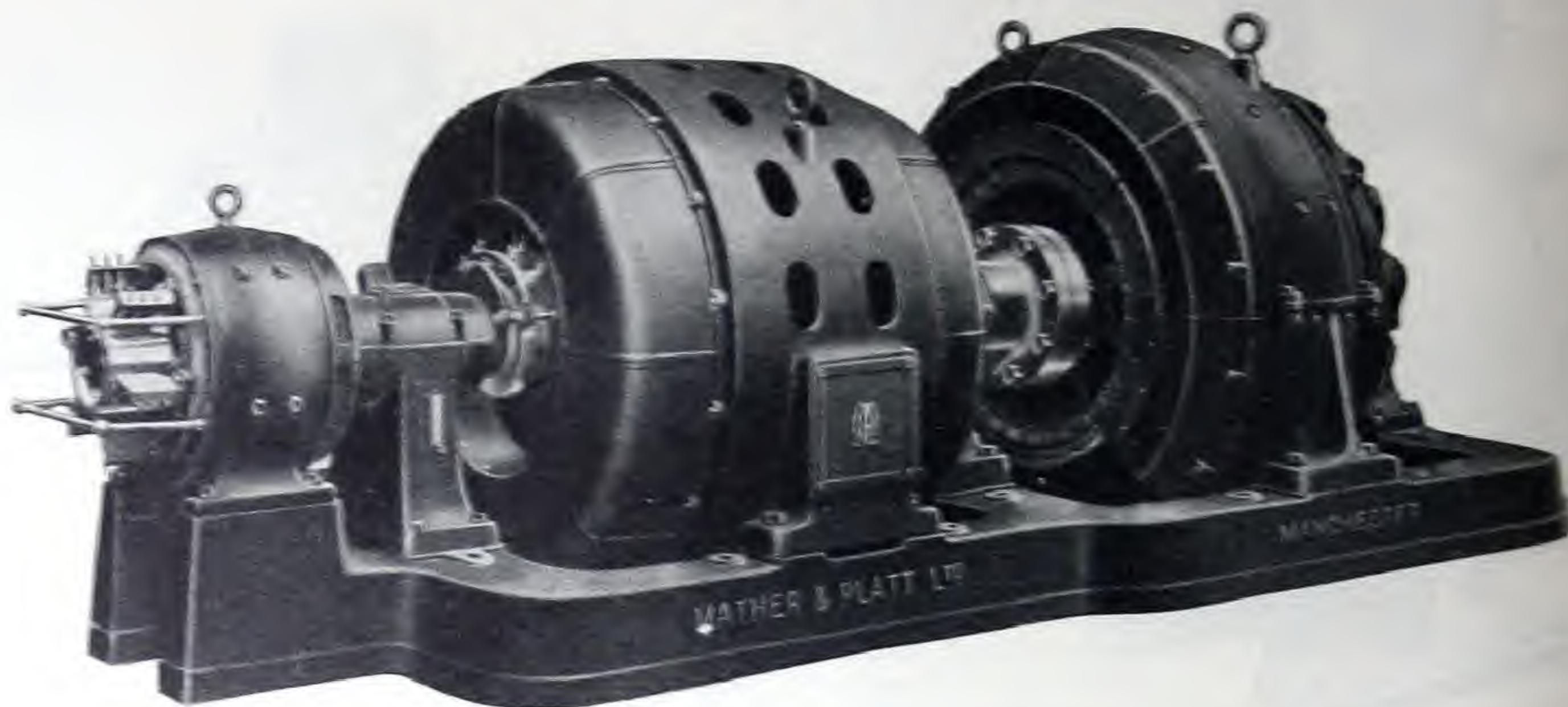
"L" Type Wound Rotor Motor of size larger than described in detail in previous pages.



A.C./D.C. Motor Generator Set with a D.C. output of 8000 amperes at 140 volts.

MATHER & PLATT AUTO-SYNCHRONOUS MOTORS

Salient Pole Type



Large Synchronous Motor, with overhung Exciter.
driving a Direct-Current Generator.
(Squirrel Cage Started)

GENERAL DESCRIPTION

The motors of the salient pole type, are usually constructed with a revolving field, but occasionally, in the smaller sizes, the revolving armature pattern is adopted. They are equipped with squirrel cage windings embedded in the pole faces to enable them to be started from rest and brought up to a speed approaching synchronism in induction motor fashion. Synchronization is then brought about by establishing the field of the machine, for which purpose a direct current exciter, usually driven direct by the synchronous motor, is provided. In certain cases, excitation current may be supplied from an existing source, or one specially installed for the purpose.

SCOPE OF APPLICATION

This type of motor may be usefully employed for the majority of constant speed drives requiring an alternating current motor of moderate or large capacity (say 100 B.H.P. and upwards) where the starting effort required of the motor is reasonably low and where the rather heavy starting current demanded by this type of machine is not objectionable. The fact that this machine may be designed to operate at unity power factor or at any desired degree of leading power factor, is of course a very considerable asset, and in this respect it is worthy of note that for the larger sizes of machine the salient pole type synchronous motor provides the cheapest means of power factor improvement.

GENERAL

Synchronous motors working at unity or leading power factor are being installed in increasing numbers with the main purpose of improving the overall power factor of the systems to which they are connected.

The Induction Type Synchronous Motor is in principle a slipping induction motor which can be started against a heavy load by a starting resistance in the ordinary way. When up to full speed the rotor is excited through its slip rings with direct current taken from a suitable exciter. It is thereby enabled to pull into step and continues to run as a true synchronous motor, the power factor of which can be adjusted to the correct value by control of the excitation.

The efficiency and cost of such a motor depend on the amount of leading current required at full load and also on the overload which the motor must withstand without falling out of synchronism. These factors are not independent of each other, and enquiries should be accompanied by all possible information regarding the running conditions, to enable the most advantageous scheme to be submitted.

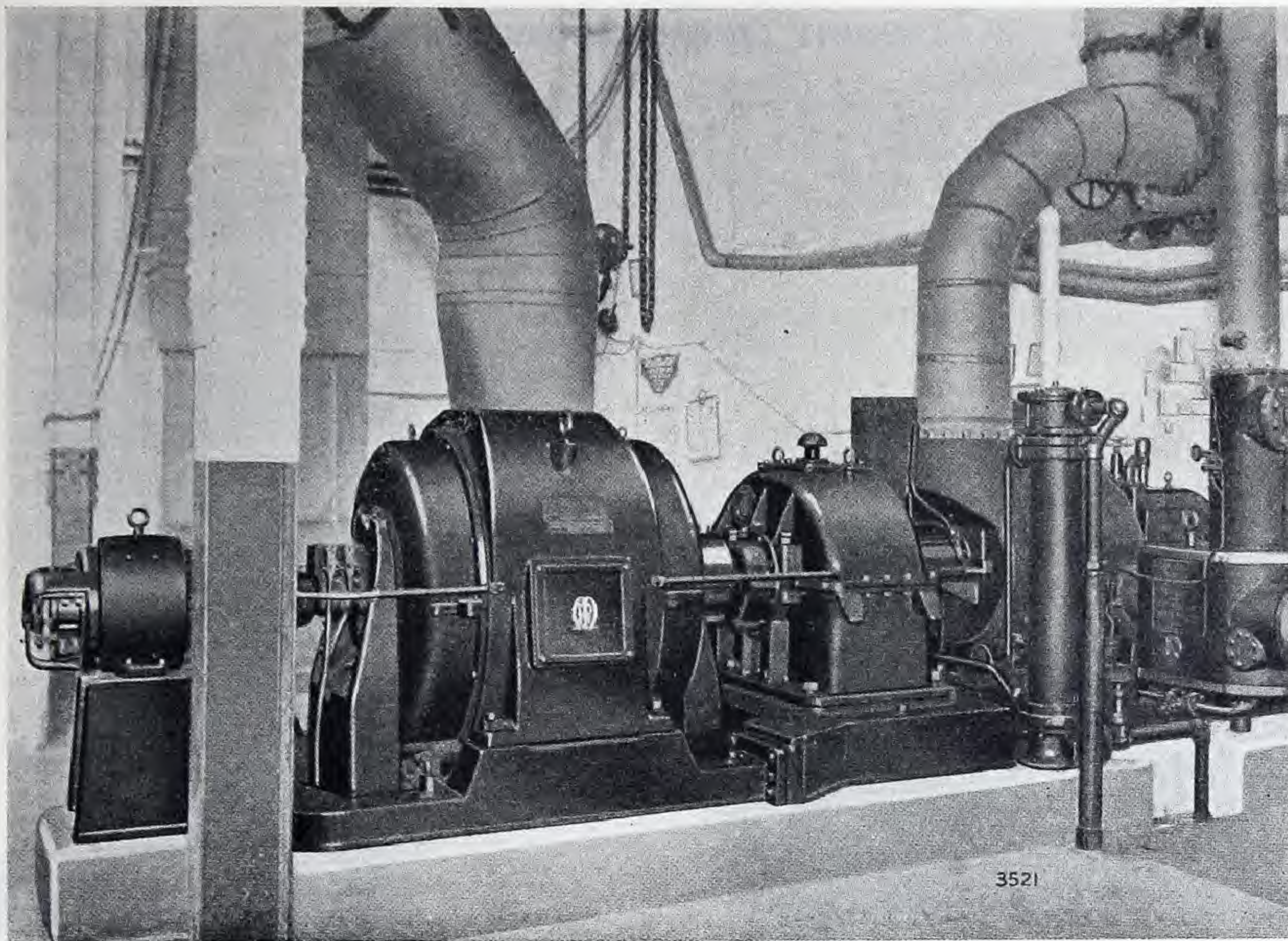
The Salient Pole Synchronous Motor is very similar in general construction to the ordinary type of salient pole alternator. In the pole faces is embedded a complete squirrel

cage winding, which in each case is carefully designed to secure the best combination of starting characteristics to suit the particular drive. These machines are built up to the largest sizes for all normal speeds, and can be designed for starting either by switching directly on to full voltage or at reduced voltage through the medium of current limiting choke coils or auto-transformers. They are usually somewhat higher in efficiency and cheaper in cost than the equivalent induction type synchronous motors, and their increasing use is one of the results of the introduction of large power systems.

The Salient Pole Synchronous Motor is particularly well adapted to the driving of pumps and compressors. When it is vitally important to maintain continuity of service under partial fault conditions, as for example in certain pump drives in power stations and chemical works, this type of machine possesses the outstanding advantage that it is able to continue to develop full load at full speed in spite of a fall in voltage which would cause an induction motor to shirk its duty.

In recent years Mather & Platt Machines of this type have been built with outputs up to 2,000 B.H.P. in large and increasing numbers, a fact which demonstrates their intrinsic merit.

MATHER & PLATT "S" TYPE ALTERNATORS



Mather & Platt 750 K.W. Alternator, driven through gearing by a Steam Turbine, supplying power to a Sugar Factory in Canada.

Small alternators are frequently designed on the lines of C. machines with stationary fields and rotating armatures, provided with sliprings instead of commutators.

For medium and large outputs the "S" Type Range of rotating Field Alternators is available. These machines can be designed for three-phase, two-phase or single-phase supply at all usual voltages and frequencies, in sizes up to about 5,000 K.V.A. They can be arranged for belt, rope, or direct coupled drive according to requirements, or for driving from steam turbines through gearing.

According to speed, output and working conditions, the machines may be of the open type or provided with enclosed guards and arranged for duct ventilation. The exciters are usually of the end bracket type, but where space is limited, overhung exciters without shafts or bearings can be mounted on extensions of the alternator shafts.

INFORMATION REQUIRED

Engineers inviting tenders will assist us to meet their requirements by giving the following:

For Generators

1. Output in kilowatts or, alternatively, B.H.P. to be absorbed by the generator.
2. Full load and no-load speeds, R.P.M.
3. Voltage required, at terminals, at full load and no-load.
4. If alternating current, state number of phases, frequency, and expected power factor of load to be supplied.
5. State whether machine has to run in parallel with any other generators, and if so, please furnish full details of the latter.

Also further particulars as called for below, items 7-11 inclusive.

For Motors

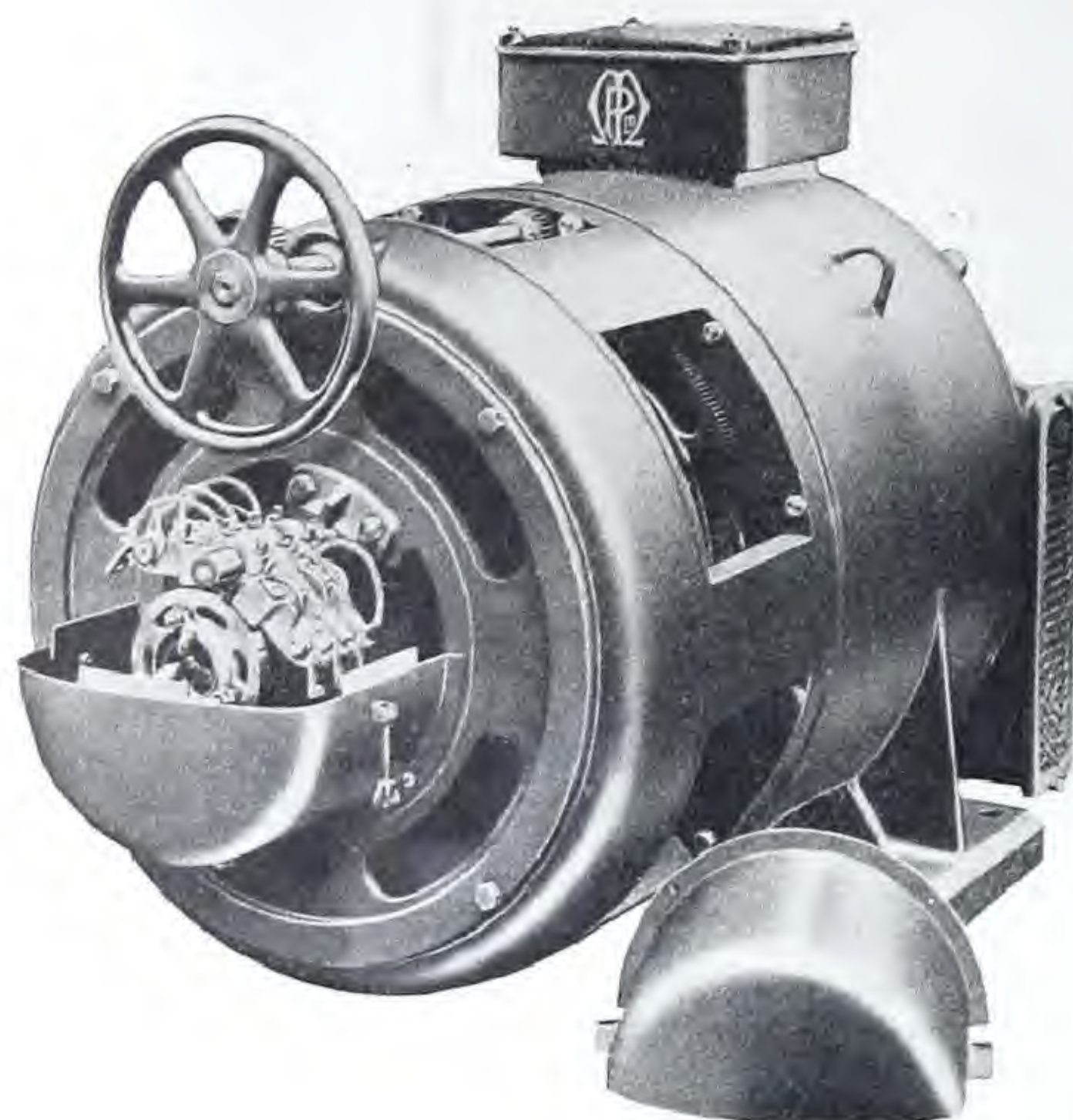
1. Full load output, B.H.P.
2. Full load R.P.M. If speed is to be varied, state output (and duration) at top and bottom speeds and at any important intermediate speed.

3. Voltage available at motor terminals. If liable to variations, give details. If alternating current, state number of phases and frequency, and if two-phase, state whether three or four-wire supply.
 4. If synchronous motor, state either:—
 - (a) Full load power factor required of motor,
 - (b) Amount of leading K.V.A. to be provided by motor, or
 - (c) Total existing load in K.W. (excluding load on proposed new motor), the present power factor, and the desired final overall power factor.
 5. Speed of driven shaft, name and purpose of machine(s) to be driven.
 6. Starting effort required as percentage of full load, details of any special starting requirements, including frequency of starting. If synchronous motor, state maximum overload to be carried without falling out of synchronism, and whether liable to be applied suddenly or slowly.
- Also further particulars as called for below, items 7-11 inclusive.

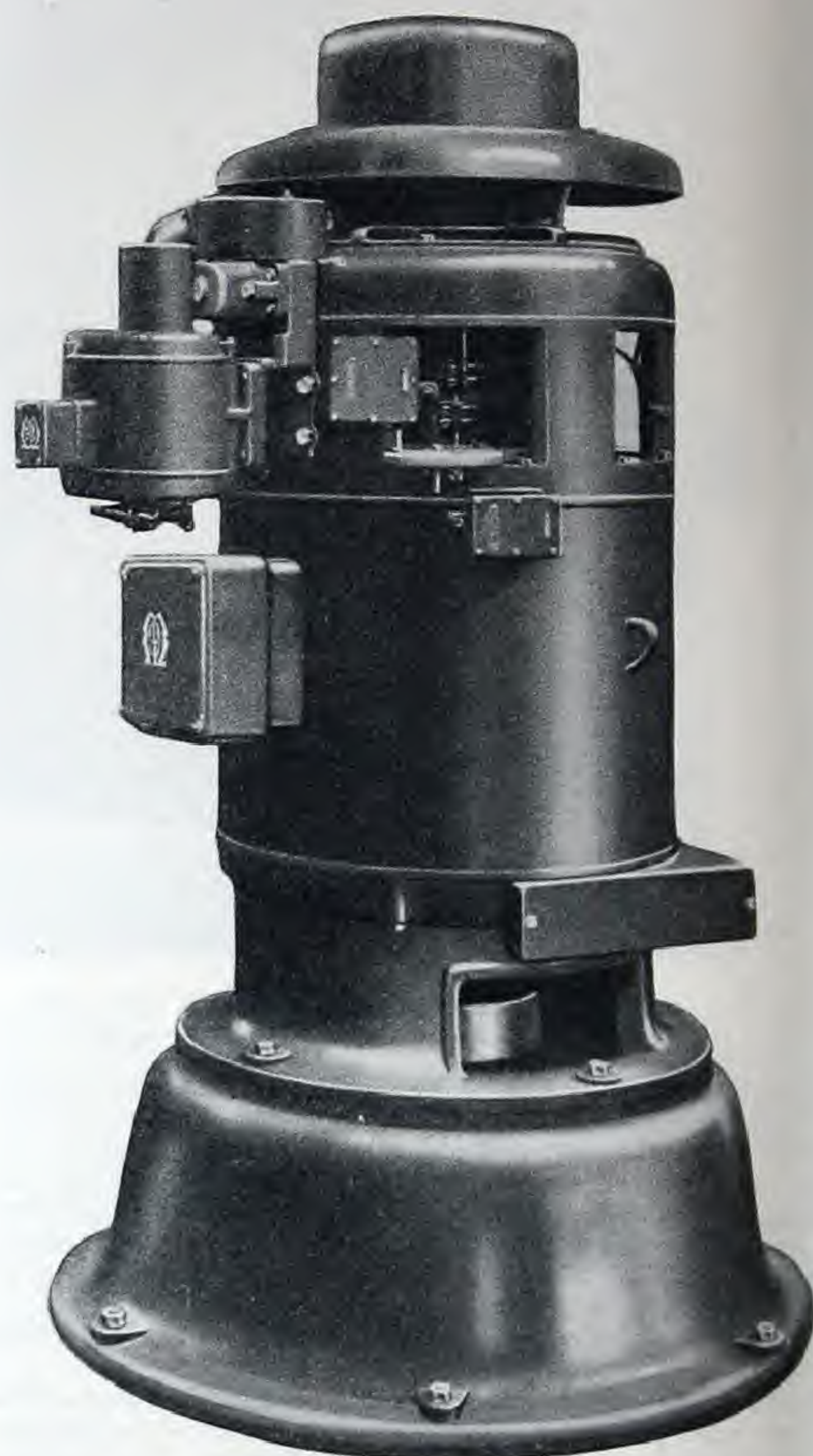
In All Cases—Motors and Generators

7. Class of rating, e.g., "continuous," "continuous maximum" or "short time" (half hour or one hour).
8. Type of enclosure, e.g., "open type," "screen-protected," "drip-proof," "pipe-ventilated," or any special requirement.
9. Any special conditions of environment, e.g., room temperature if over 35 deg. C. (95 deg. F.); altitude if over 1,000 metres (3,300 ft.); limited ventilation; presence of dirt, fumes, gas, water, etc.
10. State what accessories are to be included in quotation:
 - (a) Coupling (solid or flexible); belt pulley or rope pulley; chain and chain wheels; gears.
 - (b) Soleplates, bedplate, slide rails, foundation bolts.
 - (c) Armour glands or other cable entry fittings.
 - (d) Starting and control gear.
11. Delivery:
 - (a) Address.

MATHER & PLATT "C" TYPE VARIABLE SPEED ALTERNATING CURRENT COMMUTATOR MOTORS



Standard Type "C" Variable Speed Commutator Motor



Mather & Platt Vertical Open Type "C" Commutator Motor with Borehole Pump for Waterworks duty.

For Three-Phase and Two-Phase Circuits

The motors described in this pamphlet are of the type in which the primary winding is on the rotor. Occupying the same slots but electrically independent of this primary winding, is another winding connected to a commutator. The commutator is provided with a double brush rocker, and connected between groups of brush arms on the front and back rocker respectively are the sections of the secondary winding, usually three in number (three phase), which is located in slots in the stator of the motor.

A reasonable limit for the speed range that is practicable by this method is represented by the ratio 4 : 1 and this ratio of speed has been adopted for our standard motors. A

greater ratio up to at least 6 : 1 is generally possible, but such a machine is naturally more expensive than one with restricted speed range. Similarly, if the speed range narrowed, a somewhat cheaper motor may result. An appreciable departure from the standard speed range of 4 : 1 particularly if this range is widened, involves a non-standard design of motor and all such cases need special consideration.

These motors are suitable for developing a constant torque throughout the whole of their speed range, and their most useful sphere of application is to drives requiring a speed range of at least 2 : 1 where the torque requirement is approximately constant. They have a "shunt" characteristic, i.e. the speed falls only slightly with increasing load.

MATHER & PLATT DIRECT CURRENT MOTORS AND GENERATORS

R TYPE
Sizes R-7 to R-14

SPECIFICATION

The machines described in this catalogue embody the best modern practice in the design and construction of direct current motors and generators. All sizes are fitted with four main poles and four commutating poles. They comply in all respects with the British Standard Specification for Industrial Electric Motors and Generators, No. 168, and are fully designed to ensure perfect stability and sparkless running under the most exacting conditions there laid down. The specification herein applies to motors and generators having two end bracket bearings, but other arrangements of bearings, with a possible modification in price, can be supplied in special cases if desired.

The types of enclosures of these motors are generally similar to those already described covering the "L" Type Induction Motors.

Temperature rise, overload capacity and ratings conform to those given above for A.C. machines.

DETAILS OF CONSTRUCTION

Frame

The frame is a plain ring of high permeability steel. The main poles consist of steel stampings accurately machined and assembled, and are bolted to the frame. The armature coils are held in position without the use of any loose shoes or tips, and are easily removable with their poles. The commutating poles are of solid steel, bolted to the frame.

Bearings

Standard machines are provided with a roller bearing of standard size at the driving end, and a ball bearing at the commutator end.

Commutator

The commutator is designed with a very high factor of safety at the highest speed for which the machine is constructed. The segments of hard-drawn copper are insulated from each other and from the end rings by built-up mica of the highest quality. They are mounted on a strong cast-iron hub, and clamped between "V" end rings.

Armature Core

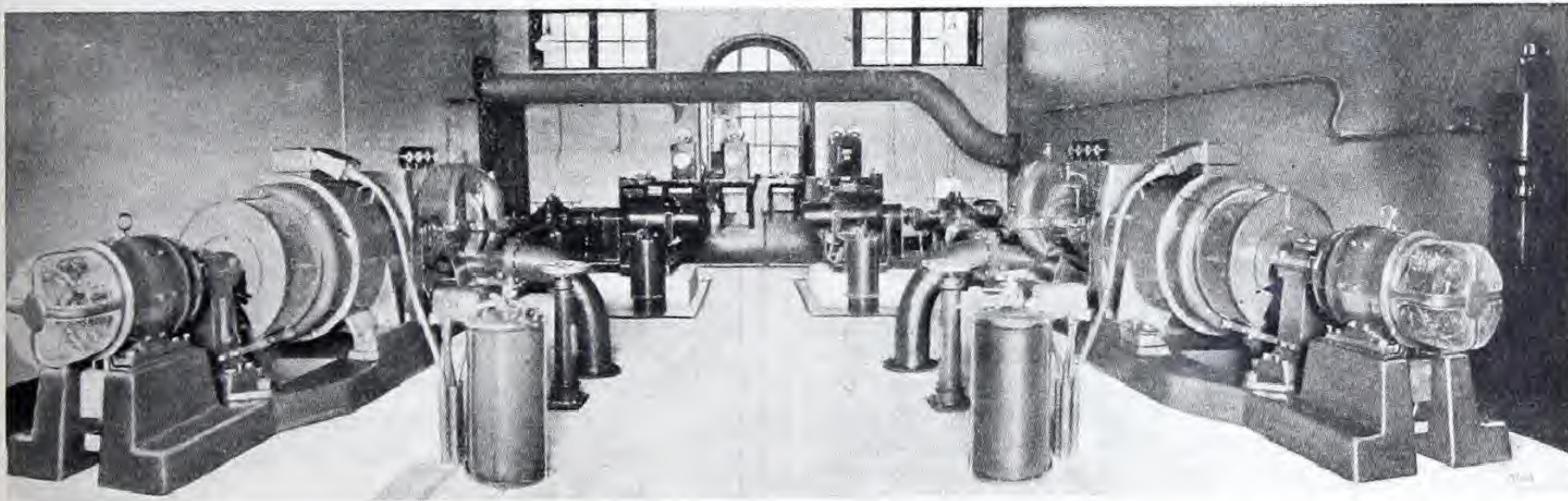
The armature is built up of high grade thin steel laminations, insulated from each other and clamped together under pressure.

Armature Windings

The methods of winding and insulating the armature coils are the result of long experience in meeting and overcoming the severe conditions to be found in collieries, chemical works, bleaching, dyeing and printing works, and other difficult situations. All conductors are thoroughly impregnated before assembly, and the main insulation, consisting of our standard mica sheet mechanically protected by leatheroid, forms a completely sealed insulating tube enclosing the straight part of each half coil and extending for a considerable distance beyond the armature core. The completed armature is finally dried and thoroughly treated with an oil and moisture-proof varnish.

Field Windings

The shunt coils are carefully wound on metal spools, and the cotton covered wires are treated with insulating enamel during the process of winding in such a way as to produce a solid coil whose wires cannot cut or chafe when subjected to vibration. Each shunt coil is provided with two stout terminals which relieve the last turns of wire from all stress. The series coils of compound wound machines are in all cases wound separately from the shunt coils, and are mounted outside the latter, and fully insulated therefrom.



MATHER & PLATT AUTO-SYNCHRONOUS MOTORS—Non-Salient Pole Type (“Wound Rotor” Started)

GENERAL DESCRIPTION

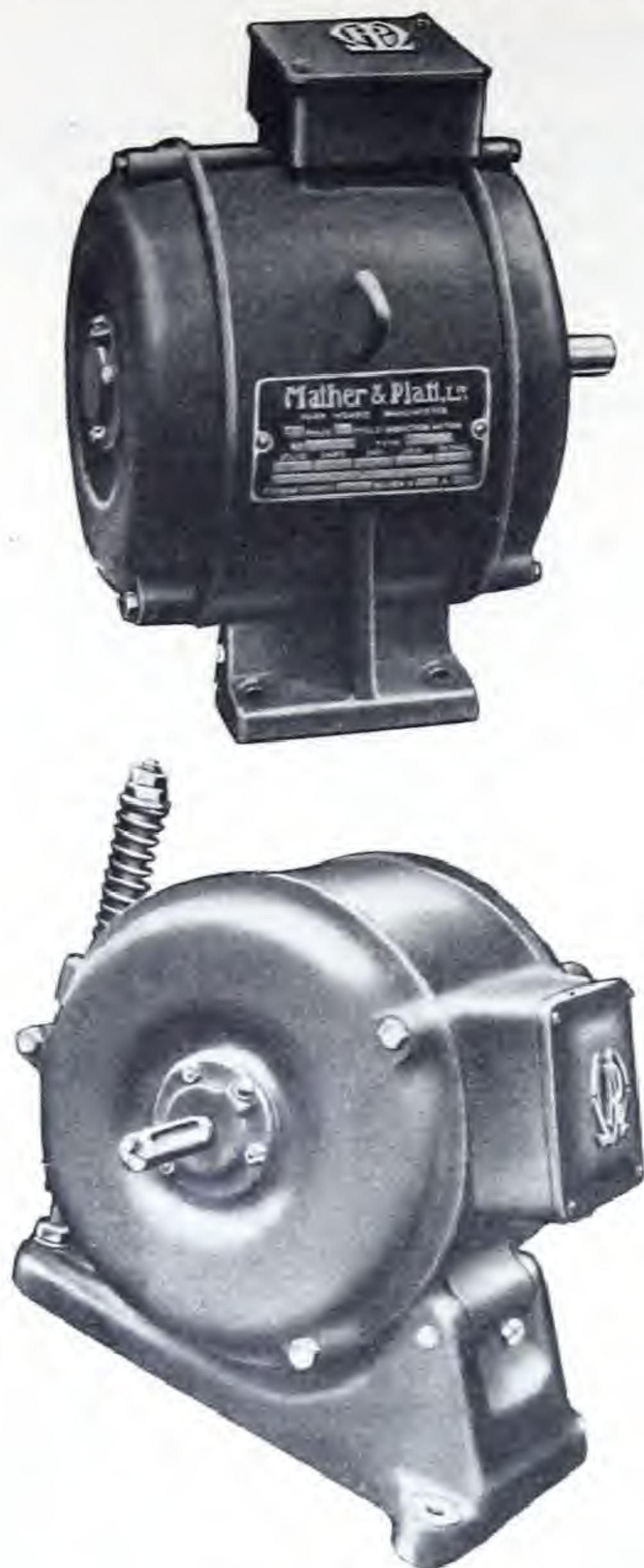
These motors are of the non-salient pole type usually with revolving field but occasionally, in the smaller sizes, of the revolving armature pattern. The secondary windings are of the wound type, a three-phase winding being usually employed, and the motors are started from rest and brought to a speed approaching synchronism by the use of a secondary circuit rheostat. Synchronization is then effected by establishing the field of the machine, for which purpose a direct current exciter, usually driven direct by the synchronous motor, is provided. In certain cases excitation current may be supplied from an existing source or one specially installed for the purpose.

SCOPE OF APPLICATION

of Non-Salient Pole Auto-Synchronous Motors

This type of motor may be usefully employed for the majority of constant speed drives requiring an alternating current motor of moderate or large capacity (say 50 B.H.P. and upwards) where the starting effort required of the motor is considerable and where the somewhat heavy starting current demanded in such cases by motors of the squirrel cage started salient pole type, is objectionable. The fact that the non-salient pole type auto-synchronous motor may be designed to operate at unity power factor or at any desired degree of leading power factor is of course a very considerable asset, and in this respect it is worthy of note that for the larger sizes of machine this type of motor provides one of the cheapest means of power factor improvement.

MATHER & PLATT LOOM MOTORS



GENERAL

Mather & Platt experience in the installation of electrical machinery in textile factories extends over practically half-a-century, and during this period they have led the way in the steadily increasing application of electric drives to the processes of textile manufacture. The wide experience, gained in this and other fields of arduous service, has earned for their electrical products a reputation for reliability which is unsurpassed, and this reputation is fully maintained by the motors designed for the individual driving of looms.

The relative merits of individual and group driving of looms are nowadays well recognized, but it is, however, worth while to emphasize that the success of individual driving depends finally on the absolute reliability and low maintenance costs of the motors themselves. These qualities can only be obtained by strong mechanical construction, generous electrical design, sound insulation and careful workmanship.

RANGE OF OUTPUTS

The majority of looms require motors having outputs between 0.5 B.H.P. and 2 B.H.P., usually at a full load speed of approximately 1140 R.P.M. on a 60 cycle supply. For the larger sizes of looms it is sometimes advisable to reduce the motor speed to 720 R.P.M., especially when the drive is by belt or vee-rope, in order to ensure a satisfactory pulley ratio. These speeds and outputs are well within the range of our standard loom motor sizes and there are windings for all normal voltages, frequencies and speeds.

Price on application.

MATHER & PLATT DIRECT CURRENT MOTORS AND GENERATORS

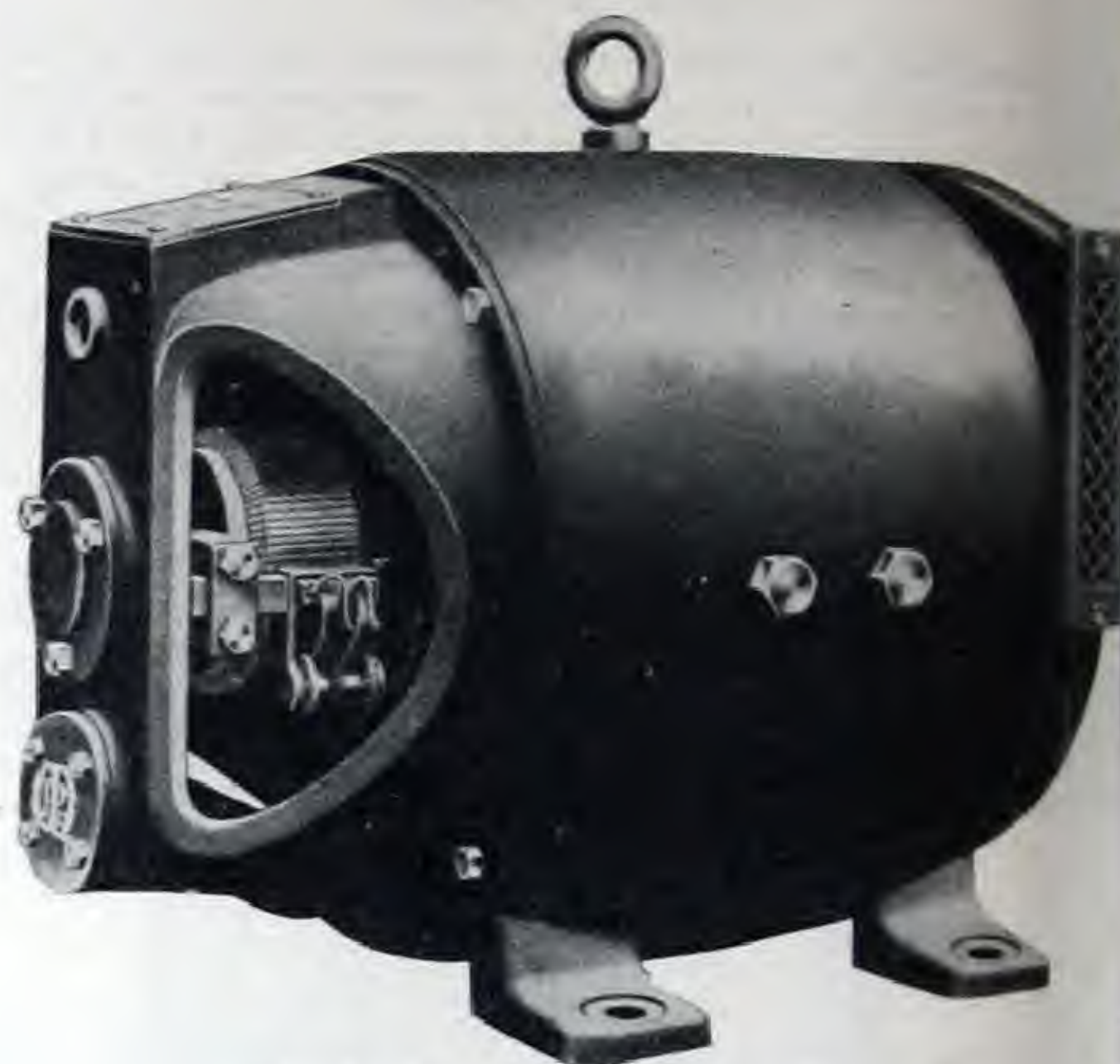


Fig. 1—Open End Bracket Type.

Type TP—Sizes TP-9 to TP-13

General

The TP type machines embody the best modern practice in the design and construction of small direct-current motors and generators. They are carefully designed to meet the exacting requirements of the British Standard Specification for Industrial Electric Motors and Generators (B.S.S. No. 168) with which they comply in all respects.

Price on application.

CUTLER-HAMMER—IGRANIC ELECTRIC CO.

Outstanding manufacturers of electric control apparatus in United States and England—distributing in Canada through Northern Electric Company.

PRODUCTS INCLUDE:

- A.C. & D.C. Elevator Controls & Accessories
- Pressure Regulators, Float Switches, Push Button Switches
- A.C. & D.C. Manual Starters
- A.C. & D.C. Manual Speed Regulators
- A.C. & D.C. Drum Type Controllers
- A.C. & D.C. Automatic Starters
- A.C. & D.C. Mill Controllers.
- A.C. & D.C. Fire Pump Controllers
- Magnetic Separators
- Clutches, Brakes, Magnets
- Industrial Heating Devices
- Gas Measuring Devices
- Electronic Control Apparatus
- Battery Charging Equipment
- Field Rheostats
- Theatre Dimmers
- Automatic Valve Control
- Miscellaneous Resistors
- Marine Control
- Printing Equipment

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.
Motor Controls.

Condit Electrical Mfg. Corp.
Oil Circuit Breakers.

Ferranti Electric Ltd.
Transformers, Surge Absorbers.

J. P. Tubular Heater Co.
Electric Heating Systems.

Sangamo Electric Limited,
Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,
Cutouts and Disconnects.

Telegraph Condenser Co.
Power Static Condensers.

Weston Electric Instrument Corp.
Indicating Instruments of all kinds.
Radio Test Equipment.

Mather & Platt Ltd.
Motors and Generators, All Types,
A. C. and D. C. Complete line of
Centrifugal Pumps.

A. Reyrolle & Co. Limited.
Metal Clad Switchgear.

Ilg Electric Ventilating Co.
Ventilating Fans and Blowers.
Air Conditioning.

WAGNER SINGLE PHASE MOTORS
Repulsion-Start-Induction Type



Typical Fractional H.P. Repulsion-start-induction motor



Typical large Repulsion-start-induction motor

The first commercially successful single phase motor was placed on the market by Wagner in 1896 and ever since that date Wagner single phase motors have been recognized as the highest grade equipment of that type available. Continual progress has been made in the improvement of design and construction in order to make the motor most suitable for modern operating conditions.

Wagner design is well balanced to meet the following requirements:—

- Cool operation,
- Long-lived insulation,
- Low upkeep costs,
- Minimum service,
- Best bearings obtainable,
- Minimum vibration and noise,
- Good appearance and finish,
- Simplicity of construction,
- Years of reliable operation.

Wagner repulsion-start-induction motors develop high starting torque with low starting current so are most suitable for driving machines with high inertia or any load requiring a motor with high torque. They are particularly suitable for use with mechanical refrigeration, air compressors, stokers, pumps, machine tools and similar applications.

The standard motor is of the ventilated type with high grade sleeve bearings, but motors are available for practically any condition. They can be supplied with ball bearings for horizontal or vertical operation; with enclosed or drip proof endplates; with rigid or resilient mounting, and other mechanical variations are developed to meet special requirements.

Wagner repulsion-start-induction motors start as repulsion motors and are equipped with a governor mechanism, by means of which the commutator is short circuited and the brushes lifted from the commutator as the motor comes up to speed. As the brushes are in contact with the commutator for only a few seconds in starting, long brush life is assured. The motors will not cause radio interference so are particularly desirable for service on equipment installed in the home.

Wagner bearing housings are sealed to prevent the entrance of dust or grit, which produce rapid wear. Long strand wool yarn is used to carry an uninterrupted supply of oil to the bearing and to filter the oil. Oil wells are of exceptionally large capacity so require addition of oil at infrequent intervals.

Wagner single phase motors are available for all commercial voltages and frequencies.

WAGNER SINGLE PHASE MOTORS

Split Phase Type



Typical Split Phase Motor

Type RB Split Phase motors are suitable for loads which do not require high starting torque and are in general use for driving fans, blowers and similar applications. They are available in drip proof or totally enclosed construction, and with rigid or resilient mounting.

The stators of Type RB motors are arranged with two windings, one of these being an auxiliary winding which is in use during the starting period only. By means of a switch operated by a centrifugal device the starting winding is cut out after the motor comes up to speed. This Wagner switch mechanism has been designed with a view to long life and freedom from failure, and on test withstands over 500,000 starts and stops without sign of breakdown.

The bearings and endplates are similar to those of Wagner repulsion-start-induction motors, so that proper lubrication and long bearing life are assured.

Type RB Split Phase Motors

110 or 220 volt, 60 cycle

H.P.	Full Load R.P.M.	Frame	Shipping Weight
1/15	1725	59VRB	26
1/15	1140	59WRB	29
1/8	1725	59VRB	26
1/8	1140	59WRB	29
1/6	1725	59VRB	26
1/6	1140	64VRB	38
1/4	1725	59VRB	26
1/4	1140	64XRB	45
1/3	1725	64WRB	49
1/3	1140	64XRB	45

110 or 220 volt—25 cycle

1/15	1425	59WRB	29
1/15	710	59XRB	32
1/10	1425	59WRB	29
1/10	710	64VRB	38
1/8	1425	59WRB	29
1/8	710	64WRB	40
1/6	1425	59WRB	29
1/6	710	64XRB	40
1/4	1425	64VLRB	40
1/4	710	75WRB	80
1/3	1425	67WRB	60
1/3	710	75WRB	80

WAGNER SINGLE PHASE MOTORS

Single Phase Repulsion Start Induction Motors 60 Cycle,
110/220 Volts, 40° C. Cont. Duty

H.P.	Fl. Ld. R.P.M.	Frame	Ship. Wt.	Dia.	Pulley Face	Bore
1/8	1725	59XKA	43	2 1/2"	1 3/4"	1 1/8"
1/8	1140	64RA	61	2 1/2"	1 3/4"	5/8"
1/6	1725	59XKA	43	2 1/2"	1 3/4"	1 1/8"
1/6	1140	64RA	61	2 1/2"	1 3/4"	5/8"
1/4	3450	64XLRA	55	2 1/2"	1 3/4"	5/8"
1/4	1725	64XKA	59	2 1/2"	1 3/4"	5/8"
1/4	1140	64RA	66	2 1/2"	1 3/4"	5/8"
1/3	3450	64YLRA	55	2 1/2"	1 3/4"	5/8"
1/3	1725	64YKA	61	2 1/2"	1 3/4"	5/8"
1/3	1140	75WRA	84	3"	2 1/2"	3/4"
1/2	3450	67XRA	59	3"	2 1/2"	3/4"
1/2	1725	64YGA	62	3"	2 1/2"	3/4"
1/2	1725	75VKA	85	3"	2 1/2"	3/4"
1/2	1140	75XRA	89	3"	2 1/2"	3/4"
1/2	870	224RA	150	4"	3 1/2"	1"
3/4	3450	67YRA	61	3"	2 1/2"	3/4"
3/4	1725	75WKA	90	3"	2 1/2"	3/4"
3/4	1160	204ZRA	106	3"	2 1/2"	3/4"
3/4	870	225RA	165	4"	3 1/2"	1"
1	3450	75XLRA	92	3"	2 1/2"	3/4"
1	1725	204ZKA	106	3"	2 1/2"	3/4"
1	1160	224RA	150	4"	3 1/2"	1"
1	870	254RA	240	5"	4 1/2"	1 1/8"
1 1/2	3500	204RA	106	4"	3 1/2"	1"
1 1/2	1750	224RA	150	4"	3 1/2"	1"
1 1/2	1160	225RA	165	4"	3 1/2"	1"
1 1/2	870	254RA	240	5"	4 1/2"	1 1/8"
2	3500	224RA	150	4"	3 1/2"	1"
2	1750	224RA	150	4"	3 1/2"	1"
2	1160	254RA	240	5"	4 1/2"	1 1/8"
2	870	13TRA	435	5"	4 1/2"	1 3/8"
3	3500	224RA	150	4"	3 1/2"	1"
3	1750	225RA	165	4"	3 1/2"	1"
3	1160	11XRA	365	5"	4 1/2"	1 1/4"
3	870	13VRA	465	5"	4 1/2"	1 3/8"
5	1750	254RA	240	5"	4 1/2"	1 1/8"
5	1160	13VRA	465	5"	4 1/2"	1 3/8"
5	870	15TRA	670	6"	5 1/2"	1 7/8"
7 1/2	1750	13VRA	465	5"	4 1/2"	1 3/8"
7 1/2	1160	15TRA	670	6"	5 1/2"	1 7/8"
7 1/2	870	15VRA	725	8"	7"	1 7/8"
10	1750	15TRA	670	6"	5 1/2"	1 7/8"
10	1160	15VRA	725	8"	7"	1 7/8"
1/8	1425	64YLRA	55	2 1/2"	1 3/4"	1 1/2"
1/6	1425	64YLRA	55	2 1/2"	1 3/4"	1 1/2"
1/4	1425	67XRA	62	2 1/2"	1 3/4"	5/8"
1/3	1425	67YRA	67	2 1/2"	1 3/4"	5/8"
1/2	1425	67ZRA	72	3"	2 1/2"	3/4"
1/2	720	204RA	101	3"	2 1/2"	3/4"
3/4	1450	204RA	101	3"	2 1/2"	3/4"
3/4	720	224RA	150	4"	3 1/2"	1"
1	1450	224RA	150	4"	3 1/2"	1"
1	720	254RA	300	4 1/2"	4 1/2"	1 1/8"
1 1/2	1450	225RA	165	4"	3 1/2"	1"
1 1/2	720	11VRA	320	4"	3 1/2"	1 1/4"
2	1450	254RA	300	4 1/2"	4 1/2"	1 1/8"
2	720	13TRA	435	5"	4 1/2"	1 3/8"
3	1450	254RA	300	4 1/2"	4 1/2"	1 1/8"
3	720	13TRA	435	5"	4 1/2"	1 3/8"
5	1450	13VLRA	530	5"	4 1/2"	1 1/4"
5	720	15TRA	670	6"	5 1/2"	1 7/8"
7 1/2	1450	15TLRA	670	6"	5 1/2"	1 7/8"
7 1/2	720	15VRA	725	8"	7"	1 7/8"
10	1450	15VLRA	725	8"	7"	1 7/8"

59, 64 and 67 frames have slotted feet—sliding bases not required.

Prices on application.

ROCKWOOD PAPER PULLEYS

Rockwood Pulleys for every service

The construction of Rockwood Pulleys permits a great flexibility in design and combination of materials. The illustrations on these pages show various constructions carefully designed to meet the varying requirements of different pulley applications.

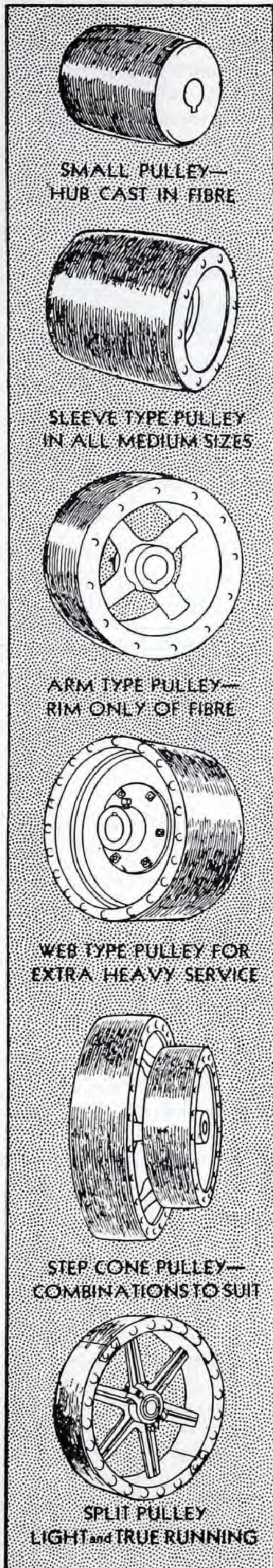
Pulleys as small as 1/2 inch diameter for fractional horsepower drives are as important to successful machine performance as are the large 36 inch diameter pulleys for board drop-hammers. Drills, gas engines, threshing machines are typical of the applications of Rockwood Pulleys as are electric motors, line shafts and machine tools.

No extra charge for custom-made-to-order pulleys in fractional diameters and widths. . . . Hub widths and locations may be varied to suit. . . . Ways and bores are machined as to size. . . . All pulleys are turned inside out and carefully finished for high speeds. . . . Relatively light weight pulleys for transportation. . . . These are some of the factors that make Rockwood Pulleys lowest cost and most practical to use.

Rockwood Pulleys can safely run at speeds impractical for other pulleys. Their fibre rims are tough and durable, and are not affected by acids or fumes. They will withstand shocks and strains that would ruin metal or wood pulleys. The fibre surface prevents contact with metal belt fasteners.

All Rockwood Pulleys are water-resistant and guaranteed to withstand normal conditions of moisture. For unusually severe conditions or outdoor exposure, they should be ordered special water-proofed.

To order, send sketch or complete information including dimensions and type of service for which pulleys are to be used. . . . Every Rockwood Pulley has the unconditional Rockwood guarantee: satisfaction or money refunded.



SMALL PULLEY—
HUB CAST IN FIBRE

SLEEVE TYPE PULLEY
IN ALL MEDIUM SIZES

ARM TYPE PULLEY—
RIM ONLY OF FIBRE

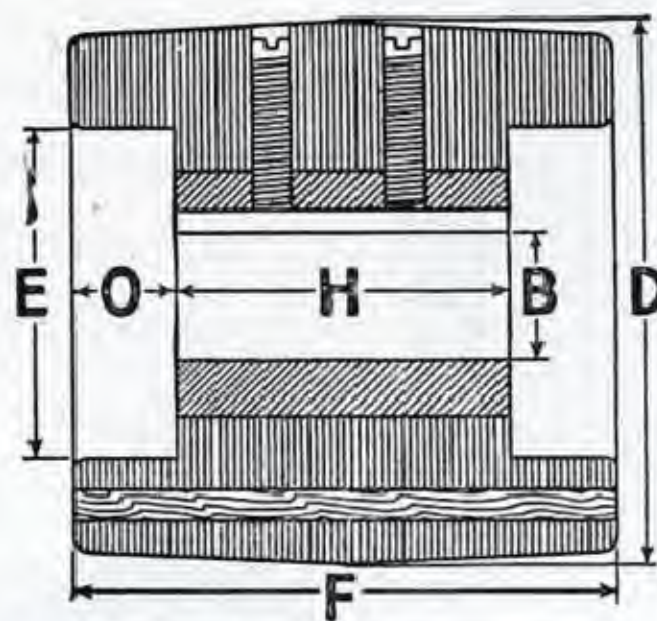
WEB TYPE PULLEY FOR
EXTRA HEAVY SERVICE

STEP CONE PULLEY—
COMBINATIONS TO SUIT

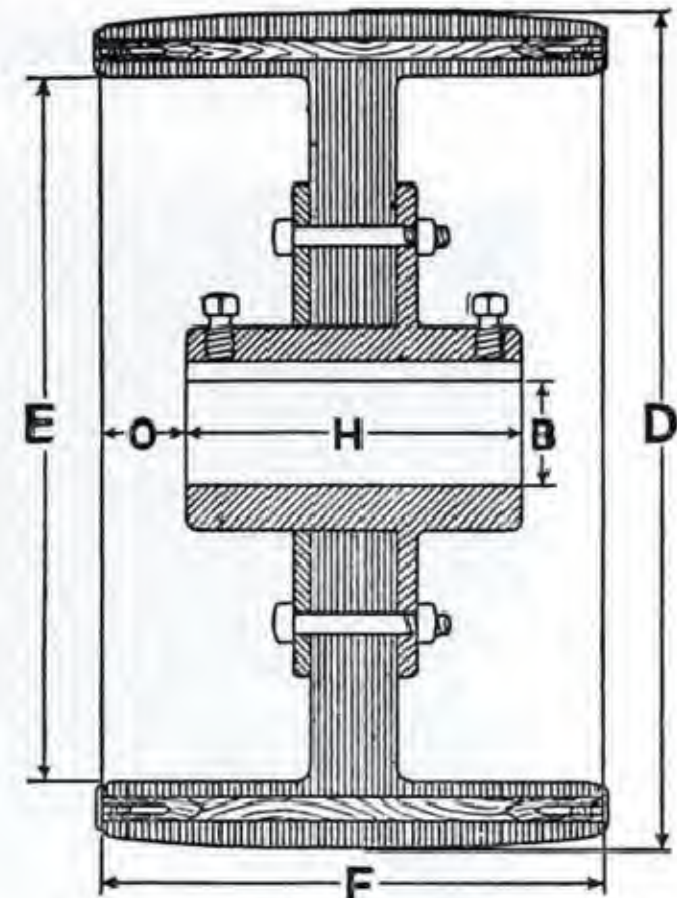
SPLIT PULLEY
LIGHT and TRUE RUNNING

ROCKWOOD PAPER PULLEYS

How to Specify Pulleys
Made to Your Order



Sleeve Type



Web Type

Give Information as Follows:

1. Number of pulleys wanted.
2. Diameter of pulley (D).

No extra charges for exact diameter at crown or edge of rim or for fractional sizes. 1/2-inch and larger takes next higher list.

3. Total width of face (F). (See Note 1.)

No extra charges for straight face, double crown, center groove, special high crown, etc. No extra charges for exact width, or for fractional sizes, except 1/2-inch and larger takes next higher list.

4. Width of belt to be used.

5. Exact bore or shaft diameter (B). (See Note 2.)

No extra charge for bores in 1/16-inch and in reasonable proportion to outside diameter of pulley. A nominal extra charge is made for large bores requiring special construction. Standard limit of accuracy: A ground plug gauge full length of bore and exact shaft diameter must pass through hole by hand and without shake.

6. Width of keyseat in shaft.

A nominal extra charge is made for keyseats in dimensions other than 1/16-inch, as 3/32-inch or .787 inch.

7. Depth of keyseat in pulley. (See Note 3.)

No extra charge for tapered keyseat. Standard practice is for single straight keyseat with set-screws over it. Keyseat depth is usually made one-half of the width.

8. Length of hub or shaft projection. (See Note 4.)

No extra charge for offset or special length hubs. Ends of hubs are approximately true but not machined.

9. Distance from end of hub to edge of rim (O). (See Note 5.)

10. Least allowable inside rim dimension (E). (See Note 6.)

11. Kind of face—crown, straight, double crown, etc.

12. If double crown, give location of faces relative to hub.

13. State on what machine pulley is to be used and name of maker. If electric motor, give type of motor, horsepower, revolutions per minute and, if possible, frame number.

14. Balance—All Rockwood Pulleys are carefully put in static (standing) balance. Attention should be called to rim speeds above 5,000 feet per minute.

Note 1. Rockwood Pulleys are rounded at the edges of the rims and the total width of face should exceed the width of belt, as follows: Up to 2 inches plus 1/4 inch; 2 inches to 5 inches, inclusive, plus 1/2 inch; 6 inches to 9 inches, inclusive, plus 3/4 inch; 10 inches to 23 inches plus 1 inch; 24 inches to 36 inches plus 1 1/2 inches; above 36 inches plus 2 inches.

Note 2. Bores of pulleys should not be ordered as "scant" or "full." If shafts are not standard give micrometer dimensions or send wire gauges with order.

Note 3. If not otherwise specified, keyseats are made straight and set screws placed over the keyseats.

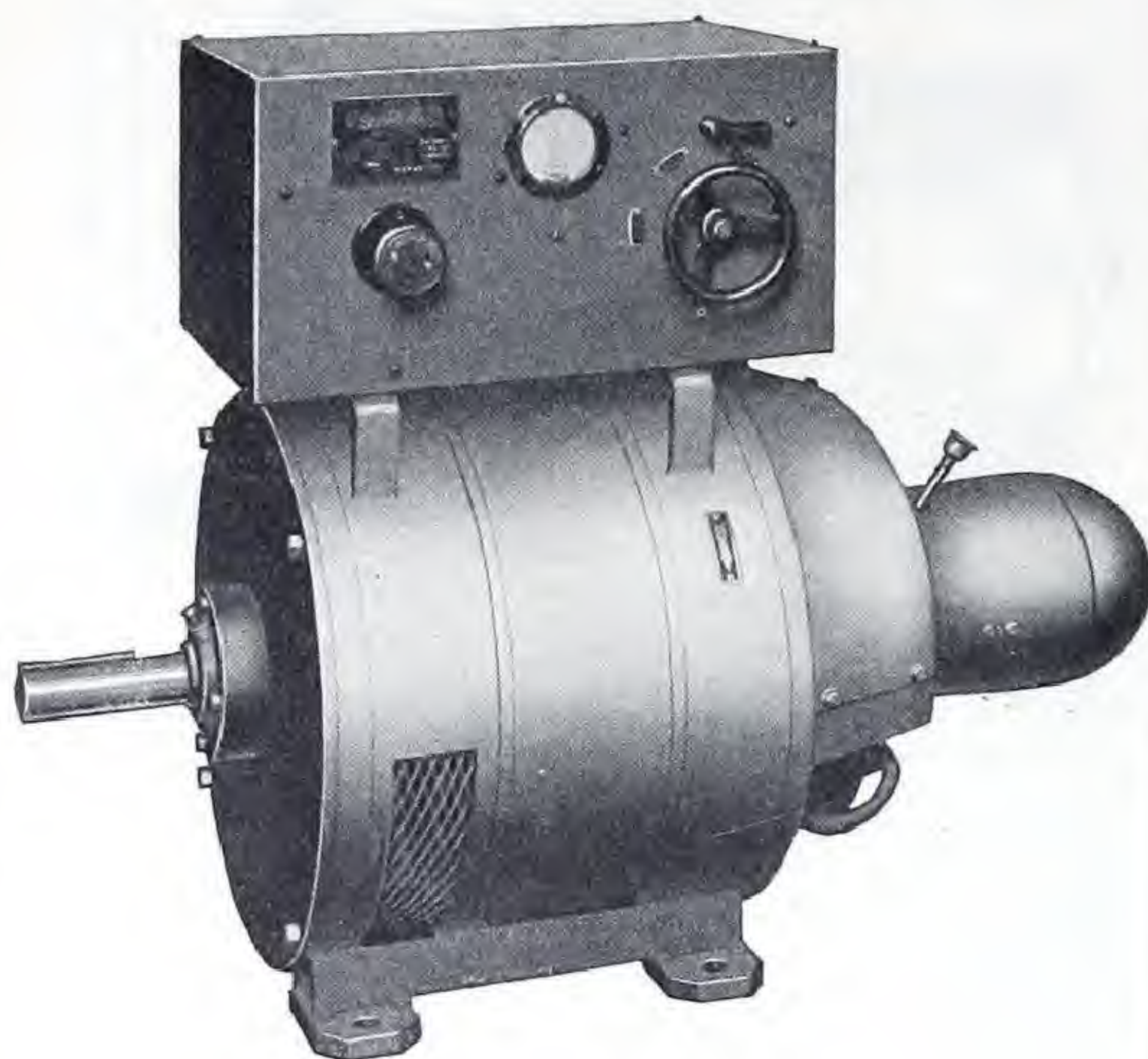
Note 4. The lengths of hubs are made slightly less than three (3) times the diameter of shaft (to conform to electric motor practice), unless otherwise specified. Exceptions to this rule are necessarily made when the total width of face is less than three (3) times the shaft size or when hubs are required to be full length of the pulley to conform to special constructions in small diameters.

Note 5. If pulleys are to be used on shafts extending from machines, give the dimension "O" on the side of pulley next to the machine.

Note 6. If rim of pulley is to overhang or extend over a bearing or other similar part of machine, give the smallest allowable inside diameter of rim for clearance. The rims of paper pulleys are thicker than for cast iron pulleys.

LINCOLN SHIELD ARC WELDERS

Belted or Direct-Driven Types



GENERATOR. N.E.M.A. rated, single operation variable voltage type with completely laminated magnetic circuit (frame and pole pieces) and equipped with interpoles. Requires no external reactance or stabilizer. Patented dual control of welding current accomplished by adjustment of both series and shunt fields. Supplies uniform welding current for metallic arc welding with bare or heavily coated (shielded arc type) electrodes, also for carbon arc welding.

EXCITATION. Separate excitation of generator shunt fields (115 volts D.C.) supplied by amply large exciter direct connected on commutator end. Exciter armature mounted by sleeve construction on same shaft as generator armature.

GENERATOR CONTROL. Enclosed non-breakable steel cabinet mounted at handy height on top of unit contains control mechanism for generator. No parts carrying current are exposed. Center reading combination volt-ammeter, generator field rheostat, current regulating switch, polarity reversing switch are mounted in a vertical position on "dead-front" panel of control cabinet.

CONSTRUCTION AND GENERAL ASSEMBLY. Arc-welded steel, drip-proof construction employed to fullest extent. All units completely assembled. Welder completely wired ready for operation, and no wiring exposed. Electrode and ground cable connection enclosed in control cabinet. Generator and exciter armatures mounted on one large shaft, with two ball bearings which are of extra large size. Pulley furnished as standard equipment but may be omitted if not needed.

Prices on application.

LINCOLN SHIELD ARC WELDER

Belted or Direct-Driven Types

OPTIONAL EQUIPMENT

"Lincontrol," a remote control device attached to control panel—for automatic regulation of welding current from point of welding without use of extra cables or portable accessories.

Sliding base, for belt adjustment.

Oversize exciter—for furnishing one kilowatt excess power (115 volts D.C.) for auxiliary tools or lights.

Standard set of welding accessories as follows:

- 1 Ground Cable, 30 feet, rubber-covered Lincoln cable with lugs or terminals.
- 1 Electrode Cable, 35 feet, Lincoln Stable-Arc, extra flexible, with lug or terminal.
- 1 Lincoln Electrode Holder.
- 1 Face or Head Shield complete with protective lens and cover glass.
- 1 Wire Scratch Brush.
- 50 lbs. assorted Lincoln Electrodes.

Ampere Rating at 40 Volts

N. E. M. A.*	300	400	600
Current Range, Welding Duty either 25 or 40 volt arc	90-375 amperes	120-500 amperes	180-750 amperes
Type Designation	SA-300	SA-400	SA-600
Specification No.			
1800 r.p.m.	S-3657	S-3661	S-3668
1500 r.p.m.	S-3658	S-3659	S-3669
Horsepower Required (actual, not calculated engine rating)	20	25	40
Weights, approximate, in lbs.			
Net	875	915	1075
Shipping, Domestic	975	1015	1175
Shipping, Export	1280	1340	1500
Base, additional	83	83	84
Standard Accessories	80	90	90
Rotation	Clockwise when facing pulley end.		

*N. E. M. A. Rating. The standard ampere rating shall be such that when the machine is operated at its normal rated voltage and speed against a resistance load for a period of one hour, the temperature rise with normal rated current flowing, shall not exceed 50° C. except commutator which is 65° C.

Prices on application.

The Lincoln "Shield-Arc" Welder will save in labor costs over other welders, enough in three years to pay for its entire first cost.

LINCOLN SHIELD ARC WELDERS

AC Motor-Driven Types



Portable Unit

This new addition to the famous Lincoln line of "Shield-Arc" welders is designed for more efficient welding with alternating current. This motor generator type of arc welder produces 2-phase or 3-phase alternating current of standard voltages and frequencies and converts it into alternating current of lower voltage at the higher frequency most suitable for metallic arc welding with either heavily coated (shielded arc type) or washed electrodes.

The characteristics of the AC arc as produced by this machine are greatly improved. The arc is more stable, has less magnetic blow and is easier to start. Higher quality of weld metal is obtained due to less splatter loss. Welds of multiple beads have greater density.

Power factor of the "Shield-Arc AC" welder is approximately double that of the usual transformer type of equipment. Power is taken from all phases, instead of one phase. Thus unbalancing of phases is eliminated. Regulation of the transmission equipment is greatly improved because the "Shield-Arc AC" draws from the line balanced power at lower current and higher power factor. Current drawn from the line by this new AC welder is no more than required by the DC motor generator type and is a fraction of the amount of current drawn by the transformer type of welding machine.

MOTOR—Lincoln "Linc-Weld" squirrel cage induction motor for across-line-starting. Supplied for either 220 or 440 volts, also for 550 volts, 2 or 3 phase, 60 or 50 cycles as desired.

CONTROLS—Enclosed non-breakable steel cabinet mounted at handy height on top of unit contains control mechanism for motor and current range, including the across-the-line magnetic motor starter with overload and no voltage protection. No parts carrying current are exposed. Amperage selector, current selector switch and Lincoln safety push button switch for motor starter are mounted on the "dead front" panel of control cabinet. Continuous current control knob conveniently mounted on the nose of the machine.

Prices on application.

LINCOLN SHIELD ARC WELDERS

A.C. Motor-Driven Types

GENERAL CONSTRUCTION

Arc-welded steel, drip-proof construction employed to fullest extent. All units completely assembled and mounted on welded steel platform type base with or without roller bearing running gear and steering handle as desired.

Welder completely wired ready for operation. No generator or motor wiring exposed. Power line and electrode and ground cable connection enclosed in control cabinet.

OPTIONAL EQUIPMENT

Weatherproof canopy with steel frame and top, equipped with canvas side and end curtains.

Solid rubber tired running gear.

Standard set of welding accessories as follows:

1—Ground Cable, 30 feet, rubber covered Lincoln cable with lugs or terminals.

1—Electrode Cable, 35 feet, Lincoln Stable-Arc, extra flexible, with lug or terminal.

1—Lincoln Electrode Holder.

1—Face or Head Shield complete with supervisibility protective lens and cover glass.

1—Wire Scratch Brush.

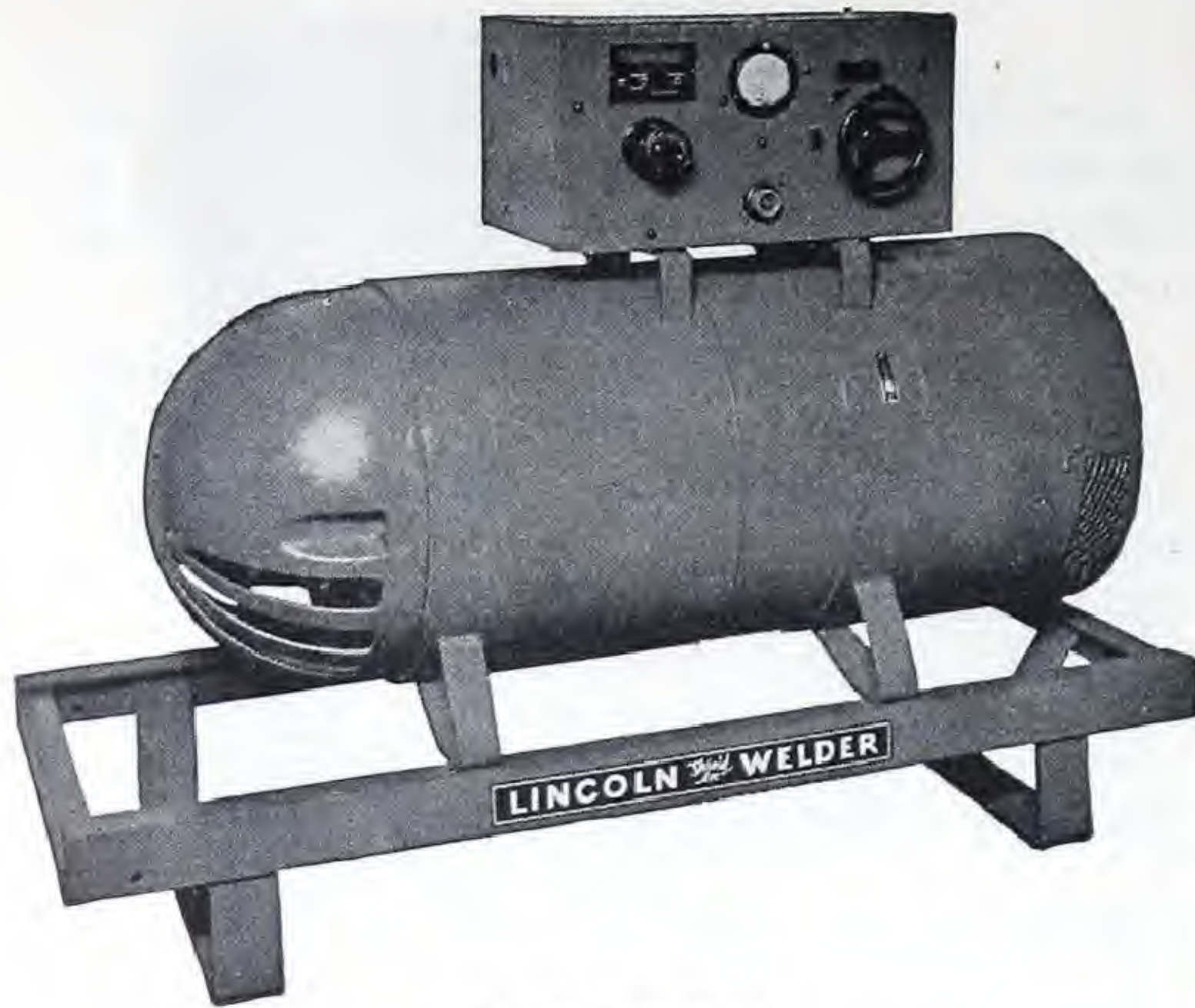
50 lbs.—Assorted Lincoln Electrodes.

Type Designation	SAC-300	SAC-500
Current Range, Welding Duty	75 to 450 amperes	100 to 700 amperes
Horsepower Rating, Motor	20	30
Weights, Approximate, in lbs.		
Net	1230	1500
Shipping, Domestic	1310	1580
Shipping, Export	1790	2000
Running Gear, Additional	90	90
Standard Accessories	80	90
Dimensions, in Inches		
Length, Stationary or Portable unit	56"	56"
Width, Stationary Unit	21½"	21½"
Width, Portable Unit, Overall	27¾"	27¾"
Height, Stationary Unit	42¾"	42¾"
Height, Portable Unit	50¾"	50¾"

Prices on application.

LINCOLN SHIELD ARC WELDERS

A.C. Motor-Driven Types



Stationary Unit

GENERATOR—N. E. M. A. rated, single operator variable voltage type with completely laminated magnetic circuit (frame and pole pieces) and equipped with interpoles. Requires no external reactance or stabilizer. Patented dual control of current accomplished by adjustment of both series and shunt fields. Supplies uniform welding current for metallic arc welding with bare or heavily coated (shielded arc type) electrodes, also for carbon arc welding.

MOTOR—Lincoln "Linc-Weld" squirrel cage induction type for across-the-line starting. Size of motor ample for heavy overloads. Connections for either 220 or 440 volts readily available. Also supplied for 550 volts or special voltages; two or three phase; 60, 50, 40, 30 or 25 cycles as desired.

EXCITATION—Separate excitation of generator shunt fields (115 volts D. C.) supplied by amply large exciter connected on motor end. Exciter armature mounted by sleeve construction on same shaft as motor rotor and generator armature.

MOTOR AND GENERATOR CONTROL—Enclosed non-breakable steel cabinet mounted at handy height on top of unit contains unified control mechanism for both motor and generator, including the across-the-line magnetic motor starter with overload and no-voltage protection. No parts carrying current are exposed. Center reading combination volt-ammeter, generator field rheostat, current regulating switch, polarity reversing switch and Lincoln safety push button for motor starter are mounted in a vertical position on "dead-front" panel of control cabinet.

CONSTRUCTION AND GENERAL ASSEMBLY—Arc-welded steel, drip proof construction employed to fullest extent. All units completely assembled and mounted on welded steel platform type base with or without roller bearing running gear and steering handle as desired.

Welder completely wired ready for operation. No generator or motor wiring exposed. Power line and electrode and ground cable connection enclosed in control cabinet. Motor rotor, generator and exciter armatures all mounted on one large shaft, requires only two ball bearings which are of extra large size.

OPTIONAL EQUIPMENT

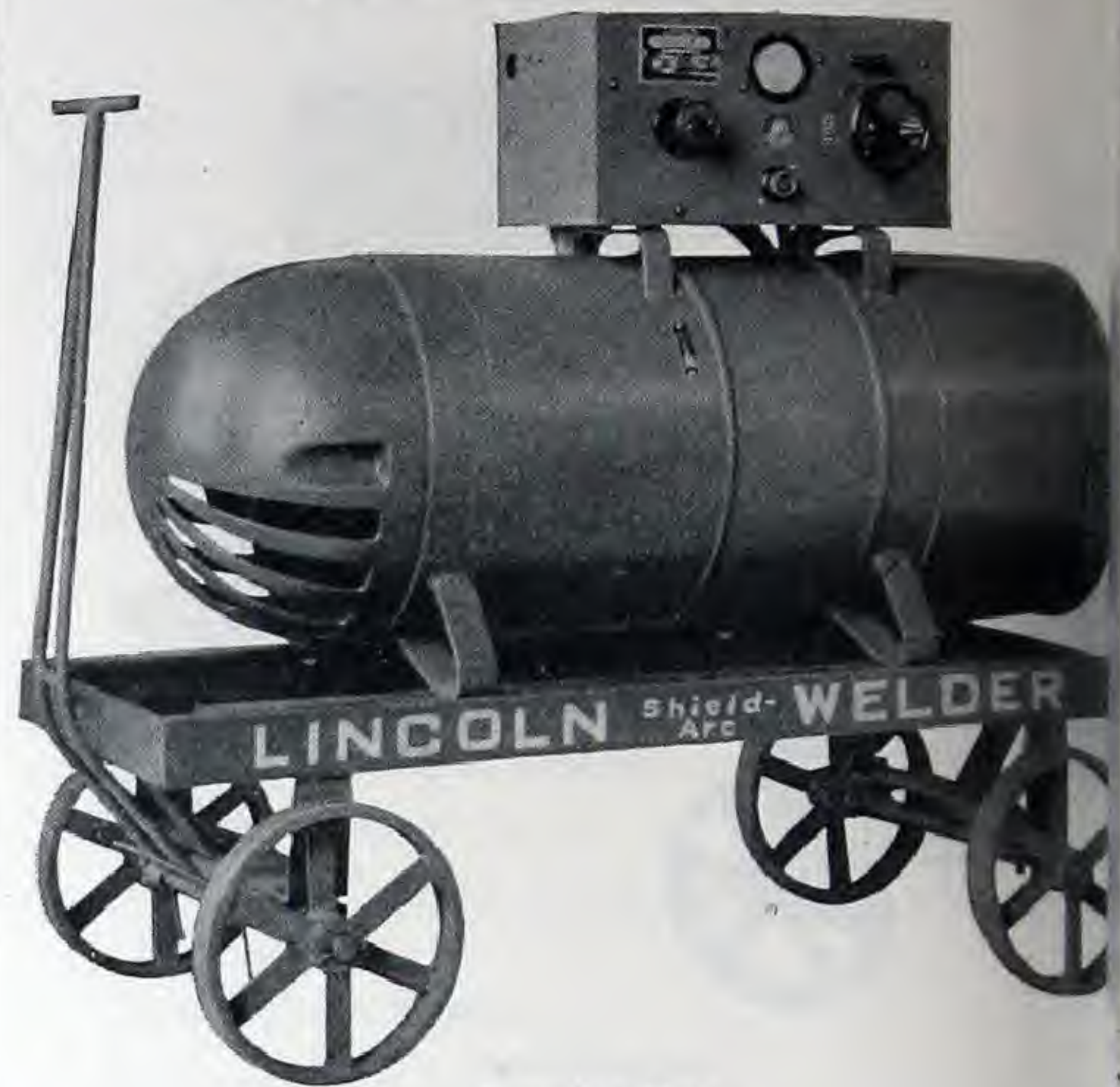
"Lincontrol," a remote control device attached to control panel—for automatic regulation of welding current from point of welding without use of extra cables or portable accessories.

Special shaft extension—for direct connection.

Prices on application.

LINCOLN SHIELD ARC WELDERS

A.C. Motor-Driven Types



Portable Unit

OPTIONAL EQUIPMENT

Dual-Voltage motor and control—for quickly changing from 220 to 440 volts or vice versa.

Oversize exciter—for furnishing one kilowatt excess power (115 volts D. C.) for auxiliary tools or lights.

Weatherproof canopy with steel frame and top, equipped with canvas side and end curtains.

Solid rubber tired running gear.

Standard set of welding accessories as follows:

1—Ground Cable, 30 feet, rubber covered Lincoln cable with lugs or terminals.

1—Electrode Cable, 35 feet, Lincoln Stable-Arc, extra flexible, with lug or terminal.

1—Lincoln Electrode Holder.

1—Face or Head Shield complete with supervisory protective lens and cover glass.

1—Wire Scratch Brush.

50 lbs.—Assorted Lincoln Electrodes.

Ampere Rating at 40 Volts

N. E. M. A.*..... 300 400 600

Current Range, Welding

Duty either 25 or 40 volt arc..... 90 to 375 120 to 500 180 to 750

Type Designation..... SA-300 SA-400 SA-600

Specification Number

60 Cycles, 1800 RPM... S-3624 S-3625 S-3662

50 Cycles, 1500 RPM... S-3624 S-3625 S-3662

25 Cycles, 1500 RPM... S-3634 S-3635 S-3663

Horsepower Rating, Motor

Weights, Approximate, in

lbs.

Net..... 1230 1500 1700

Shipping, Domestic.... 1310 1580 1780

Shipping, Export..... 1790 2000 2200

Running gear, additional

Standard accessories.... 80 90 90

Dimensions, in inches

Length, stationary or

portable unit..... 56" 56" 56"

Width, stationary unit.. 21½" 21½" 21½"

Width, portable unit,

overall..... 27¾" 27¾" 27¾"

Height, stationary unit.. 42¾" 42¾" 43¾"

Height portable unit... 50¾" 50¾" 51½"

*N. E. M. A. Rating—The standard ampere rating shall be

such that when the machine is operated at its normal rate

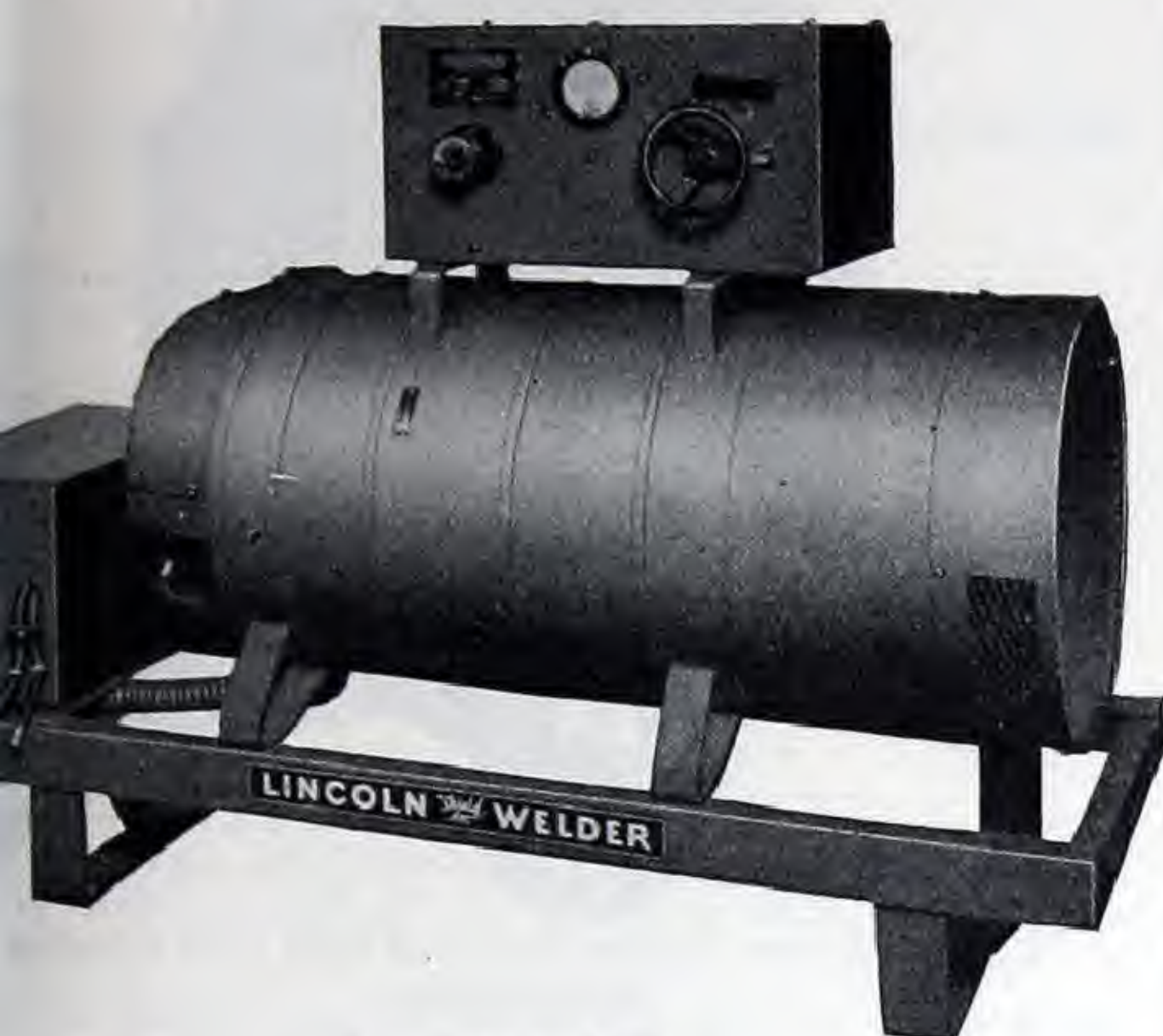
voltage and speed against a resistance load for a period of one

hour, the temperature rise with normal rated current flowing

shall not exceed 50° C. except commutator which is 65° C.

Prices on application.

LINCOLN SHIELD ARC WELDER DC Motor-Driven Types



Stationary Unit

GENERATOR

E. M. A. rated, single operator variable voltage type completely laminated magnetic circuit (frame and pole shoes) and equipped with interpoles. Requires no external excitation or stabilizer. Patented dual control of welding current accomplished by adjustment of both series and shunt fields. Supplies uniform welding current for metallic arc welding with bare or heavily coated (shielded arc type) electrodes, also for carbon arc welding.

MOTOR

Lincoln "Linc-Weld" compound wound, with interpoles. Standard voltages 115 and 230; also built for 550 or 400 to 600 volts and other special voltages. Size of motor ample for heavy loads.

EXCITATION

Separate excitation of generator shunt fields supplied from power line voltage.

MOTOR AND GENERATOR CONTROL

Enclosed non-breakable steel cabinet mounted at handy height on top of unit contains control mechanism for generator. No parts carrying current are exposed. Center reading voltmeter, generator field rheostat, current limiting switch, polarity reversing switch (for 115 or 230 volt circuits) are mounted in a vertical position on "dead-end" panel of control cabinet.

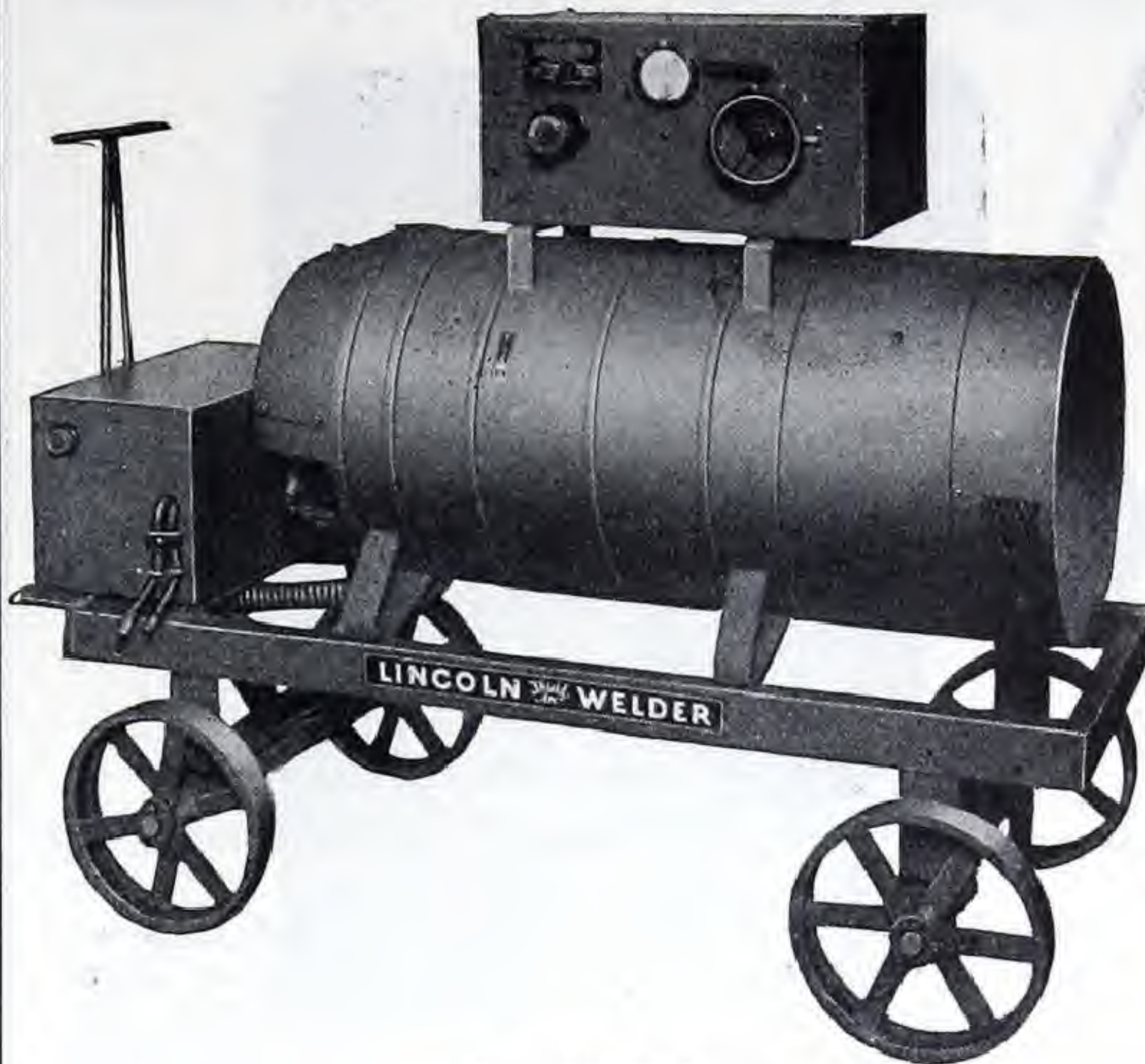
Magnetic, automatic, motor starter, in enclosed steel case mounted at motor end of unit on platform frame and operated by push button. Push button mounted in starter enclosing

CONSTRUCTION AND GENERAL ASSEMBLY

Welded steel, drip-proof construction employed to the extent. All units completely assembled and mounted on welded steel platform type base with or without roller wheels and running gear and steering handle as desired. Welded completely wired ready for operation. No generator or motor wiring exposed. Connections for power line readily made. Electrode and ground cable connection enclosed in control cabinet. Motor and generator armatures mounted on large shaft, requires only two ball bearings, which are of large size.

Prices on application.

LINCOLN SHIELD ARC WELDER D.C. Motor-Driven Types



Portable Unit

OPTIONAL EQUIPMENT

"Lincontrol," a remote control device attached to control panel—for automatic regulation of welding current from point of welding without use of extra cables or portable accessories (for 115 or 230 volt circuits).

Weatherproof canopy with steel frame and top, equipped with canvas side and end curtains.

Solid rubber-tired running gear.

Special shaft extension—for direct connection.

Standard set of welding accessories as follows:

1—Ground Cable, 30 feet, rubber-covered Lincoln cable with lugs or terminals.

1—Electrode Cable, 35 feet, Lincoln Stable-Arc, extra flexible, with lug or terminal.

1—Lincoln Electrode Holder.

1—Face or Head Shield complete with protective lens and cover glass.

1—Wire Scratch Brush.

50 lbs.—Assorted Lincoln Electrodes.

Ampere Rating at 40 Volts

N. E. M. A. * 300 400 600

Current Range, Welding

Duty either 25 or 40 volt arc 90 to 375 120 to 500 180 to 750

amperes amperes amperes

Type Designation SA-300 SA-400 SA-600

Specification Number S-3642 S-3643 S-3644

Horsepower Rating, Motor

1800 r.p.m. 20 25 40

Weights, approximate, in lbs.

Net 1450 1670 2200

Shipping, Domestic 1550 1770 2300

Shipping, Export 1950 2170 2700

Running gear, additional 90 90 90

Standard accessories 80 90 90

Dimensions, in inches

Length, stationary or portable unit 60" 60" 70"

Width, stationary unit 21 1/2" 21 1/2" 21 1/2"

Width, portable unit, overall 27 3/4" 27 3/4" 27 3/4"

Height, stationary unit 42 3/8" 42 3/8" 43 5/16"

Height, portable unit 50 3/16" 50 3/16" 51 1/8"

*N. E. M. A. Rating—The standard ampere rating shall be such that when the machine is operated at its normal rated voltage and speed against a resistance load for a period of one hour, the temperature rise with normal rated current flowing, shall not exceed 50° C. except commutator which is 65° C.

Prices on application.

LINCOLN SHIELD ARC WELDER Engine-Driven Type



Engine-Driven Welder mounted on pneumatic tired running gear

GENERATOR

Ampere rating at 40 volts, N. E. M. A., 400 amperes; current range for welding duty either 25 or 40 volt arc, 120 to 500 amperes. Single operator variable voltage type with completely laminated magnetic circuit (frame and pole pieces) and equipped with interpoles. Requires no external reactance or stabilizer. Patented dual control of welding current accomplished by adjustment of both series and shunt fields. Supplies uniform welding current for metallic arc welding with bare or heavily coated (shielded arc type) electrodes, also for carbon arc welding.

GENERATOR CONTROL

Enclosed non-breakable steel cabinet contains control mechanism for generator. No parts carrying current are exposed. Center reading combination volt-ammeter, generator field rheostat, current regulating switch and polarity reversing switch are mounted in a vertical position on "dead-front" panel of control cabinet.

COUPLING

The generator frame is mounted directly to the engine bell-housing and the generator shaft is connected directly to the engine flywheel by special type of flexible coupling.

EXCITATION

Separate excitation of generator shunt fields (115 volts D.C.) supplied by amply large exciter direct connected on commutator end. Exciter armature mounted by sleeve construction on same shaft as generator armature.

IDLING DEVICE

(Throttle Control)—An exclusive Lincoln feature permits the engine to idle at a low speed when not welding but upon striking the arc, the speed automatically increases to the properly governed speed. This patented feature affects a material reduction in fuel and oil consumption, as well as reducing wear in the engine. Momentary interruption of the arc does not affect the speed of the engine, thus allowing for changing of electrode without reducing the engine speed. An adjustable period of approximately 15 to 30 seconds is provided between interrupting the arc and the actual slowing down of the engine speed.

BASE AND MOUNTING

Base is made of heavy structural steel channel, strongly braced and welded. Engine, generator and radiator are securely fastened to the substantial channel frame. Gasoline tank and control panel, bolted to cross members between canopy supports.

CANOPY

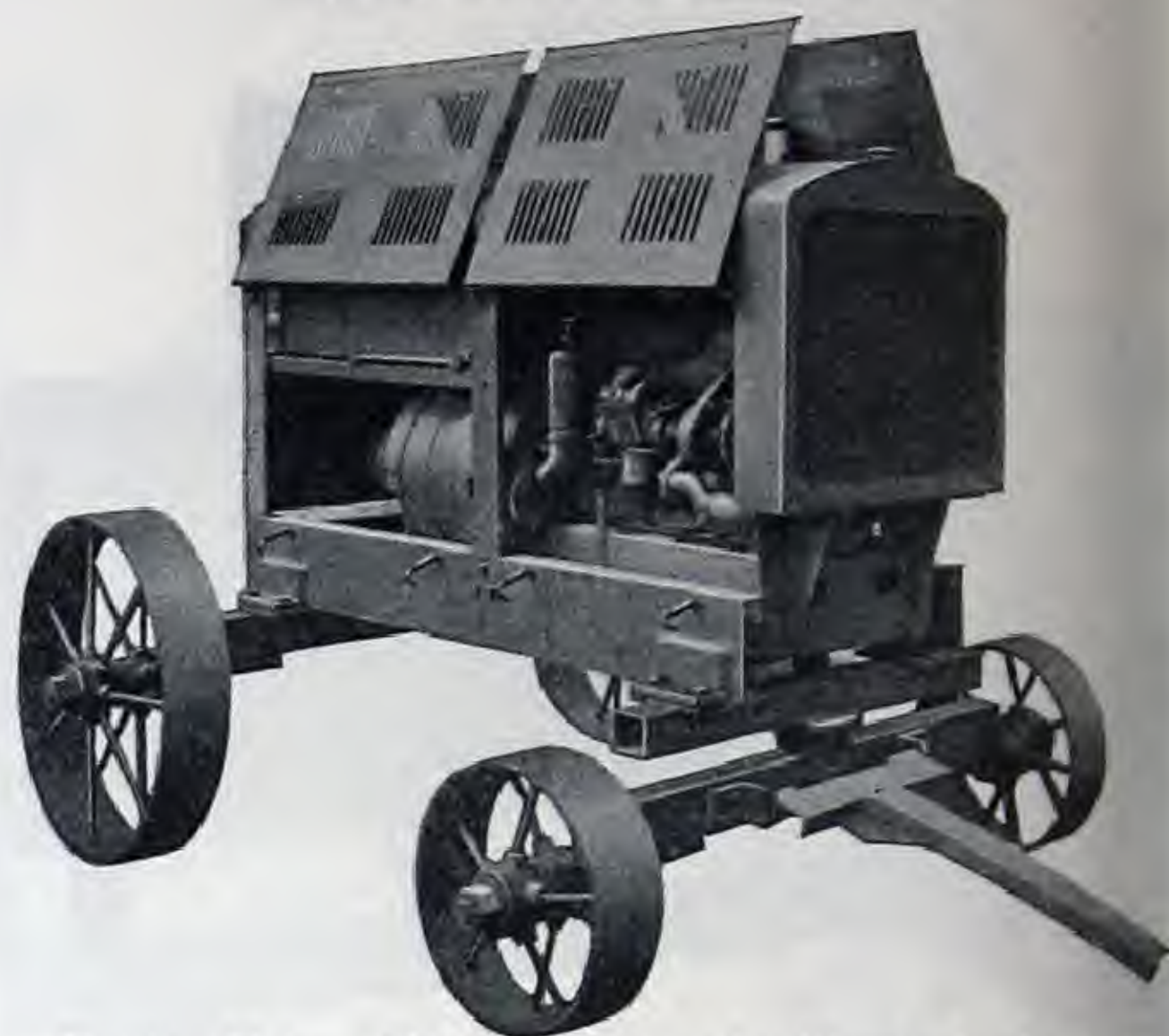
(Enclosing Cover)—A pressed steel canopy is supported by heavy structural steel members. Two side doors on either side are hinged at top and provided with ventilating louvres, with spring fasteners at bottom. A hinged door at rear of the unit provides easy access to welder control panel.

LIFTING HOOK

Provision is made whereby the entire unit can be easily raised with one hook of a chain or crane fall, and is properly balanced when so raised.

Prices on application.

LINCOLN SHIELD ARC WELDER Engine Driven Type



Engine-Driven Welder equipped with steel wheeled running gear

MAKE AND TYPE

Buda Model H-298 six-cylinder type, $3\frac{3}{4}$ " bore, and $4\frac{1}{2}$ " stroke with piston displacement of 298.2 cubic inches, capable of delivering 66 H.P. at 1800 r.p.m., the speed at which the unit is operated.

CYLINDERS

Cast en bloc semi-steel. Ample water jacket space designed to secure complete circulation around each valve and cylinder. Removable cylinder head.

CRANKSHAFT

Drop forged from open hearth steel, heat treated, machine and drilled for force feed oiling system. Balanced on special crankshaft balancing machine.

CONNECTING ROD ASSEMBLY

Drop forged "I" beam section of chrome vanadium steel, heat treated, with upper ends provided with phosphor bronze bushings and lower ends with babbitt bearings of special design.

MAIN BEARINGS

Seven main bearings 3" diameter; length—front $1\frac{1}{2}$ " intermediates $1\frac{1}{8}$ ", center 2", rear $2\frac{1}{8}$ ". All main bearings are bronze shell babbitt lined.

PISTONS

Cast iron, light weight with balancing pad permitting each piston to be machined for weight and balance. Four rings are provided, three above wrist pin and one oil wiper ring below.

CAMSHAFT AND CAMS

Drop forged in one piece from open hearth steel, machine and case hardened. Working surfaces and four bearings accurately ground on special machines. Cams are exceptional wide. Cam shaft bearings of which there are four are phosphor bronze.

TIMING GEARS

Extra wide face with helical cut teeth, easily accessible upon removal of gear case cover.

VALVES

Operated by single cam shaft and entirely closed. Valves are—inlet, $1\frac{1}{2}$ "; exhaust, $1\frac{3}{8}$ " diameter—accurately machined and ground. Exhaust valves of silchrome No. 1 steel.

LUBRICATION

Buda patented design; force feed to all crank shaft, cam shaft and connecting rod bearings and timing gears. Oil pump is gear driven from cam shaft. Oil pressure regulation by adjustable spring relief valve.

COOLING

Centrifugal water pump operated by gear train at front engine.

IGNITION

Standard high tension magneto with impulse starting coupling.

LINCOLN SHIELD ARC WELDER

Engine Driven Type

GOVERNOR

grade type, maintains proper engine speed at all load ns.

CARBURETOR

al type attached to intake manifold.

AIR CLEANER

ective device requiring no attention.

GASOLINE TANK

of pressed steel, welded, and mounted in top with feed to carburetor.

on application.

OPTIONAL EQUIPMENT

ontrol," a remote control device attached to control or automatic regulation of welding current from welding without use of extra cables or portable es.

ize Exciter—for furnishing one kilowatt excess power ts D.C.) for auxiliary tools or lights.

arter—Self-starter for engine and battery ignition, erator for charging storage battery can be provided al order.

al Gas Engine—Special engine equipment can be for operating on natural gas or both natural gas and

ard set of welding accessories as follows:

ound Cable, 30 feet, rubber-covered Lincoln cable s or terminals.

ctrode Cable, 35 feet, Lincoln Stable-Arc, extra with lug or terminal.

coln Electrode Holder.

ce or Head Shield complete with protective lens and ss.

re Scratch Brush.

—Assorted Lincoln Electrodes.

RUNNING GEAR

types of running gear can be supplied as follows:

Type—Small shop type steel wheels, suitable for ver cement or other smooth floors. Wheels are ately 12 inches in diameter in front and 20 inches in ipped with roller bearings and provided with fifth d steering handle. Approximate shipping weight ds additional.

Steel Wheels—Front wheels, 20 inches in diameter; els, 32 inches in diameter; equipped with roller standard tread; complete with fifth wheel and steel r pulling. Approximate shipping weight, 690 pounds l.

atic Tires—Four wheel spring mounted running automobile trailer type; standard tread. Roller with Alemite fittings. Heavy duty, truck type tires 25. Complete with trailer hitch. Approximate weight, 920 pounds additional. Can also be furn- imilar manner but equipped with solid rubber tires.

heeled Trailer—Two-wheeled pneumatic tired trail- trailer hitch. Approximate shipping weight, 450 dditional.

Weights—Approximate in Pounds

	2400
Domestic.....	2575
Export.....	3150

on application.

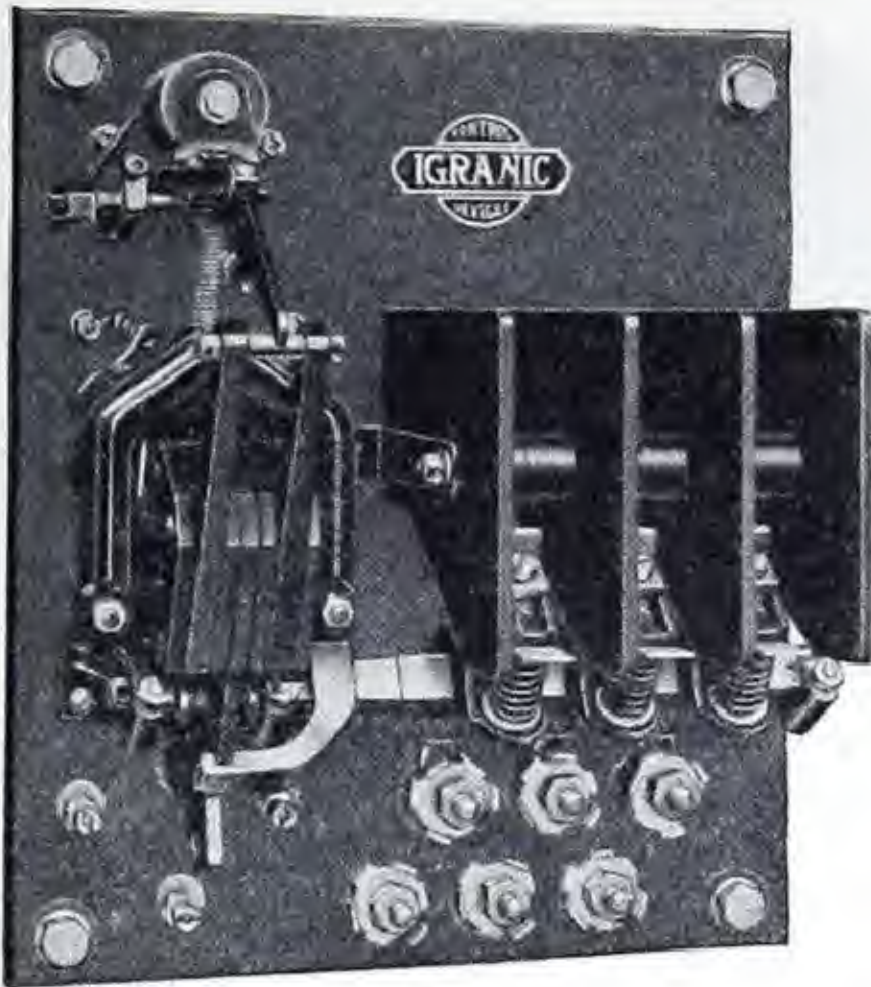
IGRANIC CONTROL DEVICES

Voltages up to 550 All standard frequencies

MAGNETICALLY OPERATED

Latched-In Contactors

with momentarily excited operating coils



No. 1360

Open type Triple-pole Latched-in Contactor, 100 amperes continuous capacity.

APPLICATION

For all installations where positive freedom from A.C. hum must be assured. Suitable for pushbutton or auto- matic control of lighting, heating or power circuits, and particularly well adapted to the automatic regulation of electric heating by thermostat master control.

SPECIFICATION

Open-type contactors are mounted on impregnated slate bases arranged for corner fixing.

Enclosed-type switches in substantial wall fixing housings of cast iron and sheet steel, with all-metal hinged doors (glazed doors can be fitted if preferred).

Single, double or triple-pole high-efficiency air-break magnetically-operated contactor switches, closed and opened by the momentary action of separate electro-magnets.

A mechanical latch holds these switches in the closed position, no current is being consumed in the coil circuits, the switches are absolutely silent except at the moment of operation.

Laminated main brushes of ample area, protected by easily renewable auxiliary sparking contacts.

Deep arc barriers and arc splitters, effective spacing and insulation between phases.

Remote pushbutton of fully automatic control from any number of suitable master devices, which must be of the three-wire double-throw type, suitable for making one circuit to the closing coil and one to the opening coil, with a common centre lead. A No. 540/83 pushbutton with two normally open buttons is typical, and standard three- point thermostats are suitable.

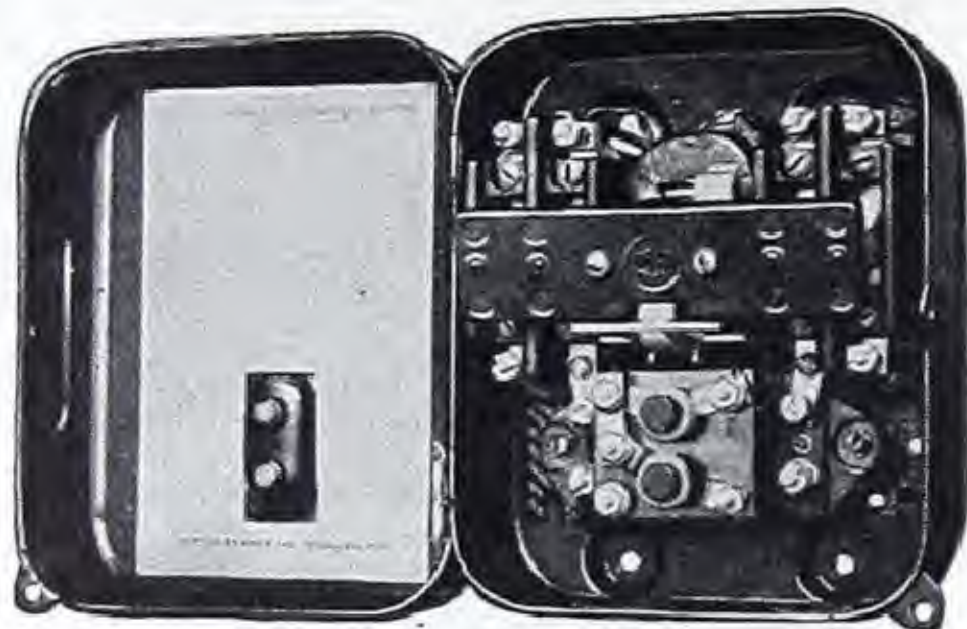
		Volt-Amperes to Operate					
Continuous Ampere	Capacity	Closing			Opening		
		25	50	60	25	50	60
		cy.	cy.	cy.	cy.	cy.	cy.
100		340	600	820	98	185	255
200		900	1680	2010	105	190	270

Prices on application.

CUTLER-HAMMER

A. C. ENCLOSED AUTOMATIC MOTOR STARTERS

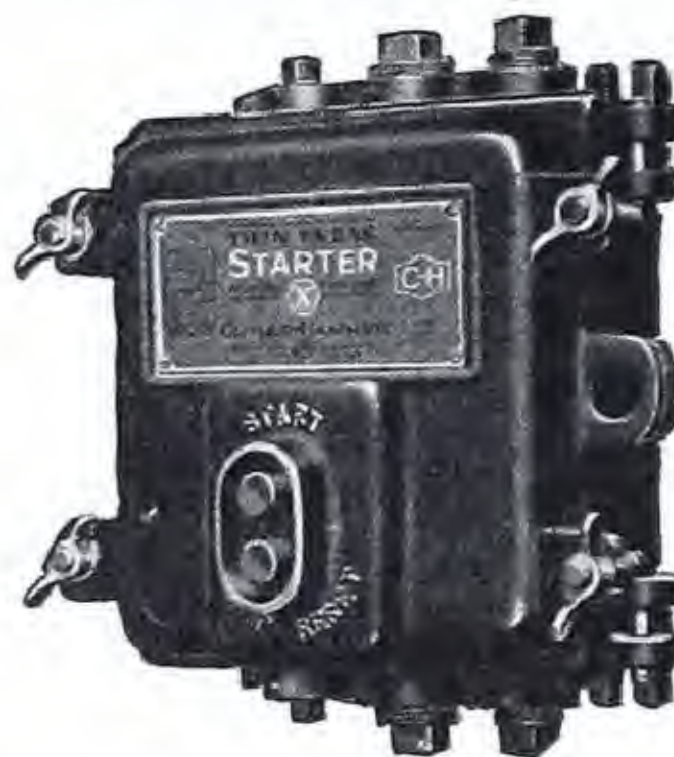
Three and Four Pole—Across-the-Line Type—With Thermal Overload Protection—For Standard or High Torque Polyphase, and Single Phase Squirrel Cage Motors.



With door open to show construction of starter type AAA with "start," "stop" and "reset" pushbuttons in cover as listed in Group I.



Starter type AAA with three position pilot switch and reset button in cover. Group V.



Dust-tight weather-proof enclosure for starter type AAA listed in group III.

STANDARD FEATURES OF DESIGN

- 1—Plain starting, non-reverse.
- 2—Inverse time limit overload protection.
- 3—Long time element on overloads.
- 4—Overload relays manually reset from outside of case.
- 5—Low voltage protection with three wire control.
- 6—Low voltage release with two wire control.
- 7—Interchangeable for all horsepower sizes on the same type, voltage and frequency by changing heater coils.
- 8—Safety, enclosing case arranged for conduit wiring.
- 9—Panel removable from case without disturbing conduit.
- 10—Provision for padlocking case. (Padlock not furnished.)

INFORMATION REQUIRED WITH ORDER

1. Ampere rating of motor. (†)
2. Horsepower and voltage.
3. Frequency and number of phases.
4. List number of starter.
5. List number of heater coils.
6. List number of pushbutton station.
7. Whether motor is rated on 40° C. or 50° C. temperature rise basis.
8. If protection against single phasing is desired.

(†) Because of possible variations in ampere ratings of A. C. motors, the heater coils should be selected from the actual ampere rating of the motor, rather than from horsepower and voltage. If motor current rating is not available, specify speed of motor.

CUTLER-HAMMER

A.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Three and Four Pole—Across-the-Line Type—With Thermal Overload Protection for Standard or High Torque Polyphase, and Single Phase Squirrel Cage Motors.

GENERAL DESCRIPTION

These enclosed automatic motor starters are for use with standard polyphase squirrel cage motors, high torque polyphase squirrel cage motors, and single phase motors with internal starting arrangements. They connect the motor directly across the line on starting. The starter may be connected at a convenient point in the main circuit and small control wires only run between the starter and point of control. This eliminates the necessity of bringing the large main line wires to the point of control and saves much copper when this point is remotely located.

Inverse time limit overload protection is obtained through the use of C-H Thermal Overload Relays. These relays give ideal protection to the motor, both during starting and running. The relays allow an ample time interval to take care of starting inrush and momentary overloads without tripping. However, when an overload becomes dangerous, the motor is disconnected from the line. After the circuit has been opened by an overload, simply pushing the "reset" button puts the starter back in service.

Low voltage protection is obtained when three-wire control is used. Should the line voltage drop to a low value or fail altogether, the contacts open and remain open, stopping the motor. To start the motor after normal voltage is restored it is necessary to push the "start" button. This type of control should always be used where the accidental starting of machinery would be dangerous to workmen or equipment.

Low-voltage release is obtained by using any type of two wire master switch, such as a single pole knife switch, snap switch, pressure regulator or float switch. Should the line voltage drop to a low value, or fail altogether, the contacts open until normal voltage is restored, when they immediately reclose starting the motor.

Price includes starter complete with heater coils.

When ordering, specify number of starter and list number of heater coils.

		Max. H.P.	List Numbers			
Type	Volts	Ratings Three Phase	25 Cycles	60 Cycles	List Price	Lbs Box
Group 1.—In standard enclosing case, with start, stop and reset push buttons in cover but without separate push button Master switch.						
AAA	110	3	9586H604	9586H596	\$28.50	1
AAA	220	5	9586H605	9586H597	28.50	1
AAA	440	7½	9586H606	9586H598	28.50	1
AAA	550	7½	9586H607	9586H599	28.50	1
Group II.—In standard enclosing case, with reset button in cover, but without push button master switch.						
AAA	110	3	9586H636	9586H620	\$25.50	1
AAA	220	5	9586H637	9586H621	25.50	1
AAA	440	7½	9586H638	9586H622	25.50	1
AAA	550	7½	9586H639	9586H623	25.50	1
AA	110	7½	.....	.....	47.25	3
AA	220	15	.....	.....	47.25	3
AA	440	25	.....	.....	47.25	3
AA	550	25	.....	.....	47.25	3
B	110	10	9586H303	9586H295	62.25	6
B	220	30	9586H304	9586H296	62.25	6
B	440	50	9586H305	9586H297	62.25	6
B	550	50	9586H306	9586H298	62.25	6

Number of poles: 3.

Switches up to 175 H.P. at 550 volts available on application.

For three-wire push button master switch No. 10250 add \$3.67.

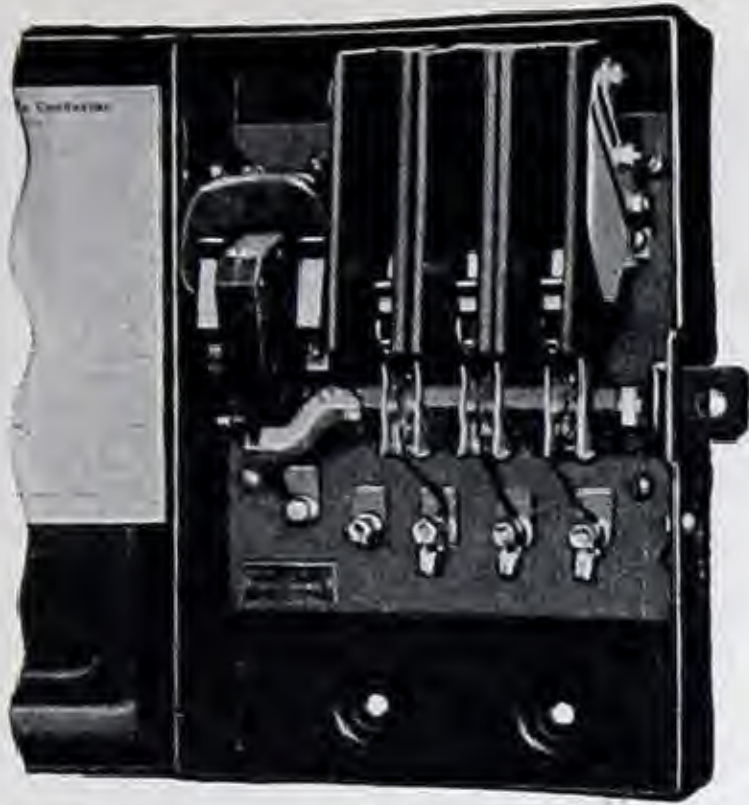
Type AAA also available with three position pilot switch in cover.

All types are available in dust-proof weatherproof or explosion proof case, also in four pole types.

CUTLER-HAMMER

A.C. MAGNETIC CONTACTORS

Two, Three and Four Pole—Continuous Duty



Contactor type A3, with door open to show construction.

STANDARD FEATURES OF DESIGN

- Two, three or four pole.
- Continuous duty coils.
- Two or three wire remote control.
- Low voltage protection with three wire control. (Cannot be obtained on type SA.)
- Low voltage release with two wire control.
- Restricted arc pockets on type AAA.
- Chimney type arc shields.
- Magnetic blowouts on types SB, A, B, C, D and E.
- Safety enclosing case arranged for conduit wiring.
- Panel can be removed without disturbing conduit.
- Provision for padlocking case. (Padlock not furnished.)

GENERAL DESCRIPTION

These A.C. magnetic contactors are used primarily to control lighting and power circuits automatically. They may be used as a safety cut-off contactor when connected with a limit switch or emergency station, or for starting cage motors by connecting them directly across-the-line. The contactor may be connected at any convenient point in the main circuit, and only small control wires run between the contactor and point of control. This eliminates the large main line wires to the point of control and saves much copper when this point is remotely located.

y Type	List No.	List Price		Lbs., Boxed
		With Encl. Case	Without Encl. Case	
Two Pole				
AAA2	9592	\$ 22.00	\$ 20.10	8
A2	9592	27.40	25.50	20
B2	9592	38.60	35.60	50
C2	9592	136.50	113.25	110
D2	9592	216.00	198.00	250
E2	9592	705.00	469.50	425
Three Pole				
SA3	9592	17.25	15.50	8
SB3	9592	20.10	18.30	8
AAA3	9592	22.00	20.10	10
A3	9592	33.00	27.40	25
B3	9592	40.50	36.75	60
C3	9592	159.00	136.50	120
D3	9592	243.00	231.00	300
E3	9592	790.50	555.00	500
A4	9592	40.50	36.75	50
B4	9592	72.00	49.10	80
C4	9592	192.00	168.00	75

Prices are for contactors either 25, 50 or 60 cycle and 110, 220, 440 or 550 volts. Specify frequency and voltage when ordering.

CUTLER-HAMMER

A.C. MAGNETIC CONTACTORS

Two, three and four pole—continuous duty

PRICE OPTIONAL FEATURES

1. Three wire pushbutton master station for remote control:
 - (a)—No. 10150H56, light duty, suitable for two and three pole contactors up to and including types C2 and C3, and four pole contactors up to and including type B4.....\$3.67 List
 - (b)—No. 10250H28, standard duty switch, suitable for type D2, D3 and C4.....\$10.50 List
 - (c)—For types E2 and E3, use type AAA2 contactor to handle the coil circuit and a No. 10250H56 pushbutton to control the AAA2 contactor.
2. Deduction for omission of enclosing case, see price table.

INFORMATION REQUIRED WITH ORDER

1. Ampere or horsepower rating.
2. Voltage.
3. Frequency and number of phases.
4. Number of poles.
5. Number of contactors.

IGRANIC CONTROL DEVICES

Push Button Boxes



No. 450-62.
"Start" and "Stop" Ironclad
Push Button Box



No. 450-63
Ironclad "Start," "Inch" and
"Stop" Push Button Box

No. 450-62. "Start" and "Stop" Ironclad Push Button Box for use in the control circuit of any "Igranic" self-acting starter to control the starting and stopping of a motor from any convenient position near to or distant from the motor.

No. 450-63. Three-way Push Button Box—"Start," "Inch" and "Stop"—for use in conjunction with "Igranic" Automatic starters as illustrated on No. 250. To control the starting, inching and stopping of a motor from any position as convenience may require.

No. 450-64. Three-way Ironclad Push Button Box, marked "Forward," "Reverse" and "Stop." For use as a master in conjunction with "Igranic" reversible self-acting motor starters.

List No. 450/62. "Start" and "Stop" Ironclad Push Button.

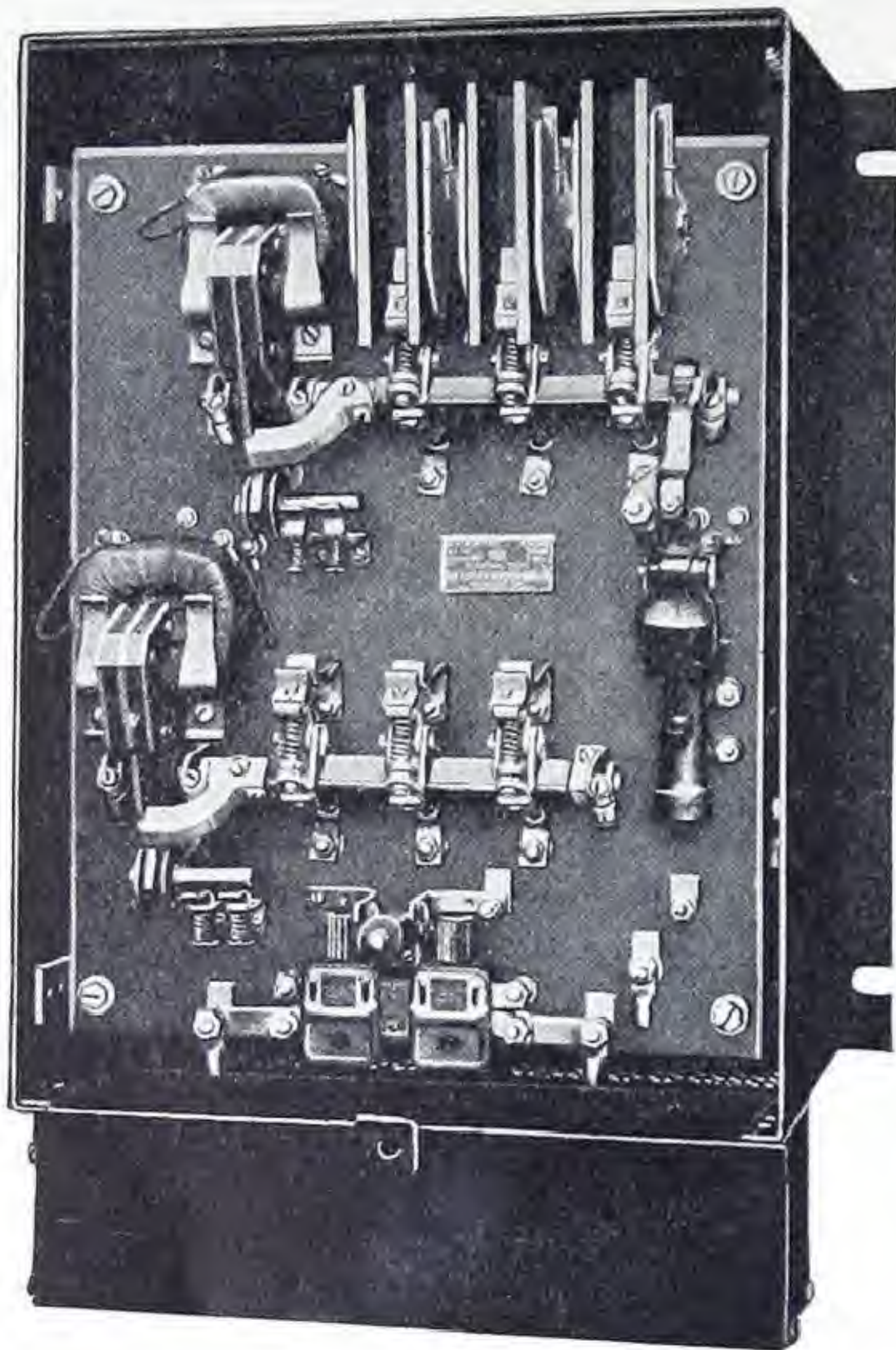
List No. 450/63. "Start," "Stop" and "Inch" Ironclad Push Button. (Mechanically interlocked).

List No. 450/64. "Forward," "Reverse" and "Stop" Ironclad Push Button.

Prices on application.

CUTLER-HAMMER A.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Primary Resistor Type—Three Pole—Time Limit
Acceleration With Thermal Overload Protection—
For Squirrel Cage Induction Motors



With cover removed to show construction
of starter, type "B."

STANDARD FEATURES OF DESIGN

1. Plain starting, non-reversing.
2. Time limit acceleration.
3. Single step primary resistor.
4. Inverse time limit overload protection.
5. Three wire remote control, by means of a No. 10250H56 pushbutton station.
6. Low voltage protection.
7. Resistor is moisture resisting.
8. Dust-proof, safety, enclosing cage.
9. Conduit knockout holes in top and bottom.
10. Panel removable from case without disturbing conduit.
11. Provision for padlocking enclosing case (padlock not furnished).
12. N.E.M.A. Service Classification No. 16.

GENERAL DESCRIPTION

These A.C. enclosed automatic starters are used with single phase self-starting or polyphase squirrel cage induction motors where reduced voltage starting is required. They are also suitable for other types of squirrel cage motors which can be controlled by a step of primary resistor. The resistors are designed to impress 65 per cent of line voltage on the motor terminals to start. The starters, therefore, must be used only on applications such as fans, blowers, centrifugal pumps, etc., where the load characteristics are such that the equipment will start on the torque developed by the motor at this reduced voltage. Equal steps of resistor are provided in each phase.

CUTLER-HAMMER A.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Primary Resistor Type—Three Pole—Time Limit
Acceleration
With Thermal Overload Protection—For Squirrel
Cage Induction Motors

INFORMATION REQUIRED WITH ORDER

1. Ampere rating or speed of motor (†).
2. Horsepower and voltage.
3. Frequency and number of phases.
4. List number of starter.
5. List number of push button station.
6. List number of heater coils.

(†) Because of possible variations in ampere ratings A.C. motors, it is preferable to select the heater coils from the actual ampere rating of the motor, rather than from horsepower and voltage. This is true especially if the ampere rating does not conform to the values given.

PRICE OPTIONAL FEATURES

1. Control relay, add.....\$47.25 Li
 2. Deduct for omission of or add for additional 10250H56 pushbutton master switches, each.... 3.70 Li
 3. Starter arranged for 2 wire remote control:
 - (a) Add for 10250H70 pushbutton snap switch in place of 10250H56 for 220 volts..... .80 L
 - (b) Add for 10250H36 pushbutton snap switch in place of 10250H56 for 440-550 volts..... 6.80 L
- Price includes starter, complete with heater coils and 10250H56 push button master switch.

When ordering, specify number of starter, number of heater coils and number of push button master switch.

220 Volts			
H.P.	List No.	List Price	Lbs. Box
Three Phase—60 Cycles			
5	9605H787	\$174.00AA	115
7½	9605H788	174.00	115
10	9605H789	183.00	140
15	*9605H790	187.50	140
15	9605H971	214.50B	170
20	9605H791	214.50	170
25	9605H792	250.50	200
30	9605H793	250.50	200
440 Volts			
5	9605H794	174.00A	120
7½	9605H795	174.00	120
10	9605H796	183.00	145
15	*9605H797	187.50	175
15	9605H973	214.50	200
20	9605H798	214.50	200
25	9605H799	214.50	200
30	9605H800	250.50	225
550 Volts			
5	9605H801	174.00	120
7½	9605H802	174.00	120
10	9605H803	183.00	120
15	9605H804	187.50	145
15	9605H805	214.50	200
20	9605H806	214.50	200
30	9605H807	250.50	225

*For these ratings, check the motor current carefully and in no case exceed the following values on any pole of starter: (The current in the common line of a two phase three wire system is 1.4 times the motor rating.)

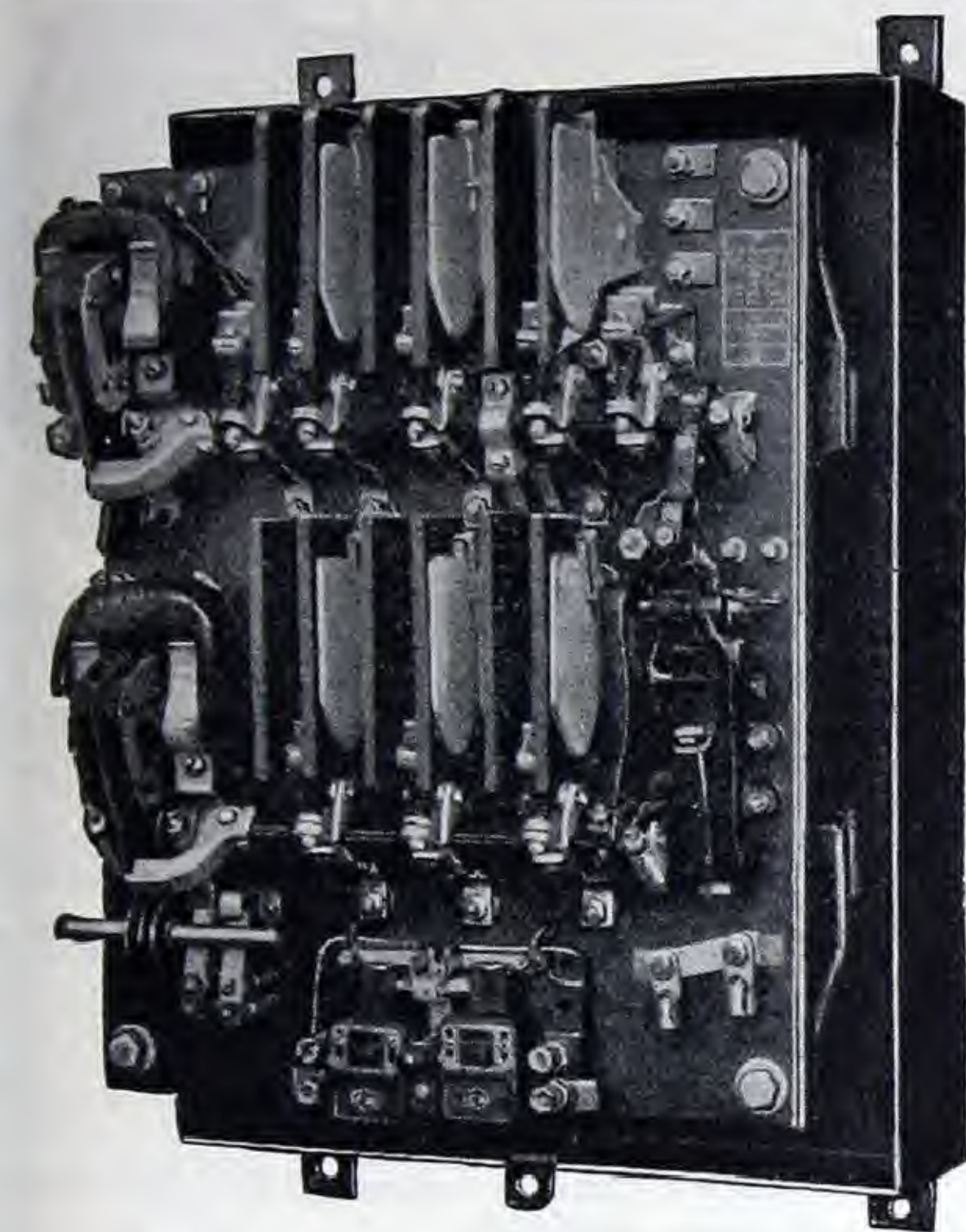
Type AA—40 Amperes. Type A—22 Amperes. Type B—80 Amperes.

Also available for 2 phase 3 or 4 wire service also for single phase.

Also available for 25 cycle three phase service at same price.

C. ENCLOSED AUTOMATIC STARTERS

Auto-Transformer Type—For Squirrel Cage Induction Motors With Thermal Overload Protection



Cover removed, showing construction of starter, type "A"

STANDARD FEATURES OF DESIGN

Automatic starting.
Time limit acceleration.
Inverse time limit overload protection.
Overload relays manually reset from outside of case.
Three-wire remote control by means of a 10250H56 pushbutton station.
Low-voltage protection.
Taps on transformer to adjust starting voltages for 50, 65 or 80 per cent of normal.
Safety, split type enclosing case.
Conduit knockout holes in top, bottom and sides of case.
Panel removable from case without disturbing conduit.
Provision for padlocking enclosing case. (Padlock not furnished.)

GENERAL DESCRIPTION

These A.C. enclosed automatic starters are for use with three phase squirrel cage induction motors. They are used in applications of service where remote control and reduced starting torque are required. They may be operated as frequently as once every four minutes for an hour. Since they have time limit acceleration features insure positive starting, these starters are particularly suited to applications where the starting load varies over a wide range.

INFORMATION REQUIRED WITH ORDER

Ampere rating of motor (*).
Horsepower and voltage.
Frequency and number of phases.
Description of application, such as distance between starter and point of control, nature of service, etc.
List number of starter.
List number of heater coils.
List number of pushbutton station.

Because of possible variations in ampere ratings of A.C. motors, the heater coils should be selected from the actual ampere rating of the motor, rather than from horsepower and voltage. This is true especially if the motor current rating differs greatly from the values given. If motor current rating is known, specify the motor speed.

A. C. ENCLOSED AUTOMATIC STARTERS

Auto-Transformer Type—For Squirrel Cage Induction Motors With Thermal Overload Protection.

Price includes starter, complete with heater coils and 10250-H56 push button master switch.

(When ordering, specify list number of starter, list number of heater coils and list number of push button).

PRICE OPTIONAL FEATURES

	List
1—Relay for control from long distance, Add.....	\$47.25
2—Deduct for omission of or add for additional 10250-H56 pushbutton master switches—each...	3.70
3—Starter arranged for 2 wire remote control:	
(a)—Add—for 10250H70 pushbutton snap switch in place of 10250-H56 for 220 volts.....	.80
(b)—Add—for 10250-H36 pushbutton snap switch in place of 10250-H56 for 440-550 volts.....	11.30

List No.	Volts	Type	Mount- ing	Horse-Power Ratings of 3 Phase	Mini- mum	Max- imum	List Price	Lbs. Boxed
				60 Cycles				
9621H193	220	A	Wall	5	10		\$232.50	230
9621H194	220	A	Wall	15	20		232.50	235
9621H195	220	A	Wall	25	*30		255.00	200
9621H234	220	B	Floor	...	...		577.50	600
9621H235	220	B	Floor	35	40		577.50	600
9621H236	220	B	Floor	50	*60		577.50	600
9621H196	440	A	Wall	5	10		232.50	230
9621H197	440	A	Wall	15	20		232.50	240
9621H198	440	A	Wall	25	25		255.00	260
9621H199	440	A	Wall	30	30		262.50	270
9621H200	440	A	Wall	35	40		277.50	270
9621H248	440	A	Wall	50	50		277.50	300
9621H237	440	B	Floor	60	60		585.00	600
9621H238	440	B	Floor	75	75		585.00	600
9621H239	440	B	Floor	100	100		585.00	600
9621H240	440	B	Floor	...	...		615.00	650
9621H201	550	A	Wall	5	10		232.50	230
9621H202	550	A	Wall	15	20		232.50	240
9621H203	550	A	Wall	25	25		255.00	260
9621H204	550	A	Wall	30	30		262.50	270
9621H205	550	A	Wall	35	40		270.00	270
9621H249	550	A	Wall	50	50		270.00	300
9621H241	550	B	Floor	...	...		585.00	600
9621H242	550	B	Floor	60	60		585.00	600
9621H243	550	B	Floor	75	75		585.00	600
9621H244	550	B	Floor	100	100		585.00	600
9621H245	550	B	Floor	125	125		622.50	650
				25 Cycles				
9621H165	220	A	Wall	5	10		232.50	230
9621H166	220	A	Wall	15	20		255.00	235
9621H167	220	A	Wall	25	*30		262.50	260
9621H208	220	B	Floor	...	...		577.50	600
9621H209	220	B	Floor	35	40		577.50	600
9621H210	220	B	Floor	50	*60		607.50	650
9621H168	440	A	Wall	5	10		232.50	230
9621H169	440	A	Wall	15	20		232.50	240
9621H170	440	A	Wall	25	25		255.00	250
9621H171	440	A	Wall	30	30		262.50	260
9621H172	440	A	Wall	35	40		270.00	270
9621H211	440	B	Floor	50	60		607.50	650
9621H212	440	B	Floor	75	75		622.50	650
9621H213	440	B	Floor	100	100		750.00	700
9621H214	440	B	Floor	...	...		572.50	700
9621H173	550	A	Wall	5	10		232.50	230
9621H174	550	A	Wall	15	20		232.50	235
9621H175	550	A	Wall	25	25		255.00	250
9621H176	550	A	Wall	30	30		262.50	260
9621H177	550	A	Wall	35	40		270.00	270
9621H215	550	B	Floor	50	50		607.50	650
9621H216	550	B	Floor	60	60		622.50	650
9621H217	550	B	Floor	75	75		637.50	650
9621H218	550	B	Floor	100	100		825.00	700
9621H219	550	B	Floor	125	125		825.00	700

*Current limitations: Type A, 80 amperes maximum—Type B, 150 amperes maximum.

These current limitations must never be exceeded. Sizes marked * must be carefully checked, especially for motors of 600 R. P. M. and less.

The Starter also available in dust tight enclosure.

Prices covering 2 phase 3 or 4 wire on application.

CUTLER-HAMMER

A. C. ENCLOSED AUTOMATIC MOTOR
STARTERS

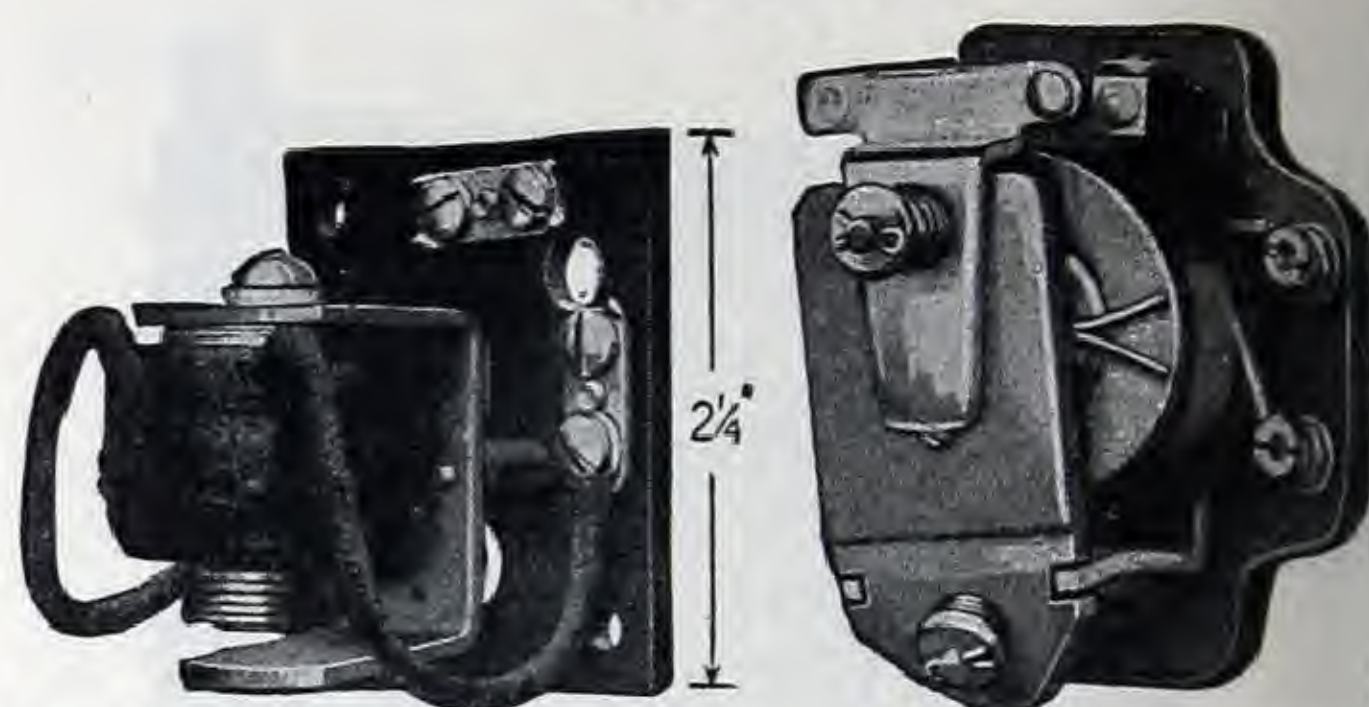
Secondary Resistor Type—Three Pole—Time Limit
Acceleration with Thermal Overload Protection—
For Low Tension Circuits—
—For Slip Ring Motors



Enclosed view, type "A."

STANDARD FEATURES OF DESIGN

1. Plain starting, non-reversing.
2. Automatic time limit acceleration.
3. Inverse time limit overload protection.
4. Overload relays manually reset from outside of case.
5. Low voltage protection with three wire control.
6. Low voltage release with two wire control.
7. Resistor is moisture resisting.
8. Dust-proof, safety, enclosing case arranged for conduit wiring.
9. Panel removable from case without disturbing conduit.
10. Provision for padlocking case (padlock not furnished).
11. N.E.M.A. Service Classification No. 36.

CUTLER-HAMMER
ALTERNATING AND DIRECT CURRENT
RELAYS

No. 381 "Midget" Relay Single Pole.

Small size, yet rated up to 15 amps, 220 volts—for innumerable uses and where mounting space is at a premium.

No. 300 Relay Single or Double Pole.

Normally open or normally closed. Rated up to 30 amps.

Typical relay with larger frame and clearance. Suitable for entire voltage range up to 550 volts.

STANDARD FEATURES OF DESIGN

All C-H Relays listed have these features:

- 1—Heavy, silver-to-silver contacts which insure continuous current carrying capacity and long contact life.
- 2—Vertical contact surfaces automatically free themselves from dust and worn particles.
- 3—Continuous duty coils.
- 4—For automatic or remote control.
- 5—Wiring connections on front of panel—except template mounted relays.
- 6—All enclosed relays arranged for conduit wiring.

Information required with order

- 1—List number of relay.
- 2—Contact voltage.
- 3—Control circuit voltage.
- 4—Frequency.
- 5—Description of service.
- 6—For relays mounted on slate template, give thickness of slate.

Type 300 Relay—Single Pole—Normally Open Contacts. Ampere Ratings are for non-inductive loads.

D. C. Ratings: Without blowout—10 Amperes at 6, 12, 24, 32 and 115 volts. 3 amperes at 230 volts.

With blowout—30 amperes at 6, 12, 24, 32 and 150 volts. 15 amperes at 230 volts.

A. C. Ratings: 30 amperes at 6, 12, 24 and 110 volts; 15 amperes at 220 volts.

*Enclosed Panel	D. C.		A. C.
	Without Blowout	With Blowout	25 or 60 Cycle
Two-wire common or separate control.....	\$10.50	\$12.00	\$10.50
Three-wire Pushbutton or Thermostat control.....	13.50	15.00	13.50

Type 381 "Midget" Relay—Single Pole—Normally Open Contacts.

D. C. Ratings: 15 amperes at 6, 12, 24 or 32 volts; 1 amp at 115 volts; 0.4 ampere at 230 volts.

A. C. Ratings: 15 amperes at 6, 12, 24, 110 or 220 volts

	Each	
	D. C.	A. C.
Two-wire common or separate Control	\$4.50	\$4.50
Three-wire Pushbutton control.....	6.00	6.00
Three-wire Thermostat control.....	7.50	7.50

*For omission of enclosing case on above relays, deduct \$1.50; also many other types of Relays have up to two normally open contacts or two normally closed contacts, both.

Prices on request.

CUTLER-HAMMER

C. ENCLOSED AUTOMATIC MOTOR STARTERS

Secondary Resistor Type—Three Pole—Time Limit
Acceleration With Thermal Overload Protection
For Low Tension Circuit—For Slip Ring Motors

INFORMATION REQUIRED WITH ORDER

- Horsepower and voltage.
- Frequency and number of phases.
- Open circuit voltage between slip rings at standstill.
- Full load rotor current per ring.
- Ampere rating of motor.*
- Description of application, such as distance between
er and point control, nature of service, etc.

Because of possible variations in ampere ratings of A. C.
ors, it is preferable to select the heater coils from the
al ampere rating of the motor, rather than from horse-
er and voltage. This is true especially if the ampere rating
not conform to the values given in the table.

PRICE INCLUDES A COMPLETE STARTER AS
ILLUSTRATED

3-Phase or 2-Phase, 3 or 4 Wire—25, 50 or 60 Cycles
110 Volts

P.	Sec- ondary Amp- eres	No. of Accel- erat'g Steps	List Price	Type	Lbs. Boxed
	60	1	\$150.00	A	115
1/2	60	1	150.00	A	115
	60	1	150.00	A	120
	120	2	330.00	C	220
	120	2	427.50	F	250
	120	2	427.00	F	250

220 Volts

	60	1	\$150.00	A	115
1/2	60	1	150.00	A	115
	60	1	150.00	A	120
	120	2	330.00	C	220
	120	2	330.00	C	225
	120	2	330.00	C	225
	120	2	330.00	C	230
	120	2	427.50	F	225
	120	2	427.50	F	225
	120	3	412.50	G	300

440 Volts

	60	1	150.00	A	120
1/2	60	1	150.00	A	120
	60	1	150.00	A	125
	60	2	177.00	B	170
	120	2	330.00	C	220
	120	2	330.00	C	225
	120	2	330.00	C	225
	120	2	330.00	C	230
	120	2	330.00	C	230
	120	2	330.00	C	240
	120	3	427.50	D	275

550 Volts

	60	1	150.00	A	120
1/2	60	1	150.00	A	120
	60	1	150.00	A	125
	60	2	177.00	B	170
	120	2	330.00	C	220
	120	2	330.00	C	225
	120	2	330.00	C	225
	120	2	330.00	C	230
	120	2	330.00	C	230
	120	2	330.00	C	240
	120	3	427.50	D	275

Price on larger sizes on application.

PRICE OPTIONAL FEATURE

Control relay, Add. \$31.50

CUTLER-HAMMER

A.C. ENCLOSED COMBINATION
AUTOMATIC MOTOR STARTERS

Three Pole—Across-the-Line Type—With Thermal Overload
Protection Disconnect Switch—Fusible and Unfused



Enclosed view, type AAA unfused,
listed in group I.

STANDARD FEATURES OF DESIGN

1. Plain starting, non-reverse.
2. Motor connected directly across-the-line on starting.
3. Inverse time limit overload protection.
4. Overload relays manually reset from outside of case.
5. Arranged for two or three wire control.
6. Low voltage protection.
7. Outside operated disconnect switch.
8. All mechanism mounted on a removable back plate.
9. Wiring channel between back plate and case, for
running wires.
10. Removable fuse panel, on groups III and IV. (Fuses
not furnished).
11. Full interlocked safety cover.
12. Provisions for padlocking enclosing case. (Padlock
not furnished.)

GENERAL DESCRIPTION

These enclosed automatic motor starters are used for starting standard or high torque three-phase squirrel cage motors and single-phase motors with internal starting arrangements, or as a primary protective panel in conjunction with a secondary resistor starter, for slip ring motors. They connect the motor directly across the line on starting. The starter may be connected at a convenient point in the main circuit and small control wires only run between the starter and point of control. This eliminates the necessity of bringing the large main line wires to the point of control and saves much copper when this point is remotely located.

A disconnect switch with outside operating handle is provided in the enclosing case, just above the fuse panel. This switch is provided with a mechanical interlock, so arranged that a slight movement of the handle automatically locks the cover before the blades are actually thrown to the "on" position.

A.C. ENCLOSED COMBINATION AUTOMATIC MOTOR STARTERS

Three Pole-Across-the-Line Type—With Thermal Overload Protection.

Disconnect Switch—Fusible and Unfused

LIST PRICE

Price includes starter complete as illustrated and with heater coils in package.

Price of push button station must be added. When ordering, specify number of starter and number of heater coil.

Type	Number of Poles	Volts	Max. H.P. Ratings Three Phase	List Price	Lbs. Boxed
Unfused—With "Start," "Stop" and "Reset" push buttons in cover.					
AAA	3	110	3	\$41.60	25
AAA	3	220	5	41.60	25
AAA	3	440	7½	41.60	25
AAA	3	550	7½	41.60	25

Type	No. of Poles	Volts	Max. H.P. Ratings Three Phase Squirrel Cage	Slip Ring	Fuse Clip Size Amps.	Volts	List Price	Lbs. Boxed
Fusible—With "Start," "Stop" and "Reset" push buttons in cover.								
AAA	3	110	1½	2	30	250	\$50.60	55
AAA	3	110	3	3	60	250	50.60	55
AAA	3	220	3	5	30	250	50.60	55
AAA	3	220	5		60	250	50.60	55
AAA	3	440	7½	7½	30	600	50.60	55
AAA	3	550	7½	7½	30	600	50.60	55

Fuses are not included in above prices.

‡Slip Ring motor ratings are on basis of using this starter as a primary circuit panel in conjunction with a secondary resistor starter.

**Motor current should be checked on these ratings and must not exceed 80 amperes in any one pole. (The current in the common line of a 2 phase 3 wire system is 1.4 times the motor current rating.)

These starters are also available unfused and fusible with reset button in cover.

Starters are also obtainable for 2 phase 4 wires and single phase service. Prices on application.

INFORMATION REQUIRED WITH ORDER

1. Ampere rating of motor (If not available, give motor speed).
2. Horsepower and voltage.
3. Frequency and number of phases.
4. List number of heater coils.
5. List number of push button station if required.
6. Whether motor is rated on 40° C or 50° C temperature rise basis.
7. If protection against single phasing is desired.

PRICE OPTIONAL FEATURES

1. For disconnect switch arranged to take test jacks, add:
 - (a)—For starter type AAA.....\$10.95 List
 - (b)—For starter types AA and B..... 11.40 List
2. Add for No. 10250-H56 three wire remote control push button master switch..... 3.70 List
3. Starter arranged for two wire remote control:
 - (a)—Add for No. 10250-H70 snap switch for 110-220 volts..... 4.50 List
 - (b)—Add for No. 10250-H36 push switch for 440-550 volts..... 10.50 List
4. Overload relays arranged to protect three phase "internal start" type motors—prices on application.

A.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Three Pole—Reversing—Across-the-Line Type
With or Without Thermal Overload Protection



Enclosed view types
SRA and SRB



Side view, type SRC for
mounting in mono-rail
hoists.

STANDARD FEATURES OF DESIGN

1. Plain starting—reversing.
2. Arranged for two or three wire remote control except type SRA is for two wire control only.
3. Low voltage protection with three wire control.
4. Low voltage release with two wire control.
5. Types AA and B arranged for pilot circuit limit switch protection in one or both directions. (Limit switches not furnished.)
6. Starters interchangeable for all horsepower sizes of the same voltage and frequency.
7. Safety, enclosing case arranged for conduit wiring except type SRC.
8. Type SRC open type panel for mono-rail hoists.
9. Contactors mechanically interlocked on all types.
10. Contactors electrically interlocked on types AA and B.
11. Panel removable from case without disturbing conduit.
12. Provision for padlocking enclosing case. (Padlock not furnished.)

Additional features for overload type starters

13. Inverse time limit overload protection.
14. Overload relays manually reset from outside of case.
15. Starters interchangeable for all horsepower sizes of the same voltage and frequency by changing heater coils.

GENERAL DESCRIPTION

These enclosed automatic motor starters are for use with standard squirrel cage motors, and high torque squirrel cage motors on applications where reversing is necessary. They connect the motor directly across the line on starting. The starter may be connected at any convenient point in the main circuit and only small control wires run between the starter and point of control. This eliminates the necessity of bringing the large main line wires to the point of control and saves much copper when this point is remotely located.

Reversing is accomplished directly by the contactors. The pushbutton master switch gives the workman ready control of starting in either direction and stopping. Interlocks prevent one contactor from closing while the other is closed.

A.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Three Pole-Reversing-Across-the-Line Type
With and Without Thermal Overload Protection

Price includes complete reversing starter as illustrated.

Price of push-button switch must be added. When ordering, specify number of starter, number of heater coils, with Thermal Overload Protection," and number of push-button switch.

Table I—Horizontal construction—(Contactors mounted side-by-side).

Volts	Max. H.P. Ratings	List Numbers Three Phase			List Price	Lbs. Boxed
	25 Cycles	50 Cycles	60 Cycles			
	Without Thermal Overload Protection					
110	1	9595H442	9595H430	9595H426	\$27.00	12
220	1	9595H443	9595H431	9595H427	27.00	12
440	1	9595H444	9595H432	9595H428	27.00	12
550	1	9595H445	9595H433	9595H429	27.00	12
110	**3	9595H402	9595H390	9595H386	40.50	15
220	3	9595H403	9595H391	9595H387	40.50	15
440	3	9595H404	9595H392	9595H388	40.50	15
550	3	9595H405	9595H393	9595H389	40.50	15

Table II—Vertical construction—(Contactors mounted one above the other.)

Without Thermal Overload Protection						
110	3	9595H230	9595H234	9595H238	\$51.00	20
220	5	9595H231	9595H235	9595H239	51.00	20
440	5	9595H232	9595H236	9595H240	51.00	20
550	5	9595H233	9595H237	9595H241	51.00	20

Table III—Back-to-Back construction.

Without Thermal Overload Protection						
110	5	.....	.....	.....	\$77.25	40
220	15	.....	.....	.....	77.25	40
440	25	.....	.....	.....	77.25	40
550	25	.....	.....	.....	77.25	40

en Type—For Hoist Service—Without Thermal Overload Protection

110	**3	9595H482	9595H470	9595H466	\$41.25	10
220	3	9595H483	9595H471	9595H467	41.25	10
440	3	9595H484	9595H472	9595H468	41.25	10
550	3	9595H485	9595H473	9595H469	41.25	10

†Do not use where motor current exceeds 15 amperes on continuous duty or 20 amperes on half-time duty.

*Where motor current exceeds 15 amperes on continuous duty or 20 amperes half-time duty on any one pole, starter type AAA must be used.

The current in the common line of a 2 phase 3 wire system is 1.4 times the motor current rating.)

Cannot be used where motor current exceeds 80 amperes.

NOTE—The type AA is newly designed to provide proper capacity to replace the two previous starters type A and type AB.

The above starters are also available with complete Thermal overload protection.

Price Optional Features

Add for No. 10250H74 or 10250H75, three position remote control push button master switch,\$9.40 List

Add for No. 10250H63 or 10250H77 hold-in two button remote control push-button master switch, each.....3.70 List

Deduction for omission of enclosing case, on type AAA only.....5.60 List

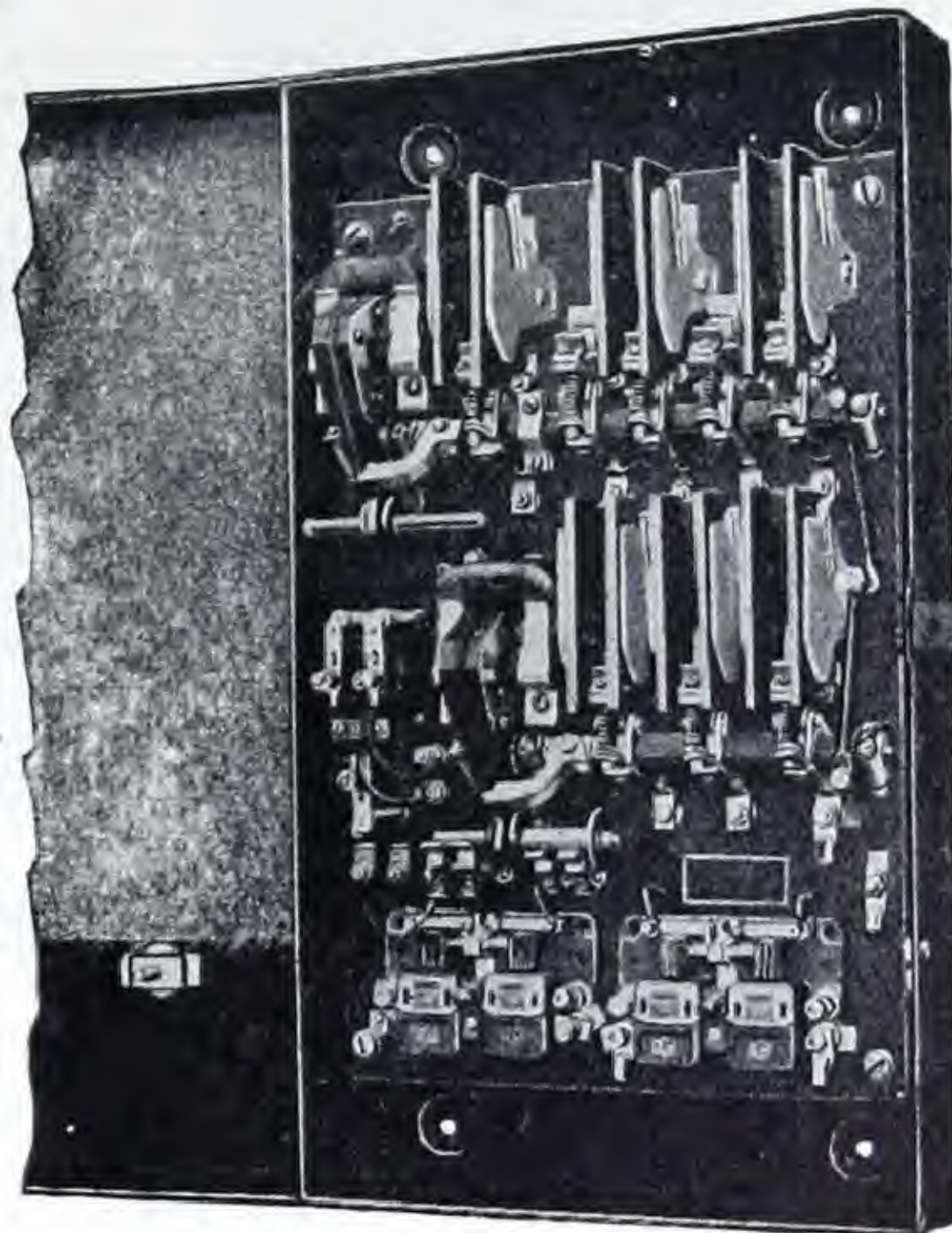
Information required with order

- Ampere rating of motor (†).
- Horsepower and voltage.
- Frequency and number of phases.
- List number of starter.
- List number of push button master switch.
- List number of heater coils.
- Temperature rise basis of motor rating.
- If single phase protection is required.

Because of possible variations in ampere ratings of C. motors, the heater coils should be selected from the ampere rating of the motor, rather than from horsepower and voltage. This is true especially if the motor current rating differs greatly from the values given. If current rating of motor is not known, give speed of motor.

A.C. MULTI-SPEED ENCLOSED AUTOMATIC MOTOR STARTERS

For Separate Winding and Consequent Pole (Reconnected) Type Motors—Two, Three and Four Speed—With Thermal Overload Protection



No. 9739 type B, with door open to show construction.

OPTIONAL FEATURES

(Standard starters are designed for starting the motor at any speed except No. 9736 with compelling relay.)

1. Pushbutton master switch for three wire remote control.
2. Compelling relay.
3. Timing relay for automatic acceleration. (Nos. 9736 and 9739 this feature is obtainable on types AA, B and C only).
4. Timing relay for automatic deceleration. (Nos. 9736 and 9739 this feature is obtainable on types AA, B and C only).
5. Omission of enclosing case.

STANDARD FEATURES OF DESIGN

1. Non-reversing.
2. Arranged for control from separate push button master switch. (May also be adapted for control by other master switches.)
3. Inverse time limit overload protection on all speeds.
4. Low voltage protection with three wire control.
5. Interchangeable for all horsepower sizes on same voltage and frequency and within range of starter by changing heater coils of thermal overload relays.
6. Safety, split type enclosing case arranged for conduit wiring.

Maximum Ratings

- 50 H. P.—220 volts.
- 100 H. P.—440 volts and 550 volts.
- 200 H.P.—2200 volts (No. 9736 only.)

A.C. MULTI-SPEED ENCLOSED AUTOMATIC MOTOR STARTERS

For Separate Winding and Consequent Pole (Reconnected) Type Motors—Two, Three and Four Speed—With Thermal Overload Protection.

GENERAL DESCRIPTION

These automatic starters are for use with two, three and four speed, separate winding or consequent pole type motors. Across the line types and primary resistor types are listed. Control is obtained from a remote point by means of a push-button master switch or other type of master station.

The various speeds of the motor are obtained from the master switch, by simply depressing the correct pushbutton. Three general systems can be used to obtain the various speeds as outlined below:

(a) The standard starters are arranged so that the motor can be started at any desired speed by simply pressing the proper button. If it is desired to change from one speed to another, it is necessary to first press the "stop" button and then the button corresponding to the speed desired. For example, if the motor is running at first speed and it is desired to change to second or third speed, it is necessary to first press the stop button and then the second or third speed button, as desired.

(b) These controllers can be provided with a compelling relay which makes it necessary that the operator press the first speed button before bringing the motor to the desired speed. This assures that the motor is always started at low speed before going to one of the higher speeds. To decelerate to a lower speed, it is necessary first to press the "stop" button and then, again, press the first speed button before pressing the button of the speed desired.

(c) Timing relays, providing for either automatic acceleration or automatic deceleration can also be furnished as optional features. With the automatic acceleration feature, it is only necessary to press the button for the desired speed. The motor will always start in low speed and automatically step up to the desired speed. Where automatic deceleration is provided, the speed of the motor may be reduced from a high speed to a lower speed, by simply pressing the proper button for the speed desired.

Inverse time limit overload protection is provided for the windings of the motor by means of C-H Thermal Overload at each speed rather than from horsepower and voltage. This is especially true for multi-speed motors, because the current taken by the motor at the various speeds, may vary considerably.

TYPES OF STARTERS LISTED

No. 9736—Across-the-Line—For two speed separate winding type motors.

For use with two speed, separate winding type, squirrel cage motors. They connect either winding of the motor directly across the line. The starter consists of two magnetic contactors—one for each winding—and two C-H thermal overload relays to protect the windings against overload.

High tension starters for two speed separate winding type motors are also included in No. 9736, for motors up to 200 horsepower, 2200 volts. These high tension starters include two oil immersed magnetic contactors, a control transformer, two overload relays and two current transformers.

No. 9737—Across-the-Line—For three speed separate winding type motors.

Similar to No. 9736, except that an extra magnetic contactor and overload relay are necessary for the third winding of the motor.

No. 9738—Across-the-Line—For four speed, separate winding type motors.

Similar to No. 9736, except that they consist of four magnetic contactors and four overload relays, to handle the four motor windings.

A. C. MULTI-SPEED ENCLOSED AUTOMATIC MOTOR STARTERS

For Separate Winding and Consequent Pole (Reconnected) Type Motors—Two, Three and Four Speed—With Thermal Overload Protection.

TYPES OF STARTERS LISTED (Continued)

No. 9739—Across-the-Line—For two speed consequent pole motors.

For use with two-speed consequent pole type motors. The two motor speeds are obtained from the same winding, by reconnecting the winding. The starter consists of a three pole and a five pole magnetic contactor, overload relays.

No. 9741—Across-the-Line—For three speed consequent pole type motors.

For use with three speed motors which have two windings. One winding is of the consequent pole type, i.e., two speeds can be obtained from it by means of reconnections. The second winding is separate and is used for obtaining the third speed which may be either the low, medium or high speed. The starters are similar to the Bulletin 9739 type except for the number of magnetic contactors and overload relays required for handling the three motor speeds. Optional features include compelling relay, timing relay for automatic acceleration and timing relay for automatic deceleration, or all types.

No. 9742—Across-the-Line—For four speed consequent pole type motors.

For use with four speed two winding motors. The starters are similar to Bulletin 9739 except for the number of magnetic contactors and thermal overload relays required to handle the four speeds of the motor.

No. 9749—Primary resistor—For two speed separate winding type motors.

For use with two speed separate winding type motors. This controller has, in addition to the main contactors, one accelerating contactor for each speed. There is also a resistor bank for each speed.

No. 9759—Primary resistor—For two speed consequent pole motors.

Are similar to Bulletin 9749 except that they are arranged for controlling two speed consequent pole type motors.

Information required with order:

- 1—Actual ampere rating of motor on each speed.
- 2—Horsepower and voltage.
- 3—Frequency and whether three phase or two phase, 3 or wire.
- 4—Type of motor; constant torque, variable torque or constant horsepower.
- 5—R. P. M. for each speed.
- 6—Motor winding diagram.
- 7—Whether motor is rated on 40° C. or 50° C. temperature rise basis.
- 8—Optional features desired.

CUTLER-HAMMER ELECTRIC ELEVATOR CONTROL



The C-H line of elevator control includes a type for every purpose—from semi-magnetic types for slow-speed freight passenger elevators, to full automatic, multi-speed types for high speed passenger service. These include both car control (requiring an operator), push-button control (operated by passengers) or combination control systems. Also includes control for dumb-waiters—automatic return, automatic call and full call and send types. Accessories include operating and safety devices such as car stops, pushbuttons, limit switches, door switches, double w/hatchway switches with retiring cam, door interlock switches, floor selectors, transfer switches, etc. We are prepared to give you complete elevator control advice, no matter what your requirements. All values include weight of plunger, pulling vertically upward, at 85% voltage, 60 cycles. Intermittent duty coils can be in circuit for one minute out of circuit one minute or the equivalent, but not more than 15 minutes continuously.

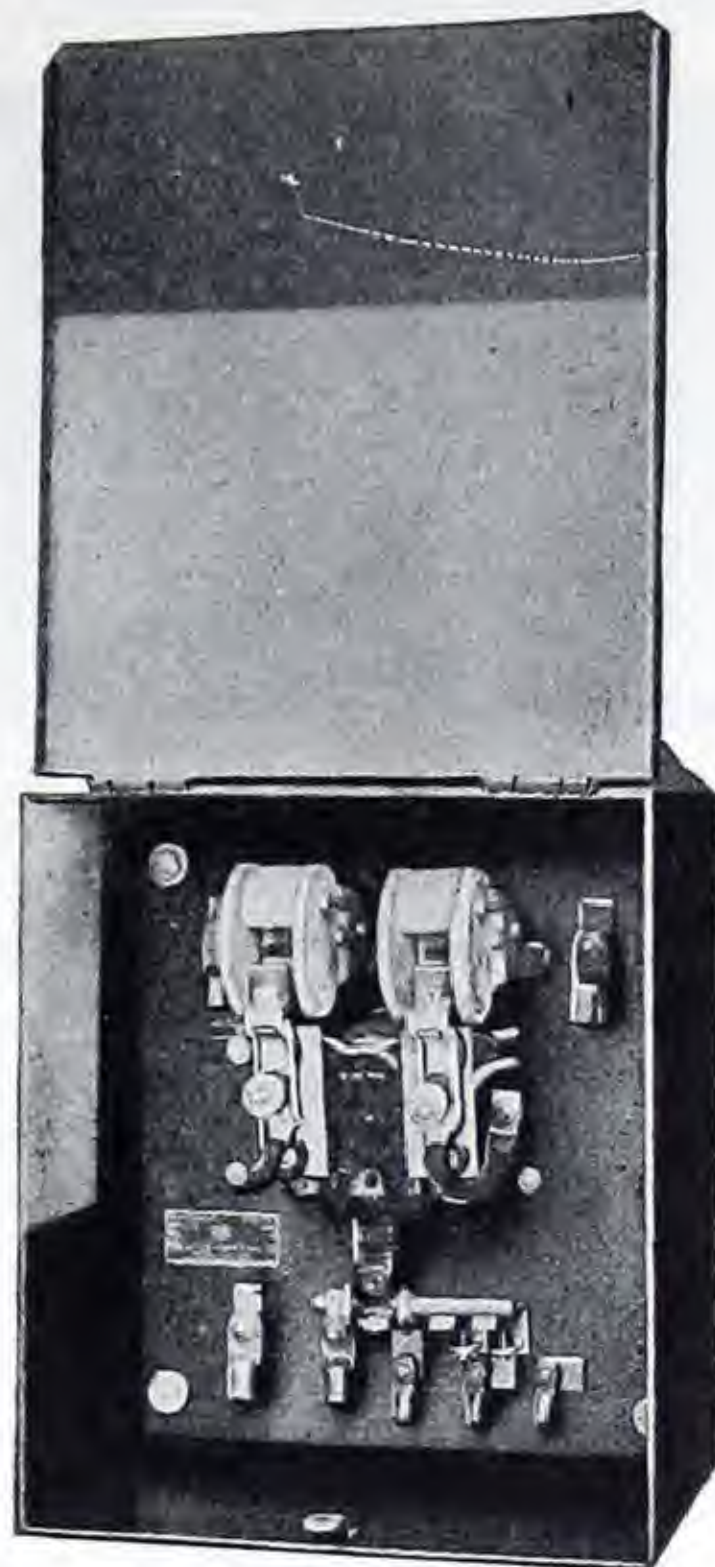
GRAPHIC ARTS CONTROL EQUIPMENT



In addition to the many types of C-H standardized motor control which are used extensively in the graphic arts industry, C-H graphic arts control equipment is designed to meet specific requirements of the industry. These include a complete line of A. C. and D. C. Automatic speed regulators for flat bed presses, calenders, printing machines, folders, paper box making machinery, etc. Features such as pre-determined speed setting from the master switch or at the controller; controlled acceleration; "ramping" from master switch; control for blower motor where required; locking cap for speed setting knob; and plugging, are available. Prices and complete specifications on request.

CUTLER-HAMMER D.C. MAGNETIC CONTACTORS

For Remote Control of Lighting and Power Circuits



With door open, showing No. 117 contactor.

STANDARD FEATURES OF DESIGN

1. Single and double pole with magnetic blowouts.
2. Two or three wire control.
3. Low voltage protection with three wire control.
4. Low voltage release with two wire control.
5. Continuous duty coils.
6. Rugged contacts, easily renewed.
7. Open or enclosed panel.
8. Dust-proof, safety, enclosing case arranged for conduit wiring.
9. Provision for padlocking enclosing case door. (Padlock not furnished.)

Capacity Limitations

Current rating as listed cannot be exceeded.

Information required with order

1. Ampere capacity.
2. Voltage.
3. Control—two or three wire.
4. Panel—open or enclosed.
5. Description of application, such as distance between contactor and point of control, nature of service, etc.

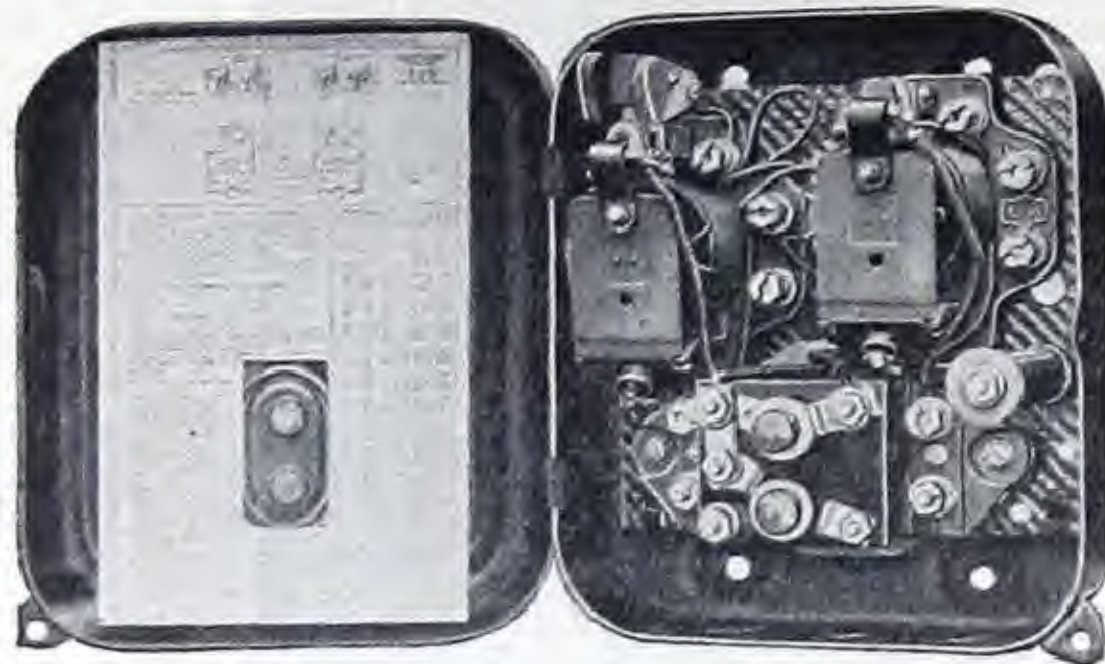
GENERAL DESCRIPTION

These D.C. contactors are used to control lighting or power circuits automatically. The contactor may be connected at any convenient point in the main circuit, and only small control wires run between it and the point of control. This eliminates the necessity of bringing the large main line wires to the point of control and saves copper when this point is remotely located.

Prices on application.

CUTLER-HAMMER D.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Across-the-Line Type—Non-Reversing—With or Without Thermal Overload Protection.



With door open, to show construction of starter with thermal overload relays and with pushbutton master switch in cover

STANDARD FEATURES OF DESIGN

- 1—Plain starting, non-reverse.
- 2—Double line break in motor circuit.
- 3—Three wire remote control by means of a 10250-H56 pushbutton master switch.
- 4—Silver contacts, easily renewed.
- 5—Low voltage protection.
- 6—All wiring on front of panel.
- 7—Starters interchangeable for all horsepower sizes on same voltage.
- 8—Safety enclosing case with conduit knockout holes in top and bottom.
- 9—Panel removable from case without disturbing conduit.
- 10—Provision for padlocking enclosing case. (Padlock not furnished).

Additional features for overload type starters

- 11—Inverse time limit overload protection.
- 12—Overload relays manually re-set from outside of case.
- 13—Starters interchangeable for all horsepower sizes on the same voltage by changing heater coils.
- 14—With or without start and stop pushbuttons in cover.

GENERAL DESCRIPTION

These enclosed automatic motor starters are for use with small series, shunt or compound wound direct current motors which can be connected directly across the line on starting. They are used with motors driving all classes of equipment and where remote control is desired.

Price includes starter complete with pushbutton master switch as listed below

[When ordering, specify number of starter, number of heater coils, if with thermal overload relays and number of pushbutton master switch (if with separate pushbutton master switch).]

		Group I—With Start, Stop and Reset pushbuttons in cover and no separate pushbutton master switch	
Volts	Maximum H. P.	List Number	List Price
115	2	6101H1	\$34.50
230	2	6101H2	34.50
		Group II—With Reset button in cover and separate 10250H56 pushbutton master switch.	
115	2	6101H5	\$35.90
230	2	6101H6	35.90
		Group III—Without Thermal Overload Relays but with separate 10250H56 pushbutton master switch.	
115	2	6101H3	\$31.40
220	2	6101H4	31.40

Weight 10 lbs., boxed.

CUTLER-HAMMER D.C. ENCLOSED AUTOMATIC MOTOR STARTERS

Price Optional Features

- 1—Additional No. 10250-H56 three wire remote control pushbutton master switch, \$4.00 List.
- 2—Starter arranged for two wire remote control:
 - a—Add to group I for 10250-H36 two wire remote control push switch, \$15.00 List.
 - b—Add to groups II and III for 10250-H36 two wire remote control push switch in place of 10250-H56 \$11.02 List.

Information required with order

- 1—Horsepower and voltage.
- 2—List number of starter.
- 3—List number of heater coils, (if with thermal overload relays).
- 4—List number of pushbutton master switch, (if separate pushbutton master switch is to be used).
- 5—Whether motor is rated on 40° C. or 50° C. temperature rise basis.

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.

Motor Controls.

Condit Electrical Mfg. Corp.

Oil Circuit Breakers.

Ferranti Electric Ltd.

Transformers, Surge Absorbers.

J. P. Tubular Heater Co.

Electric Heating Systems.

Sangamo Electric Limited,

Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,

Cutouts and Disconnects.

Telegraph Condenser Co.

Power Static Condensers.

Weston Electric Instrument Corp.

Indicating Instruments of all kinds.
Radio Test Equipment.

Mather & Platt Ltd.

Motors and Generators, All Types,
A. C. and D. C. Complete line of
Centrifugal Pumps.

A. Reyrolle & Co. Limited.

Metal Clad Switchgear.

Ilg Electric Ventilating Co.

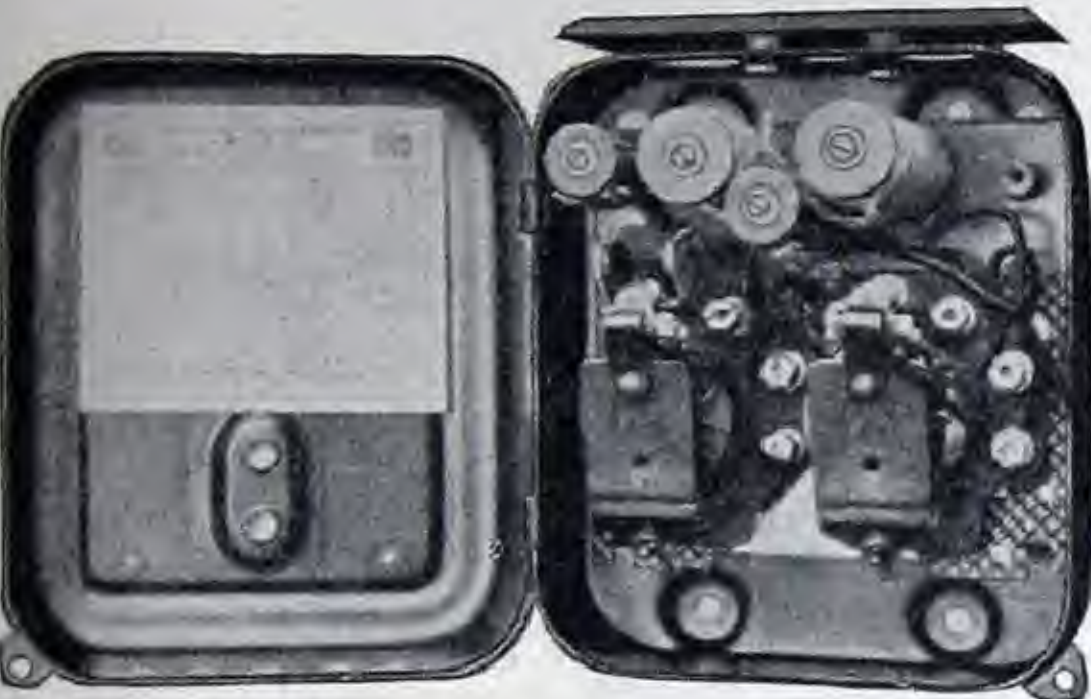
Ventilating Fans and Blowers.

Hewittic Electric Co.

Rectifiers (Glass bulb).

CUTLER-HAMMER
D.C. ENCLOSED AUTOMATIC
MOTOR STARTERS

Counter E.M.F. Type—Non-Reversing
With or Without Thermal Overload Protection



With door open, to show construction of starter without thermal overload relays.

GENERAL DESCRIPTION

These enclosed automatic motor starters are for use with series, shunt or compound wound direct current motors where reduced voltage starting is required and which can be started from rest to normal speed in 15 seconds without a current exceeding 200% full load rating of the motor. They are used with motors driving all classes of equipment where remote control is desired. They provide counter E.M.F. acceleration.

Price includes starter complete with No. 10250H56 pushbutton master switch.

When ordering, specify number of starter, number of pushbutton master switch (10250H56) and number of heater coils with thermal overload relays.

Group I.—With thermal overload relays—Price includes heater coils and pushbutton master.			
Volts	List No.	List Price	
115	6102H5	\$54.00	
115	6102H6	54.00	
230	6102H7	54.00	
230	6102H8	54.00	
Group II.—Without thermal overload relays — Price includes pushbutton master.			
115	6102H9	\$49.50	
115	6102H10	49.50	
230	6102H11	49.50	
230	6102H12	49.50	

Weight 10 lbs., boxed.

PRICE OPTIONAL FEATURES

Additional No. 10250H56 three wire remote control pushbutton master switch.....\$3.70 list

Starter arranged for two wire remote control, add for No. 10250H36 two wire remote control push switch in place of the No. 10250H56 switch.....\$6.80 list

Information required with order

Horsepower and voltage.

List number of starter.

List number of heater coils, (if with thermal overload relays.)

List number of pushbutton master switch.

Whether motor is rated on 40° C. or 50° C. temperature rise basis.

CUTLER-HAMMER
D.C. AUTOMATIC MOTOR STARTERS

Reversing—Across-the-Line Type
Enclosed and Open Panels



Type SRB, with door open to show construction.

GENERAL DESCRIPTION

These automatic reversing starters are for use with small series, shunt or compound wound direct current motors, which can be connected directly across-the-line on starting. They are used with motors driving hoists, machine tools, lifts, operating garage doors, and any other applications where a half-time, intermittent duty reversing starter is required.

Price includes a complete automatic reversing starter.

Note. Price of pushbutton master switch must be added. When ordering, specify list number of starter, and list number of pushbutton master switch.

List Number	Type	Volts	Maximum H.P. Ratings	List Price
Contactors Mounted Side-by-Side in Enclosing Case				
6103H4	SRA	115	1	\$33.00
6103H1	SRB	115	1½	43.50
6103H2	SRB	230	3	43.50
6103H3	SRB	550	1½	43.50
6103H8	UAM	115	2½	142.50
6103H9	UAM	230	4	142.50
6103H10	UAM	550	4	142.50
Contactors Mounted Back-to-Back—Open Type—For Hoists				
6103H5	SRC	115	1½	41.25
6103H6	SRC	230	3	41.25
6103H7	SRC	550	1½	41.25

Type	Shipping Weights	Lbs.
SRA.....		12
SRB.....		15
UAM.....		50
SRC.....		10

PRICE OPTIONAL FEATURES

1. Add for No. 10250-H74 or H75—three button remote control pushbutton master switch for three wire control—for types SRB and SRC only—each.....\$9.40 list

2. Add for No. 10250-H63 or H77—hold-down two button remote control pushbutton master switch, for two wire control—each..\$3.70 list

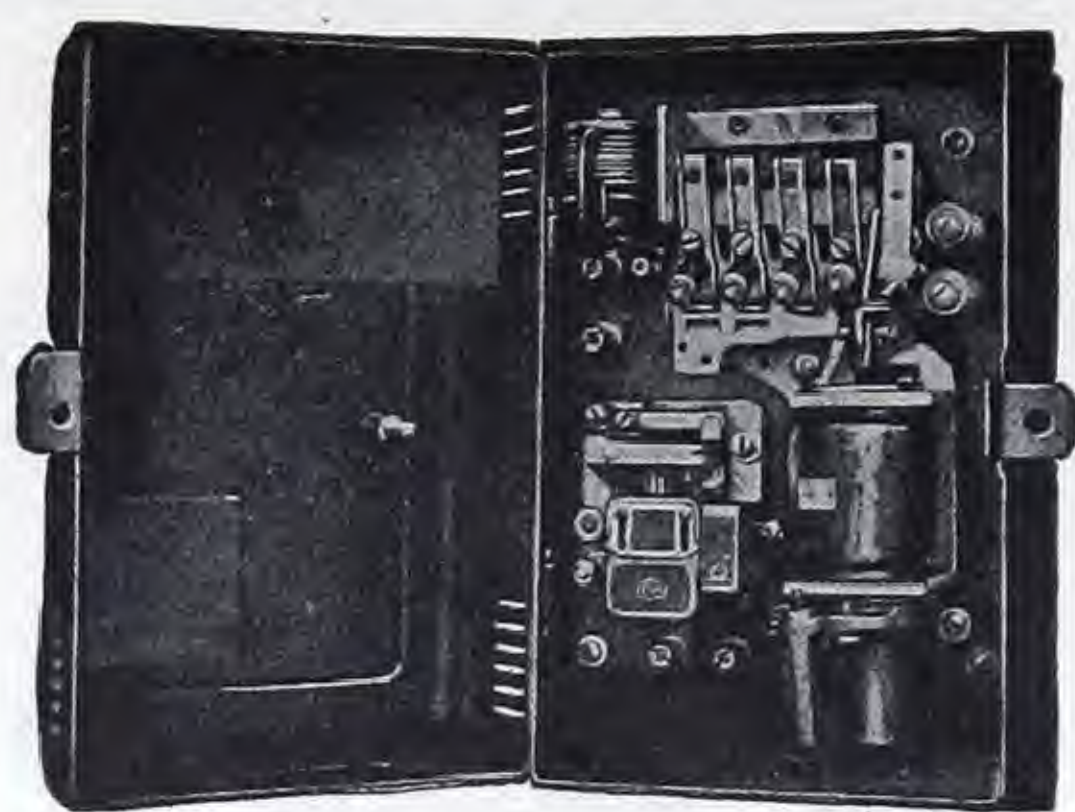
INFORMATION REQUIRED WITH ORDER

1. Horsepower and voltage.

2. List number of starter.

3. List number of pushbutton master switch.

D.C. AUTOMATIC MOTOR STARTERS



Time Limit Type
Small H.P. size, with door open
to show construction.

STANDARD FEATURES OF DESIGN

1. Automatic operation, with timing by oil dashpot.
2. Plain starting non-reversing.
3. Inverse time limit overload protection.
4. Two or three wire remote control.
5. Low voltage protection with three wire control.
6. Low voltage release with two wire control.
7. Magnetic blowout on small H.P. sizes.
8. Magnetic main contactor with blowout on large H.P. sizes.
9. Renewable contacts.
10. Enclosed type arranged for conduit wiring.
11. Resistor is moisture resisting.

Maximum Ratings:

60 H.P. 115 Volts—125 H.P. 230 Volts—200 H.P. 550 Volts.

OPTIONAL FEATURES

1. Omission of enclosing case.
2. Vibrating field relay.
3. Automatic reset for thermal overload relay.
4. Field failure relay.

These automatic starters are used with series, shunt or compound wound D.C. motors that can be accelerated from rest to normal speed in 15 seconds without taking a current exceeding 150% full load rating of the motor. They are used with motors driving pumps, fans, compressors and other classes of machinery where the load varies over a wide range and where remote control is desired. The resistor conforms to American Standards classification No. 135.

D.C. ENCLOSED AUTOMATIC STARTER



Enclosed view

STANDARD FEATURES OF DESIGN

1. Automatic operation.
2. Plain starting, non-reverse.
3. Time limit acceleration by oil dash pot.
4. Overload protection by fuses.
5. Two or three wire remote control.
6. Low voltage protection with three wire control.
7. Low voltage release with two wire control.
8. Outside operated knife switch.
9. Knife switch has quick break.
10. Resistor is moisture resisting.
11. Dust-proof, safety, enclosing case arranged for conduit wiring.
12. Provision for padlocking door, also knife switch handle. (Padlocks not furnished).
13. E.P.C. Service Classification No. 35.

GENERAL DESCRIPTION

These enclosed automatic starters are used with series shunt or compound wound D.C. motors that can be accelerated from rest to normal speed in 30 seconds without taking a current exceeding 150% full load rating of the motor. They are used with motors driving pumps, fans, compressors and other classes of machinery where the load varies over a wide range and remote control is desired.

Price includes a complete starter.

115 Volts				
H.P.	Accelerat'g Steps	List No.	List Price	Lbs. Boxed
1/4	4	6110H202	\$ 71.25	70
1/2	4	6110H203	71.25	70
1	4	6110H204	75.00	70
2	4	6110H205	77.25	70
3	4	6110H206	77.25	80
4	5	6110H298	82.50	170
5	5	6110H299	84.75	170
7 1/2	5	6110H209	142.50	180
10	5	6110H210	162.00	180
230 Volts				
1/4	4	6110H211	\$ 72.75	70
1/2	4	6110H212	72.75	70
1	4	6110H213	75.00	70
2	4	6110H214	78.00	70
3	4	6110H215	78.00	80
4	4	6110H216	84.75	80
5	4	6110H217	87.00	80
7 1/2	4	6110H300	126.00	190
10	5	6110H219	142.50	190
12 1/2	5	6110H220	162.00	190
15	5	6110H221	162.00	190
550 Volts				
1/4	4	6110H222	\$120.00	110
1/2	4	6110H223	120.00	110
1	4	6110H224	124.50	110
2	4	6110H225	124.50	110
3	4	6110H226	124.50	120
4	4	6110H227	135.00	120
5	4	6110H228	141.00	120
7 1/2	5	6110H229	195.00	170
10	5	6110H230	216.00	170
12 1/2	5	6110H231	220.50	170
15	5	6110H232	220.50	170

Pushbutton tryout switch, add.....\$4.35

C. ENCLOSED AUTOMATIC STARTING SPEED REGULATORS

Limit Acceleration—Non Reversing Speed Regulation 10% to 100% by Field Control.



door open, showing construction of regulator, type A

STANDARD FEATURES OF DESIGN

- Automatically operated.
- Speed setting, non-reversing.
- Speed regulation 10% to 100% above normal by shunt field control.
- Low voltage protection.
- Three wire remote control.
- Dynamic braking.
- Automatic time limit acceleration.
- Motor always starts under full field.
- Field discharge resistor.
- Field protective switch and resistor.
- Resistor is moisture resisting.
- Dust-proof, safety, enclosing case, arranged for conduit wiring.
- Provision for padlocking enclosing case door. (Padlock not furnished.)
- E. P. C. Service Classification No. 35.

Price includes a complete automatic speed regulator as illustrated

P.	115 Volts		230 Volts		550 Volts	
	List Price	Lbs. Boxed	List Price	Lbs. Boxed	List Price	Lbs. Boxed
1/2	\$181.50	90	\$181.50	90	\$192.00	90
	186.00	90	186.00	90	195.00	90
1/2	189.00	90	189.00	90	199.50	90
	192.00	90	192.00	90	202.50	90
1/2	193.50	90	193.50	90	207.00	90
	195.00	90	195.00	90	208.50	90
	276.00	145	256.50	145	270.00	145
	276.00	145	261.00	145	276.00	145
1/2	330.00	155	268.50	145	288.00	145
	345.00	155	282.00	145	300.00	145
1/2	.....	.....	345.00	180	367.50	180
	.....	.....	367.50	180	412.50	180

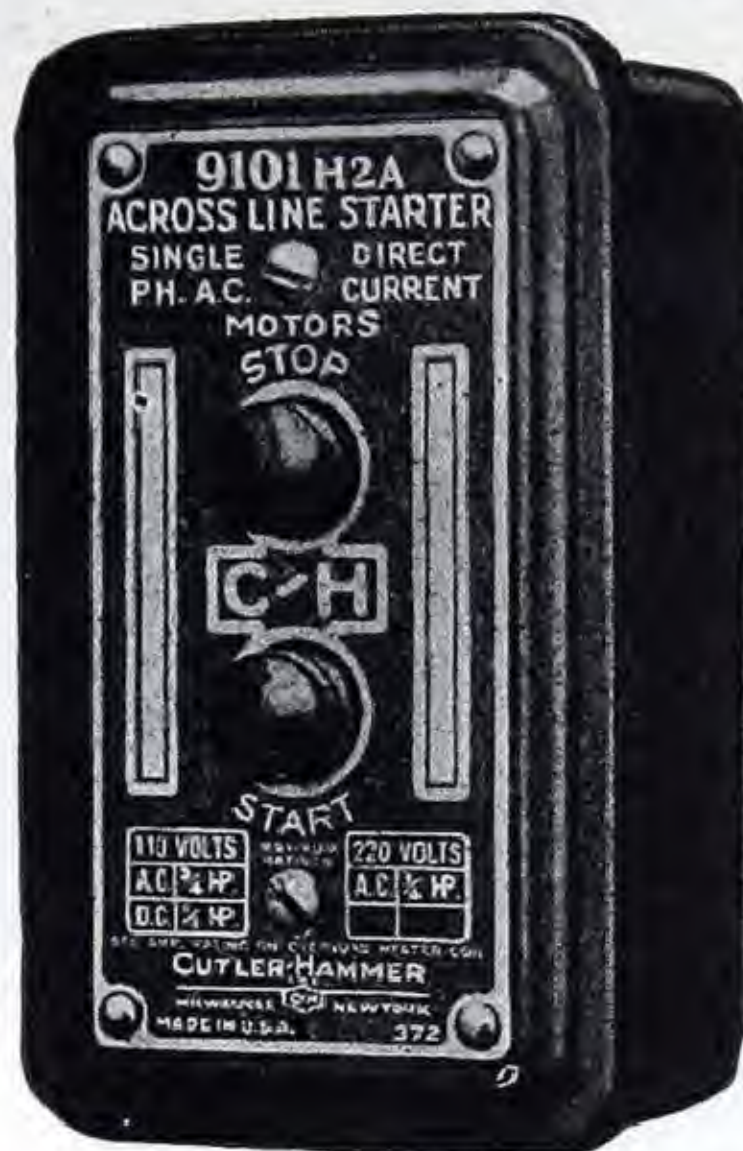
Price optional features

- Designed for "slow speed" service (E. P. C. Class No. add, 15% to List Price.
- Two wire control, add, \$9.40 List.
- Reversing by auxiliary master switch.
- Information required with order
- Horsepower and voltage.
- Normal and maximum speeds desired.
- Shunt field current at normal and maximum speeds.
- Type of pushbutton master switch.

information requested is not available, give all data on motor nameplate, or the name of the motor manufacturer your purchase order number.

A.C. OR D.C. FRACTIONAL HORSEPOWER MOTOR STARTERS

Single Pole—Pushbutton Operated—With Thermal Overload Protection For D.C. and Single-Phase A.C. Motors



Enclosed view of across-the-line type starter.

STANDARD FEATURES OF DESIGN

General

1. Single pole.
2. Pushbutton operated.
3. Inverse time limit overload protection.
4. Overload relay is reset by operating "start" button.
5. Double-break silver contacts.
6. Quick make and break contact mechanism.
7. Open or enclosed switch.
8. Enclosed switch arranged for conduit wiring.
9. Switch removable from case without disturbing conduit.

10. Interchangeable for all horsepower sizes by changing heater coil.

Across-the-line type

11. Connects the motor directly to the line.
12. Trip-free on overload,—switch cannot be held closed.

Resistor Type

13. Current limit acceleration.
14. Limits starting inrush current to a safe value.

GENERAL DESCRIPTION

These pushbutton operated motor starters are for use with D.C. and single-phase A.C. fractional horsepower motors driving machine tools, fans, blowers and any other small machinery where a high-grade starting switch with thermal overload protection is desired. Two types are furnished—the across-the-line type and the resistor type.

List No.	Type of Switch	Type of Overload Relay	List Price	Lbs. Boxed
9101H1	Open	Fast Trip	\$3.00	2
9101H2	Enclosed	Fast Trip	3.90	2
9101H54	Open	Slow Trip	3.00	2
9101H55	Enclosed	Slow Trip	3.90	2
9101H3	Open	Slow Trip	6.40	3
9101H4	Enclosed	Slow Trip	7.50	3
9101H5	Open	Slow Trip	6.40	3
9101H6	Enclosed	Slow Trip	7.50	3

Maximum Horsepower Ratings

List No.	Direct Current		Alternating Current	
	115 Volts	110 Volts	220 Volts	Frequency
Across-the-line Type				
9101H1	1/4	3/4	3/4	25 to 60
9101H2	1/4	3/4	3/4	25 to 60
9101H54	1/4	3/4	3/4	25 to 60
9101H55	1/4	3/4	3/4	25 to 60

Resistor Type

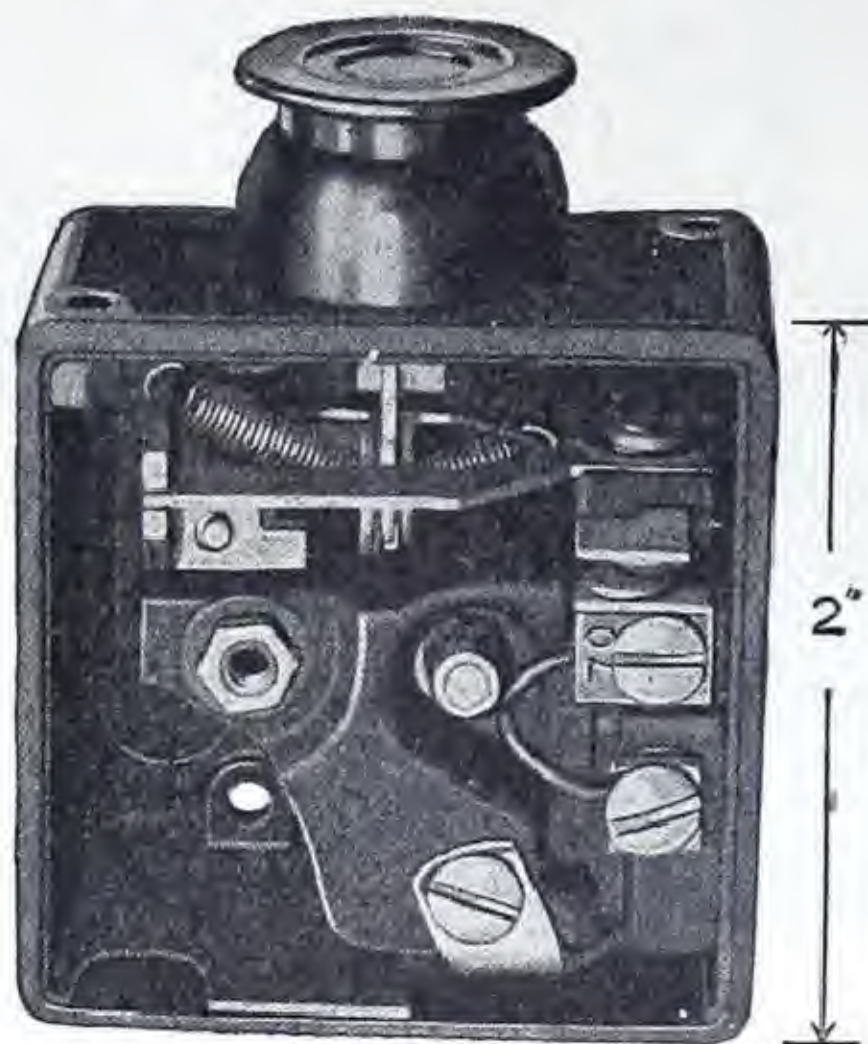
9101H3	..	3/4	3/4	60
9101H4	..	3/4	3/4	60
9101H5	1/4	..	..	..
9101H6	1/4	..	..	..

Information required with order

1. List number of starter.
2. List number of heater coil.
3. Actual ampere rating of motor.

CUTLER-HAMMER THERMAL OVERLOAD SWITCH OR FRACTIONAL HORSEPOWER MOTOR STARTER

For D.C. and Single Phase A.C.



Small size and compact construction have been achieved without sacrificing ample mechanical strength for long life and capacity to handle and protect safely, motors up to $\frac{3}{4}$ H.P.

GENERAL DESCRIPTION

This device is for use with fractional horsepower A.C. or D.C. motors on such applications as meat grinders, portable saws, oil burners, refrigerating machines, stokers, water pumps, sump pumps, fans, air-conditioning machinery, etc., where the motor is connected directly across the line. It can be used also as a manually reset overload breaker in connection with other forms of starting devices.

STANDARD FEATURES OF DESIGN

1. Single Pole.
2. Pushbutton start, stop and overload reset.
3. Eutectic metal, thermal, inverse time limit overload.
4. Quick break, double break, silver contacts reduce arcing and prolong contact life.
5. Housed in strong bakelite case, with knockouts for rubber covered wire leads.
6. All metal working parts protected against rust.
7. Interchangeable for all horsepower sizes by changing heater coil.

Maximum Ratings:

A.C.—25 or 60 Cycles, 110 or 220 Volts—Max. $\frac{3}{4}$ H.P.
D.C.—115 Volts, Max. $\frac{1}{2}$ H.P., 230 Volts, Max. $\frac{1}{4}$ H.P.

INFORMATION REQUIRED WITH ORDER

1. List number of starter (see No. 9000A).
2. List number of heater coil (see No. 10176).
3. Actual ampere rating of motor.
4. Horsepower and voltage.

CUTLER-HAMMER D.C. OR A.C. PUSHBUTTON OPERATED MOTOR STARTERS

Two Pole—Across-the-Line Type—With Thermal Overload Protection—For D.C. and Single Phase A.C. Squirrel Cage Motors



Enclosed view.

STANDARD FEATURES OF DESIGN

1. Two pole.
2. Pushbutton operated.
3. Connects motor directly to the line.
4. Inverse time limit overload protection.
5. Overload relay is reset by operating "reset" button.
6. Interchangeable for all horsepower sizes by changing heater coils.
7. Double-break, silver contacts.
8. Quick break contact mechanism.
9. Open or enclosed switch.
10. Dimensions of enclosed switch same as standard wiring box.
11. Enclosed switch arranged for conduit wiring.
12. Starter removable from case without disturbing conduit.
13. Arrangement for sealing enclosing case cover.

GENERAL DESCRIPTION

These pushbutton operated motor starters are for use with direct current motors and single phase alternating current squirrel cage motors driving machine tools, fans, blowers, and any other small machinery where a two pole starting switch, with thermal overload protection, is desired. They connect the motor directly across the line on starting. These starters can be used on any frequency from 25 to 60 cycles.

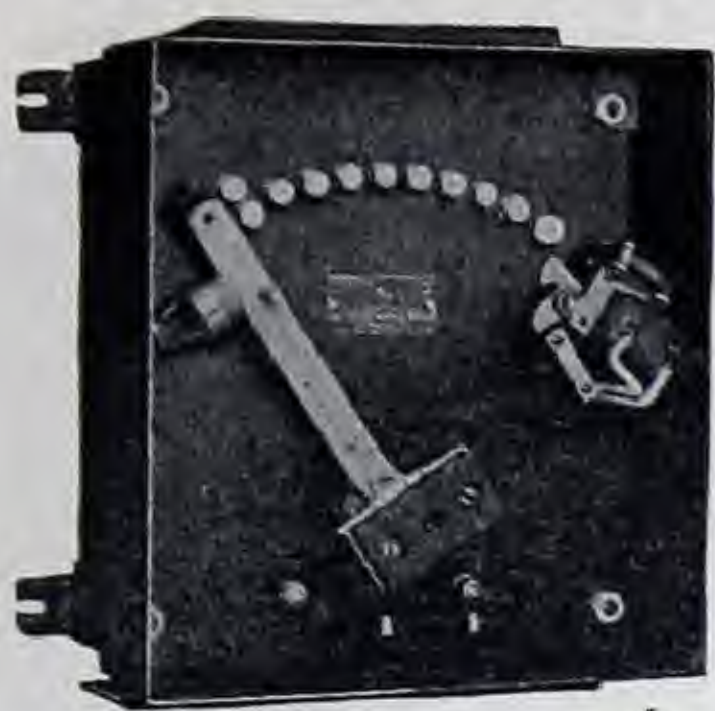
Price includes a complete motor starting switch, with heater coils, as illustrated.

When ordering, specify number of starter and list number of heater coils.

		Maximum H.P. Ratings					
List No.	Type of Starter	Direct Current		Alternating Current— Single Phase		List Price	Lbs. Boxed
		115 Volts	230 Volts	110 Volts	220 Volts		
9103H1	Open	$\frac{1}{2}$	$\frac{1}{4}$	2	2	\$7.90	3
9103H2	Enclosed	$\frac{1}{2}$	$\frac{1}{4}$	2	2	9.00	3

ENCLOSED MANUAL SINGLE PHASE MOTOR STARTERS

For Commutator or Repulsion Type Motors



With cover removed, showing button contacts as furnished with starter, types A and B.

STANDARD FEATURES OF DESIGN

Manually operated.
Plain starting, non-reverse.
Low voltage protection.
Contacts are removable from front of panel.
Safety enclosing case arranged for conduit wiring.
Outside operating lever with "On" and "Off" indications on cover.

N.E.M.A. Service Classification No. 15.

GENERAL DESCRIPTION

These enclosed, manual, single phase motor starters are with repulsion or commutator type, self-starting A.C. that can be accelerated from rest to full speed in seconds without taking a current exceeding 150% full rating of the motor.

Price includes a complete manual starter.

List No.	List Price	Lbs. Boxed
110 Volts—25 to 60 Cycles		
9111H1	\$ 30.00	50
9111H2	34.50	50
9111H3	36.00	70
9111H4	36.00	70
9111H5	40.50	70
9111H6	97.50	100
9111H7	97.50	100
9111H8	144.00	125
9111H8	144.00	125
220 Volts—25 to 60 Cycles		
9111H9	\$ 30.00	50
9111H10	34.50	50
9111H11	36.00	50
9111H12	36.00	70
9111H13	39.00	70
9111H14	52.50	80
9111H15	76.50	80
9111H16	112.50	100
9111H17	142.50	140
9111H17	142.50	140
9111H18	157.50	140
9111H18	157.50	140
9111H19	165.00	140
9111H20	172.50	140
440 Volts—25 to 60 Cycles		
.....	\$ 40.50	50
.....	40.50	50
.....	40.50	50
.....	40.50	50
.....	40.50	70
.....	57.00	70
.....	63.00	70
.....	112.50	80
.....	142.50	100
.....	142.50	100
.....	157.50	100

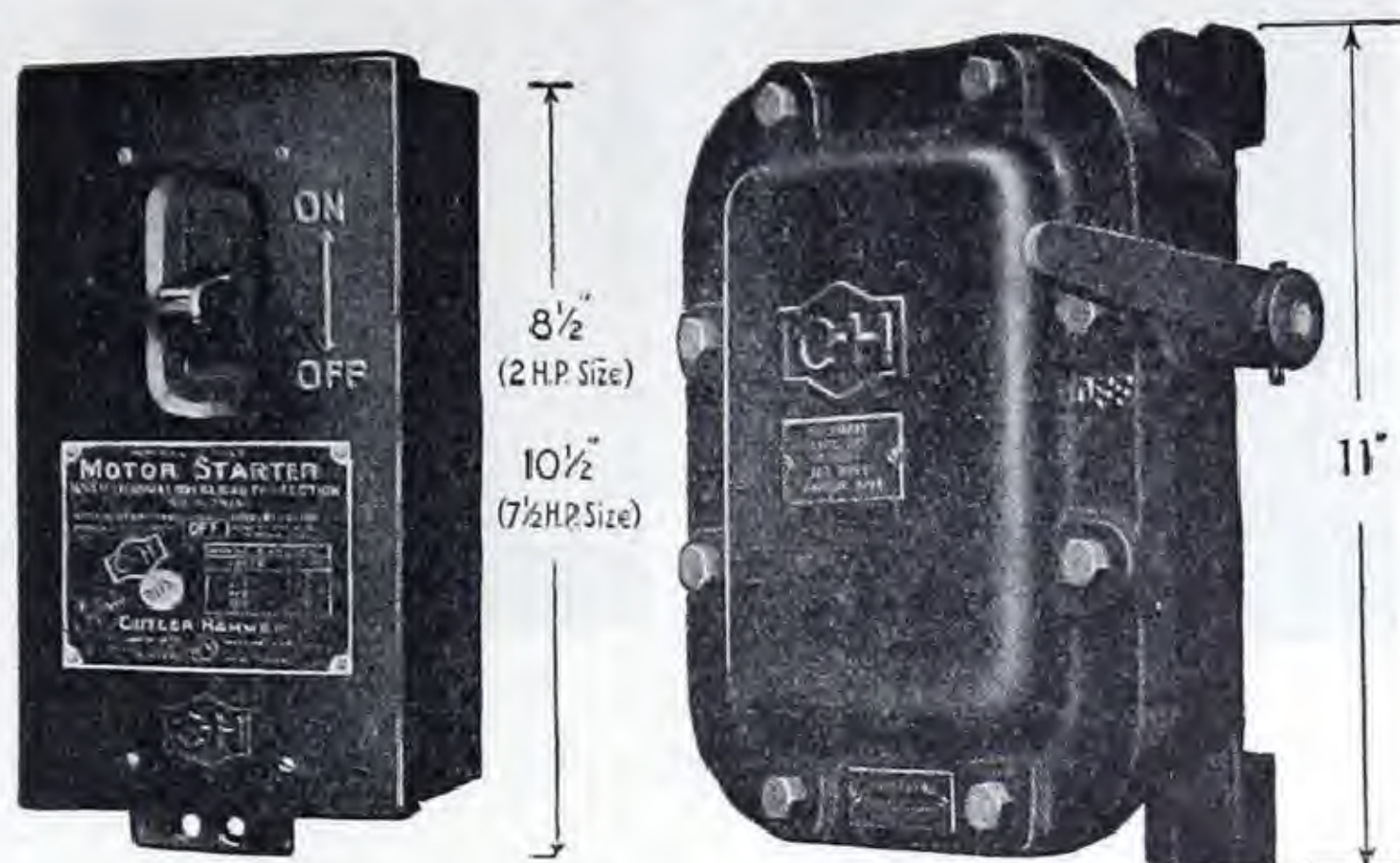
INFORMATION REQUIRED WITH ORDER

List number of starter, or horsepower and voltage.
Type of motor and name of motor manufacturer.

A. C. ENCLOSED MANUAL MOTOR STARTER

Three and Four Pole—Across-the-Line Type With Thermal Overload Protection.

Standard Dust-Proof, Watertight and Explosion Proof (Class I, Group D) Enclosures.



Enclosed view of 3 pole types

Enclosed view of 3 pole, explosion proof type

STANDARD FEATURES OF DESIGN

- 1—Manually operated.
- 2—Connects motor directly to the line.
- 3—Eutectic metal, thermal, inverse time limit overload protection.
- 4—Interchangeable for all horsepower sizes within rating of starter by changing thermal overload heater coils.
- 5—Cover interlock on standard enclosure prevents opening cover unless operating lever is in "off" position.
- 6—Double break silver contacts reduce arcing, increase life.
- 7—All metal working parts protected against rust.
- 8—Outside operating lever with "on" and "off" indications.
- 9—Standard dust-proof, water-tight and explosion proof types.
- 10—Enclosing case arranged for conduit wiring.
- 11—Panel removable from case without disturbing conduit.
- 12—Standard enclosure has provision for padlocking case or padlocking case and operating lever in "off" position. Water-tight and explosion-proof types can be padlocked in "off" position. (Padlocks not furnished.)

Maximum Ratings

Small size:—single phase—1½ H. P., 110 volts; 2 H. P., 220-550 volts.

Two or three phase—2 H. P., 110-550 volts.

Large size, three or four pole:

Single phase—3 H. P., 220 volts; 5 H. P., 440-550 volts.

Two or three phase—3 H. P., 110 volts; 5 H. P., 220 volts; 7½ H. P., 440-550 volts.

These starters can be used on any frequency from 25 to 60 cycles.

GENERAL DESCRIPTION

These A. C. enclosed manual starters are for use with standard squirrel cage motors, high torque squirrel cage motors, and motors with internal starting arrangements on applications such as fans, pumps, textile machinery, machine tools, etc. They connect the motor directly across the line on starting.

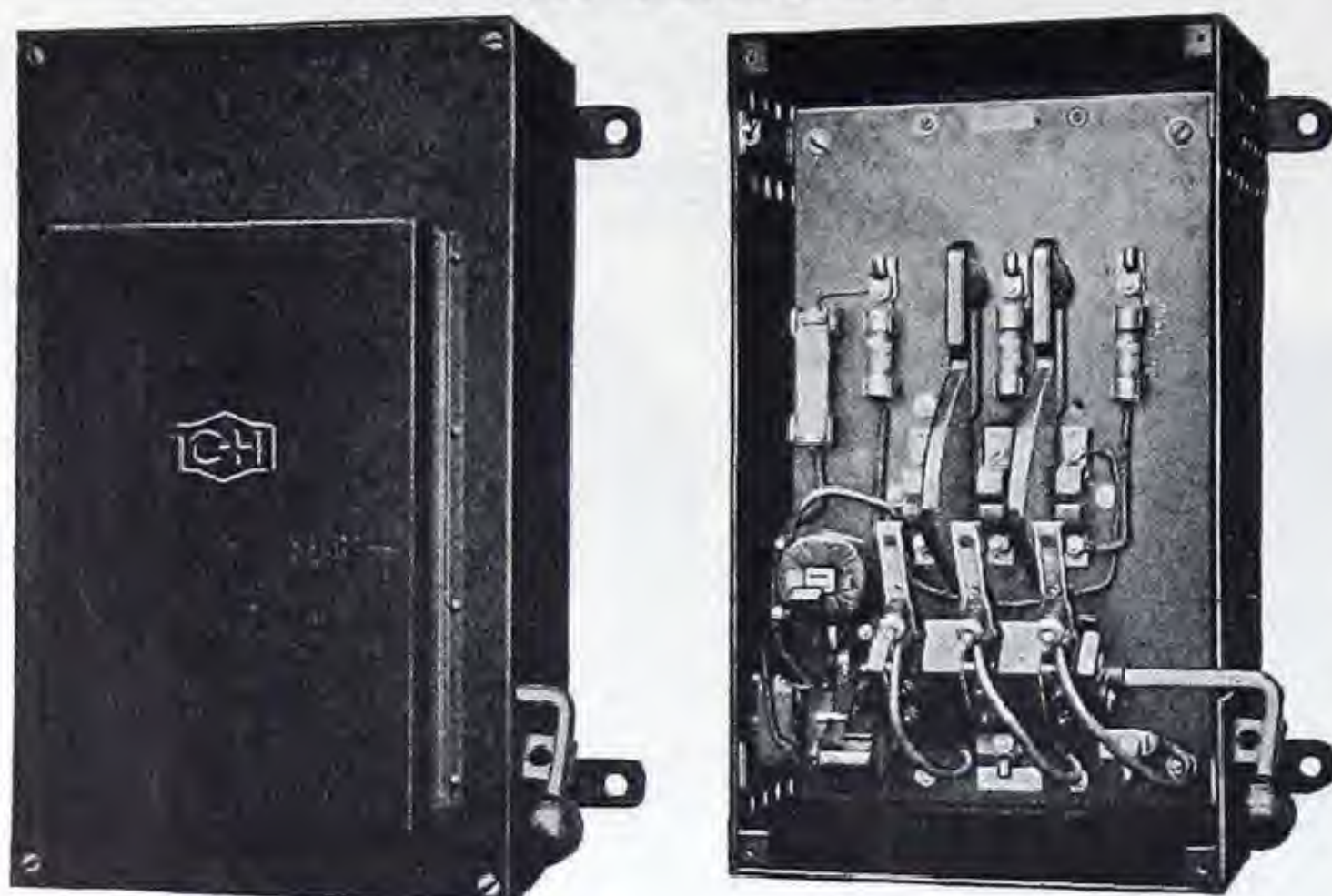
Optional Features

- 1—Pedestal mounting for 1 or 2 starters.
- 2—Galvanized or cadmium plated enclosing case.
- 3—Deduction for omission of enclosing case.

Information required with order

- 1—List number of starter.
 - 2—List number of heater coils.
 - 3—Actual ampere rating of motor.
 - 4—Horsepower and voltage.
 - 5—Type of enclosure.
- Price on application.

A.C. ENCLOSED MANUAL POLYPHASE MOTOR STARTERS



Enclosed view.

With cover removed

STANDARD FEATURES OF DESIGN

1. Manually operated.
2. Low voltage protection.
3. Fuse protection while motor is running.
4. Motor and fuses "dead" when cover is opened.
5. Arc shields between poles.
6. One step of starting resistance in each of the three phases.
7. Resistor is moisture resisting.
8. Outside operating lever with "start," "run" and "off" indications on case.
9. Dust-proof, safety, enclosing case, arranged for conduit wiring.
10. Provision for locking starting lever in "open" position.
11. E.P.C. Service Classification No. 16.

GENERAL DESCRIPTION

These enclosed, three pole, manual motor starters are for use with polyphase squirrel cage induction motors which cannot be thrown directly across the line to start and which can be started in 15 seconds without taking a current exceeding 100% full load rating of the motor.

They are used with single phase induction motors by disconnecting the middle pole, and with motors arranged for 2 phase 4 wire, by adding a four pole main line knife switch to disconnect the motor.

110 Volts				
List Numbers				
H.P.	3 Phase 25-30 Cycles	3 Phase 60 Cycles	List Price	Lbs. Boxed
1	9118H394	9118H421	\$62.25	75
2	9118H395	9118H422	62.25	75
3	9118H396	9118H423	66.00	80
4	9118H397	9118H424	66.00	80
5	9118H398	9118H425	67.50	80
7½	9118H399	9118H426	71.25	85
220 Volts				
1	9118H400	9118H427	\$62.25	75
2	9118H401	9118H428	62.25	75
3	9118H402	9118H429	66.00	80
4	9118H403	9118H430	66.00	80
5	9118H404	9118H431	69.75	85
7½	9118H405	9118H432	71.25	85
10	9118H406	9118H433	75.00	90
550 Volts				
1	9118H414	9118H448	\$67.50	75
2	9118H415	9118H449	67.50	75
3	9118H416	9118H450	69.75	80
4	9118H417	9118H451	69.75	80
5	9118H418	9118H452	71.25	85
7½	9118H419	9118H453	75.00	85
10	9118H420	9118H454	81.35	90

Information required with order

1. Horsepower and voltage.
2. Frequency.
3. Number of phases; if two phase, three or four wire.

A.C. AUTO TRANSFORMER MANUAL MOTOR STARTERS

For Polyphase Squirrel Cage Induction Motors—With Thermal Overload Protection.



Enclosed view.

STANDARD FEATURES OF DESIGN

1. Manually operated.
2. Plain starting—non-reversing.
3. Inverse time limit overload protection.
4. Low-voltage protection.
5. Standard C-H drum type contacts, oil immersed.
6. All steel finger boards.
7. Moisture proof coils, vacuum impregnated.
8. Motor is stopped from outside of case.
9. Motor completely disconnected in "off" position.
10. Dust-proof, safety enclosing case.
11. Conduit knockout holes in top of case.
12. Outside operating lever with "off," "start" and "run" indications on side of case.
13. Operating lever cannot be left in "start" position.
14. Operating lever cannot be moved direct to "run" position.
15. Provisions for padlocking operating lever in "off" position. (Padlock not furnished.)
16. All 2200 volt starters (type H) are dead front safety type construction with floor stand.

GENERAL DESCRIPTION

These A.C. enclosed manual motor starters are for use with polyphase squirrel cage induction motors where the size of the motor or limitation of the power supply requires starting at reduced voltage. The starters may be operated as frequently as once every four minutes for one hour, the starting period not to exceed 15 seconds. Auto-transformers are used during the starting period to obtain reduced voltage. As starting resistor is not used, the usual large current in-rush is eliminated and the necessary starting torque obtained with a comparatively small value of line current.

The auto transformer consists of two windings connected in open delta with taps to provide reduced voltage on starting. Up to and including 50 H.P., the auto transformer has two taps; one to give 65 per cent and the other to give 80 per cent of line voltage on starting. Above 50 H.P., the auto transformer has three taps; one to give 50 per cent, one to give 65 per cent and one to give 80 per cent of line voltage on starting. The standard starter is connected at the factory to give 65 per cent of normal line voltage at the motor terminals for starting. Changes to the other taps to meet special conditions are easily made.

Inverse time limit overload protection is obtained through the use of C-H Thermal Overload Relays. These relays give ideal protection to the motor, both during starting and running. The relays allow an ample time interval to take care of starting inrush and momentary overloads without tripping. However, when an overload becomes dangerous, the motor is disconnected from the line. After the circuit has been opened by an overload, simply pushing the "reset" button puts the starter back in service.

CUTLER-HAMMER

C. AUTO TRANSFORMER MANUAL
MOTOR STARTERS

Polyphase Squirrel Cage Induction Motors—With
Thermal Overload Protection

Price includes starter complete with thermal overload relays
with heater coils and necessary oil.

When ordering, specify number of starter and number of
heater coils.)

THREE PHASE OR TWO PHASE—3 WIRE

Volts	Starter Type	60 Cycle		25 Cycle		Lbs. Boxed
		List Number	List Price	List Number	List Price	
110	A	9141H518	\$136.10	9141H489	\$139.90	175
220	A	9141H519	136.10	9141H491	139.90	175
440	A	9141H525	136.10	9141H497	139.90	175
550	A	9141H530	136.10	9141H502	139.90	175
110	B	9141H465	136.10	9141H397	147.40	200
220	A	9141H520	136.10	9141H492	147.40	175
440	A	9141H526	136.10	9141H498	147.40	175
550	A	9141H387	136.10	9141H421	147.40	175
2200	H	9141H596	525.00	9141H607	565.50	900
110	B	9141H517	160.50	9141H490	265.00	200
220	A	9141H520	139.90	9141H492	154.90	175
440	A	9141H526	139.90	9141H498	154.90	175
550	A	9141H387	139.90	9141H421	154.90	175
2200	H	9141H597	544.50	9141H608	565.50	900
110	B	9141H363	255.00	9141H399	285.00	200
220	B	9141H521	139.90	9141H493	147.40	200
440	B	9141H378	139.90	9141H412	147.40	200
550	B	9141H388	139.90	9141H422	147.40	200
2200	H	9141H598	563.25	9141H609	591.00	900
220	B	9141H522	147.40	9141H494	266.25	200
440	B	9141H527	147.40	9141H499	266.25	200
550	B	9141H389	147.40	9141H423	266.25	200
2200	H	9141H599	563.25	9141H610	601.50	900
220	B	9141H523	249.00	9141H495	276.00	200
440	B	9141H528	154.90	9141H500	276.00	200
550	B	9141H531	154.90	9141H503	276.00	200
2200	H	9141H600	570.75	9141H611	630.00	900
220	C	9141H524	257.25	9141H496	276.00	325
440	C	9141H572	154.90	9141H568	276.00	325
550	C	9141H574	154.90	9141H570	276.00	325
2200	H	9141H601	570.75	9141H612	630.00	900

Other sizes up to 150 H. P. are available also for 2 phase
service.

Price Optional Features

	List
Head-front safety type attachment for starter types A, B, C, D and F, add.....	\$52.50
Dust-tight arrangement, add:	
Type A.....	27.00
Type B.....	28.50
Type C.....	30.00
Type D.....	31.50
Type F.....	34.50
Type H.....	34.50
Must be attached before final assembly of auto-trans- former starter.	
Instrument attachment, add:.....	82.00

CUTLER-HAMMER

D.C. ENCLOSED MANUAL MOTOR
STARTERS

Enclosed view, types A, B, C,
CD and D.

STANDARD FEATURES OF DESIGN

1. Manually operated.
2. Plain starting, non-reverse.
3. Low voltage protection.
4. Low voltage coil in series with shunt field in Group I.
5. Low voltage coil in series with motor in Group II.
6. Contacts removable from front of panel.
7. Safety enclosing case, arranged for conduit wiring.
8. Outside operating lever with "Off" and "On" indica-
tions on cover.
9. N.E.M.A. Service Classification No. 15.

Information required with order.

1. Horsepower and voltage.
2. Type of motor—series, shunt or compound.
3. Shunt field current or speed of motor.

GENERAL DESCRIPTION

These enclosed manual motor starters are for use with
series, shunt or compound wound D.C. motors that can be
accelerated from rest to normal speed in 15 seconds without
taking a current exceeding 150% full load rating of the motor.

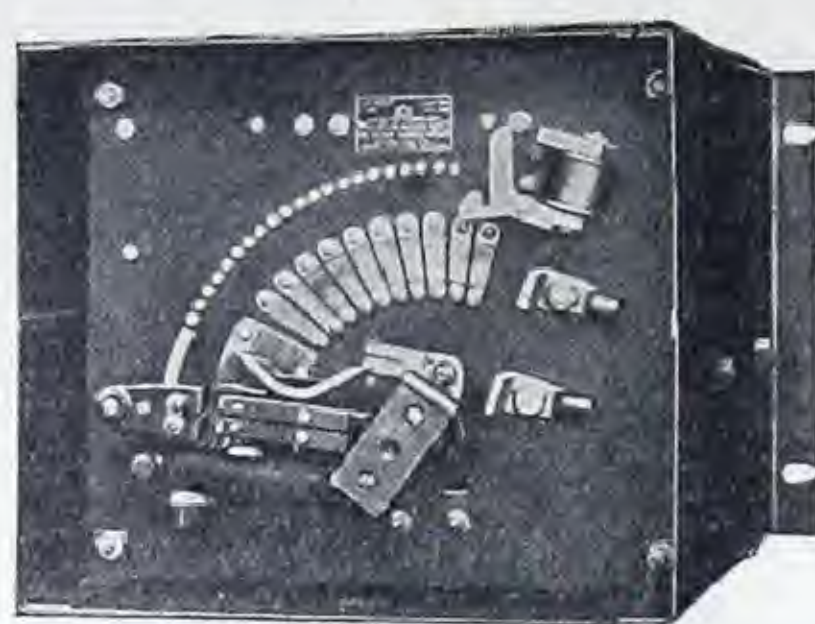
Price includes a complete starter

H.P.	115 Volts			230 Volts	
	List Number	List Price	Lbs. Boxed	List Number	List Price
Group 1.—Starters for Shunt and Compound Motors					
1/4	2111H51	\$13.35	11	2111H64	\$13.35
1/2	2111H52	13.35	11	2111H65	13.35
1	2111H53	15.75	11	2111H66	16.10
2	2111H54	19.90	20	2111H67	19.90
3	2111H55	21.00	20	2111H68	21.40
4	2111H56	32.60	45	2111H68	21.40
5	2111H57	32.60	45	2111H69	21.40
7 1/2	2111H58	34.50	45	2111H70	34.90
10	2111H59	57.75	50	2111H71	39.00
15	2111H60	59.25	55	2111H72	42.00
20	2111H61	65.25	90	2111H73	65.25

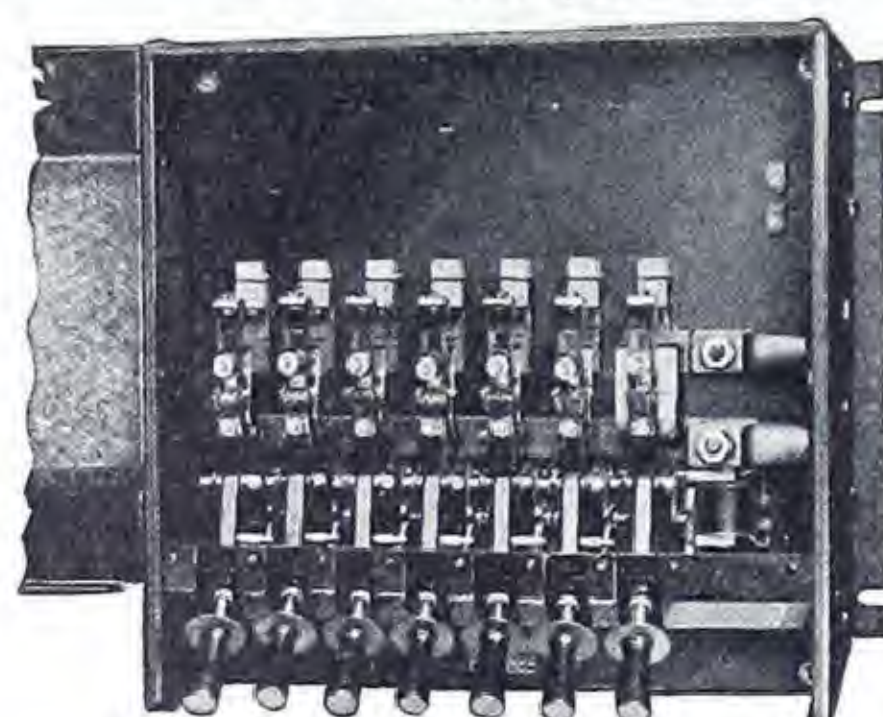
These starters are available up to 50 H.P., also for small
series motors, also for 550 volts.

D.C. ENCLOSED COMPOUND MANUAL MOTOR STARTERS

With Armature Starting and Field Regulation



With cover removed, showing renewable segment contacts as furnished with starter, type C.



With door open, showing multiple switch construction as furnished with starter, types 5D1, 5F1, 5F2, 6F2, 7F2, 8F3 and 8F4.

STANDARD FEATURES OF DESIGN

General

1. Manually operated.
2. Plain starting, non-reverse.
3. Low voltage protection.
4. Speed regulation up to four times normal by shunt field control.
5. Motor always started with full field.
6. Resistor is moisture resisting.
7. Dust-proof enclosing case arranged for conduit wiring.

Sliding Contact Type

Furnished up to and including 20 H.P., 115 volts and 35 H.P., 230 or 550 volts.

8. Armature contacts removable from front of panel.
9. Fourteen field regulating steps on type A. Twenty on types B and C.
10. Operating lever on outside of case with "off," "on" and "increase speed" indications on cover.
11. N.E.M.A. Service Classification No. 15.

Multiple Switch Type

Furnished above 20 H.P., 115 volts and 35 H.P., 230 or 550 volts.

12. Definite time interval during starting.
13. Copper to copper current carrying contacts.
14. Copper to carbon arcing contacts.
15. Arcing contacts are removable.
16. Outside operating levers.
17. Enclosing case door provided with handle and spring latch.
18. Provision for padlocking door. (Padlock not furnished).
19. N.E.M.A. Service Classification Nos. 33, 34 and 35.

Field Regulator

Furnished with multiple switch starter

20. Contacts removable from front of panel.
21. Twenty speed regulating steps.
22. Copper to brass contacts.
23. Outside operating lever with "off" and "run" indications on cover.

D. C. ENCLOSED COMPOUND MANUAL MOTOR STARTERS

With Armature Starting and Field Regulation

GENERAL DESCRIPTION

These enclosed compound manual motor starters are for use with adjustable speed, shunt or compound wound D.C. motors when speed regulation above normal is obtained by weakening the shunt field. They can be used with motor up to 25 H.P., 115 volts, and 40 H.P., 230 and 550 volts which can be accelerated from rest to normal speed in 15 seconds or with larger motors, which can be accelerated from rest to normal speed in 30 seconds without taking a current exceeding 150 per cent full load rating of the motor.

Price includes a complete starter. Above 20 H. P., 115 volt and 35 H. P., 230 and 550 volts, the multiple switch starter with a separately mounted field regulator, is furnished. Wiring connections between multiple switch starter and regulator are not furnished.

H. P.	Summa- tion Watts	Number of Arma- ture Accel- erating Steps	Number of Field Running Points	List Price	Lbs. Boxed
115 volts					
1/4-2	160	7	15	\$54.00A	60
3	240	7	15	57.00	60
4	240	10	21	69.00B	75
5	240	10	21	69.00	75
7 1/2	400	10	21	73.50	75
10	400	10	21	99.00C	150
15	400	10	21	112.50	150
20	640	10	21	112.50	150
25	640	5	21	289.505D	1210
30	640	5	21	260.005F1	280
35	640	5	21	367.50	280
40	720	5	21	390.005F2	340
50	800	5	21	405.00	340
230 Volts					
1/4-2	160	7	15	\$54.00A	60
3	240	7	15	57.00	60
4	240	7	15	57.00	60
5	240	7	15	57.00	60
7 1/2	400	10	21	73.50B	75
10	400	10	21	84.00	75
15	400	10	21	90.00	75
20	640	10	21	112.50C	150
25	640	10	21	132.00	150
30	640	10	21	136.50	150
35	640	10	21	162.00	150
40	720	5	21	307.505D	1240
50	800	5	21	322.50	265
550 Volts					
1/4-2	160	7	15	\$54.00A	60
3	240	7	15	66.00	60
4	240	7	15	66.00	60
5	240	7	15	66.00	60
7 1/2	400	10	21	81.00B	75
10	400	10	21	91.50	75
15	400	10	21	94.50	75
20	640	10	21	117.00	75
25	640	10	21	132.00C	190
30	640	10	21	136.50	190
35	640	10	21	162.00	190
40	720	5	21	337.505D	255
50	800	5	21	345.00	255

Larger sizes up to 200 H. P. are available

Price Optional Features

Deduct for open type starter

Type	List	Type	List
Type A.....	\$15.00	5D1.....	\$ 82.
Type B.....	18.00	5F1 & 5F2.....	105.
Type C.....	21.00		

Information required with order

- 1—Horsepower and voltage.
- 2—Normal or full field speed of motor.
- 3—Maximum speed of motor.
- 4—Shunt field current at maximum speed.
- 5—Resistance of cold shunt field.

If information requested is not available, give all data the motor nameplate, or name of the motor manufacturer and your purchase order number.

D.C. ENCLOSED MANUAL SPEED REGULATORS

Regulation by Armature Control



With cover removed, showing renewable segment contacts as furnished with regulator, type C.

STANDARD FEATURES OF DESIGN

- Manually operated.
- Non-reversing.
- Speed regulation to 50% below normal by armature control.
- Low voltage protection.
- Low voltage coil in series with field.
- Contacts removable from front of panel.
- Resistor is moisture resisting.
- Dust-proof safety enclosing case arranged for conduit wiring.
- Outside operating lever with "Off" and "Run" indications on cover.
- N.E.M.A. Service Classification—for fan duty No. 93—for constant torque duty No. 95.

GENERAL DESCRIPTION

These enclosed manual speed regulators are used for controlling and regulating the speed of series, shunt and compound wound D.C. motors. They provide 50% speed reduction below normal by armature control, provided the motor is fully loaded. At less than full load, the amount of speed reduction is proportionately decreased. They can be furnished for either fan or constant torque duty.

Fan duty regulators are used with motors where the load varies approximately with the speed. The current required for this service is considerably less at half speed than at full speed and these regulators give 50% speed reduction with the rated current flowing. They are used for such applications as controlling ventilating fans, blowers, centrifugal pumps (on constant discharge head), ice-cream freezers, etc.

Constant torque duty regulators are used with shunt or compound wound motors where the load is constant and independent of speed. The current required is practically constant throughout the speed range and these regulators give 50% speed reduction with 80% of the rated current flowing. They are used for such service as controlling machine tools, positive displacement blowers, compressors, printing presses, etc.

PRICE OPTIONAL FEATURES

Provision for release spool across the line...\$3.00 List

INFORMATION REQUIRED WITH ORDER

- Horsepower or current at normal speed and voltage.
- Type of motor—series, shunt or compound.
- Duty—fan, or constant torque.
- Shunt field current, or speed of motor.

D.C. ENCLOSED MANUAL SPEED REGULATORS

Regulation by Armature Control

Price includes a complete manual speed regulator.
115 Volts

H.P.	No. of Armature Regulating Steps	List Number	List Price	Lbs. Boxed
Fan Duty Regulators for Shunt or Compound Motors				
$\frac{1}{4}$	8	3111H1	\$ 40.50	15
$\frac{1}{2}$	8	3111H2	40.50	20
1	8	3111H4	43.50	20
$1\frac{1}{2}$	8	3111H5	60.00	80
2	8	3111H6	60.00	80
3	8	3111H7	73.50	90
4	10	3111H8	126.00	120
5	10	3111H9	126.00	120
$7\frac{1}{2}$	12	3111H10	148.50	175
10	12	3111H11	163.50	200

230 Volts

$\frac{1}{4}$	8	3111H27	40.50	15
$\frac{1}{2}$	8	3111H28	40.50	20
1	8	3111H30	43.50	20
$1\frac{1}{2}$	8	3111H31	60.00	80
2	8	3111H32	60.00	80
3	8	3111H33	73.50	90
4	8	3111H34	117.00	90
5	8	3111H35	117.00	100
$7\frac{1}{2}$	10	3111H36	126.75	150
10	10	3111H37	134.25	160
15	12	3111H38	193.50	210
20	12	3111H39	225.00	240

Constant Torque Duty Regulators for Shunt or Compound Motors

115 Volts

$\frac{1}{4}$	8	3111H14	40.50	30
$\frac{1}{2}$	8	3111H15	40.50	30
1	8	3111H17	43.50	30
$1\frac{1}{2}$	8	3111H18	60.00	80
2	8	3111H19	60.00	80
3	8	3111H20	73.50	90
4	10	3111H21	126.00	120
5	10	3111H22	126.00	120
$7\frac{1}{2}$	12	3111H23	148.50	175
10	12	3111H24	163.50	200

230 Volts

$\frac{1}{4}$	8	3111H45	40.50	30
$\frac{1}{2}$	8	3111H46	40.50	30
1	8	3111H48	43.50	30
$1\frac{1}{2}$	8	3111H49	60.00	80
2	8	3111H50	60.00	80
3	8	3111H51	73.50	90
4	8	3111H52	117.00	90
5	8	3111H53	117.00	100
$7\frac{1}{2}$	10	3111H54	126.75	150
10	10	3111H55	134.25	160
15	12	3111H56	193.50	210
20	12	3111H57	225.00	240

Fan Duty Regulators for Series Motors

115 Volts

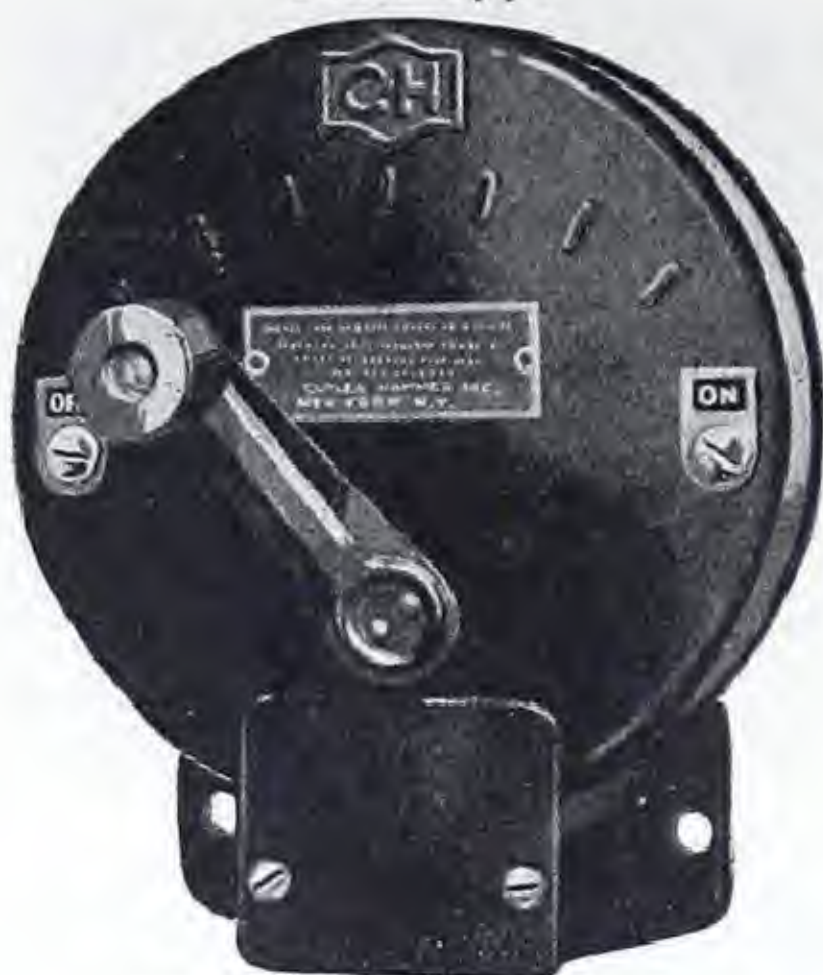
$\frac{1}{4}$	8	3111H96	40.50	15
$\frac{1}{2}$	8	3111H97	40.50	20
$\frac{3}{4}$	8	3111H98	40.50	20
1	8	3111H99	43.50	20
$1\frac{1}{2}$	8	3111H100	60.00	80
2	8	3111H101	60.00	80
3	8	3111H102	73.50	90

230 Volts

$\frac{1}{4}$	8	3111H103	40.50	15
$\frac{1}{2}$	8	3111H104	40.50	20
$\frac{3}{4}$	8	3111H105	40.50	20
1	8	3111H106	43.50	20
$1\frac{1}{2}$	8	3111H107	60.00	80
2	8	3111H108	60.00	80
3	8	3111H109	73.50	90
4	8	3111H110	117.00	90
5	8	3111H111	117.00	100

CUTLER-HAMMER D.C. ENCLOSED MANUAL REGULATING RHEOSTATS

Plate Type



Enclosed view, type A.



Enclosed view, type B

STANDARD FEATURES OF DESIGN

1. Manually operated.
2. Outside operating lever.
3. Resistor is moisture resisting.
4. All live parts completely enclosed.
5. Arranged for conduit wiring.
6. Number of regulating points.
 - a—Type A; 7, or 6 with "off" point.
 - b—Type B; 5, with or without "off" point.
7. N.E.M.A. Service Classification—for fan duty No. 93—for constant torque duty No. 95.

GENERAL DESCRIPTION

These D.C. enclosed manual regulating rheostats are of the plate type. They are used to control the speed of fractional horsepower motors driving small blowers, fans, buffers, bookkeeping machines, etc. They are also used as dimmers on lighting circuits or as regulators in connection with electric heaters. When used for regulating motor speeds they are supplied for either fan or constant torque duty.

Fan duty regulators are used with motors where the load varies approximately with the speed. The current required for this service is considerably less at half speed than at full speed and these regulators give 50 per cent speed reduction with approximately 40 per cent of the rated current flowing. They are used for such service as controlling small ventilating fans, blowers, etc.

Constant torque duty regulators are used for motors where the load is constant and independent of the speed. The current required is practically constant throughout the speed range and these regulators give 50 per cent speed reduction with 80 per cent of the rated current flowing. At other loads the per cent of speed regulation varies accordingly. They are used for such service as controlling small positive pressure blowers, jewelers' and dentists' lathes and drills, etc.

TO BUYERS OF POWER APPARATUS



Information on any of the following Cutler-Hammer Products furnished on request:

Manual Starters and Speed Regulators.

Automatic Starters and Speed Regulators.

"X" Across the Line Starters.

Pressure Regulators, Float Switches, etc.

Mill and Hoist Controllers.

Elevator Controllers.

Fire Pump Controllers.

Marine Control Apparatus.

Battery Charging Apparatus.

Lifting Magnets.

Magnetic Clutches.

Magnetic Separator Pulleys.

A. C. and D.C. Magnetic Brakes and Solenoids.

Theater Dimmers.

Printing Press Control and Press Drives.

Newspaper Conveyors.

Harland Paper Mill Drives and Control.

Industrial Electric Heating Equipment.

Space Heaters.

Automatic (Dean) Valve Control.

Thomas Gas Measuring Instruments.

C.-H. D.C. ENCLOSED MANUAL REGULATING RHEOSTATS

Plate Type

Price includes a complete rheostat arranged for conduit wiring, as illustrated.

115 Volts				230 Volts				List Price	Lbs. Boxed
List Number Without OFF Point	List Number With OFF Point	Ohms	Amperes	List Number Without OFF Point	List Number With OFF Point	Ohms	Amperes		
Armature Speed Regulator—Machine Duty									
3291H5	3291H23	125	.55	3291H14	3291H32	500	.28	\$ 7.35	5
3291H6	3291H24	100	.70	3291H15	3291H33	400	.35	7.35	5
3291H7	3291H25	86	.80	3291H16	3291H34	345	.40	7.35	5
3291H8	3291H26	82	.85	3291H17	3291H35	325	.43	7.35	5
3291H9	3291H27	70	1.00	3291H18	3291H36	280	.50	7.35	5
3291H10	3291H28	58	1.20	3291H19	3291H37	232	.60	7.35	5
3291H11	3291H29	50	1.40	3291H20	3291H38	200	.70	7.35	5
3291H12	3291H30	43	1.60	3291H21	3291H39	172	.80	7.35	5
3291H13	3291H31	35	1.80	3291H22	3291H40	140	.90	7.35	5
.....	.....	34	2.0	.....	.....	135	1.0	10.50	7
.....	.....	27.5	2.2	.....	.....	115	1.1	10.50	7
.....	.....	22.5	3.0	.....	.....	90	1.5	10.50	7
Armature Speed Regulator—Fan Duty									
3291H41	3291H59	250	.55— .28	3291H50	3291H68	1000	.28— .14	\$ 7.35	5
3291H42	3291H60	200	.70— .35	3291H51	3291H69	800	.35— .18	7.35	5
3291H43	3291H61	172	.80— .40	3291H52	3291H70	690	.40— .20	7.35	5
3291H44	3291H62	162	.85— .43	3291H53	3291H71	650	.43— .22	7.35	5
3291H45	3291H63	140	1.00— .50	3291H54	3291H72	560	.50— .25	7.35	5
3291H46	3291H64	116	1.20— .60	3291H55	3291H73	460	.60— .30	7.35	5
3291H47	3291H65	100	1.4 — .7	3291H56	3291H74	400	.70— .35	7.35	5
3291H48	3291H66	86	1.6 — .8	3291H57	3291H75	344	.80— .40	7.35	5
3291H49	3291H67	70	1.8 — .9	3291H58	3291H76	280	.90— .45	7.35	5
.....	.....	68	2.0 — 1.0	.....	.....	256	1.00— .50	10.50	7
.....	.....	55	2.2 — 1.1	.....	.....	220	1.10— .55	10.50	7
.....	.....	45	3.0 — 1.5	.....	.....	175	1.50— .75	10.50	7
Dimmer Regulator—With OFF Point									
Volts	List Number	Wattage of Lamps	Ohms	Maximum Amperes		List Price			Lbs. Boxed
15	3291H77	50— 60	650	.55		\$7.35			5
15	3291H78	75— 90	435	.82		7.35			5
15	3291H79	100—120	326	1.10		7.35			5
15	3291H80	125—150	258	1.36		7.35			5
15	3291H81	160—180	225	1.64		7.35			5
15	3291H82	200—220	163	2.00		7.35			5
15	.....	225—250	138	2.3		10.50			7
15	.....	275—300	119	2.7		10.50			7
15	.....	320—330	105	3.0		10.50			7
15	.....	350—360	95	3.3		10.50			7
15	.....	375—385	87	3.5		10.50			7
115 Volts				230 Volts				List Price	Lbs. Boxed
Maximum Reduction Per Cent	List Number	Ohms	Amperes	List Number	Ohms	Amperes			
Heater Regulator—Without OFF Point									
0—125	50	3291H83	150	1.1	3291H92	600	.55	\$7.35	5
0—250	50	3291H84	55	2.2	3291H93	210	1.10	7.35	5
5—355	50	3291H85	22.2	3.1	3291H94	90	1.55	7.35	5
0—420	50	3291H86	15.4	3.64	3291H95	62	1.82	7.35	5
5—450	50	3291H87	12.5	4.00	3291H96	50	2.00	7.35	5
5—500	42	3291H88	9.1	4.35	3291H97	37	2.18	7.35	5
5—550	40	3291H89	7.6	4.80	3291H98	30.5	2.40	7.35	5
5—600	36	3291H90	6.0	5.25	3291H99	24	2.63	7.35	5
5—660	35	3291H91	5.0	5.75	3291H100	20	2.88	7.35	5
5—550	50	.....	17	4.80	.....	68	2.40	10.50	7
5—660	50	.....	10	5.75	.....	40	2.88	10.50	7

Price Optional Features

Insulating bushing for open wiring.....\$0.15 List

Regulators with special winding or marking,2.25 List

3. Large quantities of regulators built from special data.

4. For dimmer regulators without "off" point or heater regulators with "off" point—no additional charge.

Capacity Limitations

Maximum watts—type A, 125; type B, 240.

Maximum resistance per step—type A, 150; type B, 100.

3. Maximum amperes—type A, 10; type B, 3.

4. Maximum voltage—250.

Information required with order

List number, or;

Voltage.

If for speed regulation, horsepower and duty.

4. If for dimmer, number and wattage of lamps.

5. If for heater regulator, maximum current and number of ohms required.

CUTLER-HAMMER A. C. DRUM TYPE CONTROLLERS

Non-reversing—Without Primary Contacts—For Starting or Speed Regulation of Slip Ring Motors by 3-Phase Secondary Resistor Control.

STANDARD FEATURES OF DESIGN



Type X

- 1—Manually operated.
- 2—Non-reversing.
- 3—For secondary control only.
- 4—Auxiliary interlock contacts for magnetically operated contactor or for interlocking with suitable circuit breaker.
- 5—Removable contact fingers and segments.
- 6—Pivoted, non-stubbing contact finger construction.
- 7—Adjustable star wheel lever spring.
- 8—Combined radial and thrust ball-bearing on each end of drum shaft.
- 9—Safety enclosure with separate conduit box at lower end.
- 10—Starting duty controllers include No. 9414 resistors; speed regulating duty controllers include No. 9416 resistors.

Prices on application.

A. C. DRUM TYPE CONTROLLERS

Full Reversing—With Primary Contacts—For Intermittent or Continuous Speed Regulation of Slip Ring Motors by 3 Phase Secondary Resistor Control.

STANDARD FEATURES OF DESIGN

- 1—Manually operated.
- 2—Full reversing.
- 3—For primary and three-phase secondary control, with or without provision for starting with open-phase secondary for crane or hoist duty.
- 4—Auxiliary interlock contacts for magnetically operated contactor (non-reversing or reversing type) or for interlocking with suitable circuit breaker.
- 5—Removable contact fingers and segments.
- 6—Pivoted, non-stubbing contact finger construction.
- 7—Adjustable star wheel lever spring on types X, Y and Z; manual step-by-step position notches on types P1 and P2.
- 8—Hinged arc shields.
- 9—Three-pole primary switch for 3 phase or 2 phase three or four wire—includes provision for main line limit switch selection.
- 10—Combined radial and thrust ball-bearings.
- 11—Safety enclosure with separate conduit box at lower end. (Except types P1 and P2 are without conduit boxes).
- 12—Arranged for intermittent or continuous speed regulating duty, using Nos. 9418, 9420 or 9422 resistor.

GENERAL DESCRIPTION

These A. C. drum controllers are furnished with 3 pole primary contacts for reversing and are designed for use with slip ring motors to commutate the resistor in the three-phase rotor circuit. The drum switches are listed with resistor for regulating duty (No. 9418), intermittent crane duty, (No. 9420), or hoist duty (No. 9422). If the drum switch without resistor is desired, order should specify "drum switch only."

Prices on application.

CUTLER-HAMMER A.C. AND D.C. DRUM TYPE SWITCHES

Reversing



Enclosed view, A.C. or D.C. drum Switch

STANDARD FEATURES OF DESIGN

1. Manually operated by radial or rope lever. (Rope lever can be shifted on its square shaft to any one of four positions 90° apart as desired).
2. Plain starting—reversing.
3. Motor is connected across-the-line on starting.
4. With or without limit switch selection, depending on type of drum, as listed in price table.
5. Self-centering or non-self-centering.
 - a—Radial lever drive is non-self-centering, as standard, but can easily be made self-centering, except for Type M which is not changeable.
 - b—Rope lever drive is self-centering, as standard, but can easily be made non-self-centering.
6. Removable contact fingers.
7. Safety enclosure arranged for conduit wiring.
8. Shaft extension:
 - a—Drums with radial lever drive have no shaft extension.
 - b—Drums with rope lever drive have 6 inch shaft extension beyond bearing boss on each end. (The shaft can be cut to desired length at time of installation.)

GENERAL DESCRIPTION

These A.C. 9441 Type drum switches are for use with standard squirrel cage motors or high torque squirrel cage motors which can be connected directly to the line without the use of a starting resistor, and which do not require more than six times normal full load running current on starting. Types XP and M can also be used as reversing main switches in conjunction with a separate automatic motor starter such as Nos. 9605 or 9621, to obtain reduced voltage starting.

These drum switches are used to control motors operating small hoists, auxiliary motors on machine tools such as cross rail, tail stock, tool traverse or for similar applications.

The D.C. No. 5300 Type drum switches are for use with small reversible, high resistance direct current motors which can be connected directly to the line without the use of a starting resistor. Types XP and M can also be used as reversing main switch with standard series, shunt, or compound wound motors in conjunction with a separate automatic starter to obtain reduced voltage starting.

These drum switches are used to control motors operating small hoists and for auxiliary motors on machine tools, such as cross rail, tail stock, tool traverse and similar applications. For auxiliary machine tool motors which require a step armature resistor on starting, refer to No. 5105.

The No. 5110 Type drum switches are for use with series shunt or compound wound D.C. motors on general reversing or non-reversing service, where plain starting or speed regulation is required. On regulating duty, the drum switch carries full load current continuously on any point.

Prices on application.

CUTLER-HAMMER A. C. AND D. C. PUSHBUTTON MASTER SWITCHES

Automatic Starters and Automatic Speed Regulators



No. 10250H28 No. 10250H56 No. 10250H49
Two button heavy two button stand- two button heavy
master switch. ard duty switch. duty pendent switch

STANDARD FEATURES OF DESIGN

Standard Duty Stations

Maximum ratings: The maximum ampere capacity of standard duty stations, is such that they can be used for most applications where the current to be handled is not excessive. In general, they can be used with D.C. contactors No. 6005 up to and including the number 117 contactor on 230 volts and number 225 contactor on 550 volts; and with A.C. contactors No. 9592 up to and including the three pole type C, all voltages. If a doubt exists, use the heavy duty station or give complete details in order.

Heavy copper contacts.

Pushbutton type has bakelite buttons easy to operate.

Removable elements mounted in moulded insulating base.

Starting buttons protected against accidental operation.

General purpose stations are in punched steel enclosing case with removable front covers.

Conduit knockout holes or pipe threaded holes, provided for easy wiring.

Heavy Duty Stations

Maximum rating:

(a) D.C.—2 amperes, 115 volts, 1 ampere, 230 volts, 0.2 ampere, 550 volts.

(b) A.C.—3 amperes, 550 volts or less, but inrush must not exceed 40 amperes, 110 volts, 20 amperes, 220 volts, or 10 amperes, 550 volts.

Heavy silver contacts.

Pushbutton type has large bakelite buttons—easy to operate.

Switch elements mounted on removable individual moulded bases fully enclosed.

Guard ring on pushbutton types—prevents accidental operation.

On switch elements with locking feature, open position of contacts is obtained by turning the guard ring.

Normally open contacts have spring follow-up.

General purpose heavy duty stations are in cast aluminum enclosing cases with removable front cover.

Enclosing case arranged for conduit wiring. (General purpose switches have knockout holes, pendent type switches have a clamp type connector. Dust-tight, weatherproof, water-tight, explosion-proof, etc., have pipe threaded holes.)

CUTLER-HAMMER A. C. AND D. C. PUSHBUTTON MASTER SWITCHES

For Automatic Starters and Automatic Speed Regulators



No. 10250H75
Three button, standard
duty switch.

No. 10250H127
Single button heavy duty
switch with signal light.



No. 10250H131
Dust-tight
Standard duty
master switch.



No. 10250H144
Flush type
Standard duty
master switch.

SPECIAL FEATURES

Flush type pushbutton stations are used where it is desired to make a neat appearing installation or where it is desired to match up an installation with other flush switches.

Back of board pushbutton stations are furnished where the installation is to be made on the rear of a switch board, and the button operated from the front of the panel.

Pilot lights are included in various pushbutton stations. Their function is generally to serve as indicators, to tell at a glance, from a remote point, whether the motor is in operation.

Pendant type pushbutton stations are designed for use on equipment where portable control is desired. They are equipped with a clamping device suitable for gripping the armour or flexible armoured cable.

Snap switch pushbutton stations differ from the ordinary type in that the contact is maintaining rather than momentary.

Locking feature is provided on some stations giving a means to lock the "stop" button in the normally open position, to prevent unauthorized operation from any other pushbutton station.

Low voltage time delay release feature is provided to prevent shut down of the motor because of momentary voltage drop, or failure.

Emergency stations with glass covers, such as Bulletin 10250H153 have a glass cover over the pushbutton element, so that it is necessary to break the glass before the switch can be operated.

CUTLER-HAMMER A.C. OR D.C. ENCLOSED PRESSURE REGULATORS

Single Pole—Diaphragm Type—For Pressures
Above Atmospheric



Enclosed view.

STANDARD FEATURES OF DESIGN

1. Full automatic operation.
2. Single-pole.
3. Quick make and break contacts.
4. Arranged for two wire control.
5. Accurate adjustment—uniform operation.
6. Safety enclosing case.
7. Rubber diaphragm.

GENERAL DESCRIPTION

These enclosed single pole pressure regulators are used as pilot switches with automatic starters controlling A.C. or D.C. motors driving pumps, compressors, etc. They close the circuit at low pressure and open the circuit at high pressure. They are used on systems containing air, gas, water or other fluids which are not injurious to the rubber diaphragm. Special regulators that close at high pressure and open at low pressure can be furnished at the prices specified.

Price includes a complete pressure regulator.

Type	List No.	Pressure Limitations				
		Min. Pressure to Close	Max. Pressure to Close	Max. Pressure to Open	Min. Pressure Range	Max. Pressure Range
A	10001H1	1½	12	14	2	11
B	10001H2	5	54	60	6	35
C	10001H3	6	103	115	12	38
D	10001H4	7	157	175	18	42
		List Price		Lbs. Boxed		
A	10001H1	\$35.60		20		
B	10001H2	26.25		18		
C	10001H3	26.25		18		
D	10001H4	26.25		18		

PRICES OPTIONAL FEATURES

1. Built for reverse operation—
Type A.....\$52.50 List
Types B, C and D.....44.25 List

CUTLER-HAMMER A.C. OR D.C. ENCLOSED FLOAT SWITCHES

Two or Four Pole—For Pilot Circuit or Small Motor Service



Enclosed view of switch
without accessories.

STANDARD FEATURES OF DESIGN

1. Two or four pole switch.
2. Quick make and break contacts.
3. Arranged for either tank or sump operation.
4. Standard C-H finger construction easily renewed.
5. Splash-proof, safety, enclosing case, arranged for conduit wiring.
6. Accessories: Copper float with 5 feet of brass rod guide lever with connecting rod and mounting bracket.

Copper float with 15 feet of chain, guide lever with connecting rod, and mounting bracket as shown with cast iron counterweights, pulleys and stops for mountings.

Temperature limitation: The standard float can be used where the temperature of the liquid does not exceed 10 degrees Fahrenheit. Where the temperature is likely to exceed this, the Hot Well float should be specified instead.

GENERAL DESCRIPTION

These enclosed float switches are used with A.C. and D.C. motors driving pumps. They handle the main circuit directly on the small motor sizes, and for the larger horse power ratings the two pole switch is used as a pilot switch operating an automatic starter. These float switches maintain water level automatically. The switching mechanism is operated as the float rises and falls with the water level. Reliable operation is secured with as little difference in water level as 6", for the 2 pole switch and 6½" for the 4 pole switch. The movement of the outside operating lever is magnified by a lever which operates the quick make and break mechanism thereby reducing the arcing at the contacts to a minimum. The quick make and break mechanism is the cam and roller type which maintains a constant pressure on the contacts until the switch opens. The roller motion actually reaches the peak of the cam and starts downward before the contact finger moves. The contacts are of standard C-H finger construction designed for long life and requiring minimum care. The standard switch can be arranged for either tank or sump operation by changing the lever connections, reversing the operation of the float.

CUTLER-HAMMER
A.C. OR D.C. ENCLOSED FLOAT
SWITCHES

One or Four Pole—For Pilot Circuit or Small Motor Service
Direct Current—Small Motor Control

*Maximum Capacity—Horsepower			
Type of Switch	115 Volts	230 Volts	550 Volts
One Pole.....	3	3	.....
Four Pole.....	..	..	7½ (2 breaks)

These D.C. ratings are for use when switch is used as a float switch. They are not across-the-line ratings.

Alternating Current					
Type of Motor	Type of Switch	Horsepower			
		110 Volts	220 Volts	440 Volts	550 Volts
Single Phase.....	Two Pole	2	4	5	5
Standard two or Three Phase, Squirrel Cage.	Four Pole	3	5	7½	7½
Star or Three Phase, External Starter.....	Four Pole	4	7½	10	10

Note.—For larger motors, use two pole switch for control of the pilot circuit of any A.C. or D.C. automatic starter. Price includes a complete float switch with accessories for cold water applications.

Type	Two Pole		List No.	Four Pole	
	List Price	Lbs. Boxed		List Price	Lbs. Boxed
10036H17	\$39.00	65	10036H23	\$67.50	85
10036H18	45.00	65	10036H24	73.50	85
10036H19	51.00	90	10036H25	79.50	110
10036H20	58.50	70	10036H26	87.00	90
10036H21	58.50	65	10036H27	87.00	85
10036H22	58.50	65	10036H28	87.00	85

TO BUYERS OF POWER APPARATUS

Cutler-Hammer experience has been so wide and varied that there are few Control problems which have not already been met and answered by C-H. In all probability C-H equipment for almost any need already exists, or may be adapted readily. This is assurance before-hand that the installation will operate properly and will cost as little as possible . . . That fact is recognized; the trend to C-H on public works grows daily . . . Whatever the application, our Engineers are glad to place the Cutler-Hammer facilities at the disposal of Civic Officials, City and Consulting Engineers, and Contractors, to the end that the Control will be satisfactory from the start.

CUTLER-HAMMER
A.C. OR D.C. ENCLOSED FLOAT
SWITCHES

Single Pole—Sensitive Type—For Pilot or Small Motor Service



Enclosed view

STANDARD FEATURES OF DESIGN

1. Single pole.
2. Quick make and break contacts.
3. Current carrying parts, completely enclosed.
4. Splash-proof, safety, enclosing case, arranged for conduit wiring.
5. Arranged to provide two wire control.
6. Accessories: Float with 15 ft. of chain, counter weights, pulleys and stops.

Price includes float switch as illustrated.

List No.	Description	List Price	Lbs. Boxed
10031H1	Float Switch only.....	\$24.00	20
*10031H3	Float Switch with Accessories for Cold Liquid....	39.00	40
10031H4	Float Switch with Accessories for Hot Liquid.....	66.00	40

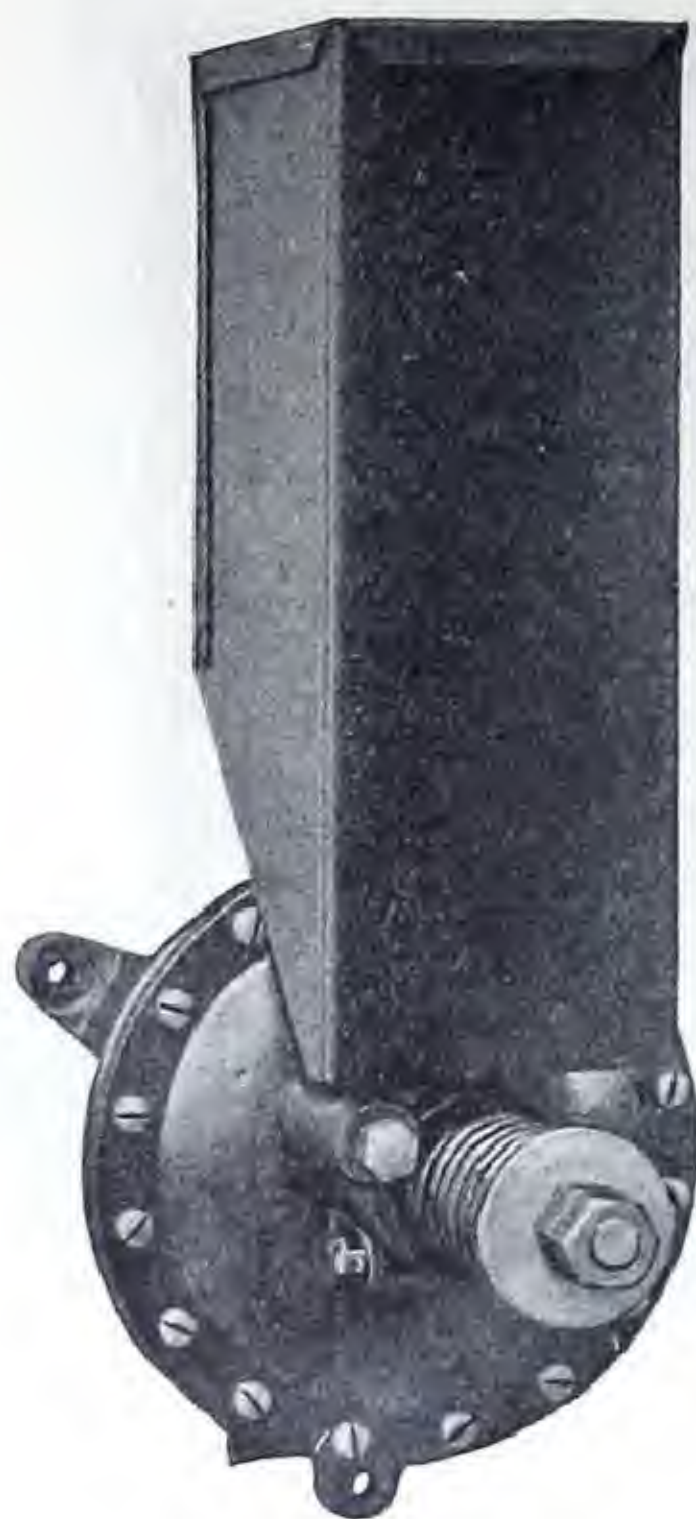
*Float switch with accessories for cold liquid can be used where the temperature of the liquid does not exceed 100 degrees Fahrenheit. Where the temperature is likely to exceed this, the switch with accessories for hot liquid should be used.

INFORMATION REQUIRED WITH ORDER

1. List number of switch, or:
2. Accessories to be furnished.
3. Horsepower and voltage.

CUTLER-HAMMER A. C. or D. C. ENCLOSED VACUUM REGULATORS

Single Pole—Diaphragm Type For Pressures Below
Atmospheric



Enclosed view

Dimensions overall
High 17"
Wide 8"
Extends 9"

GENERAL DESCRIPTION

These enclosed single pole vacuum regulators are used as pilot switches with automatic starters controlling A. C. or D. C. motors driving pumps, compressors, etc. They can also be used as a single pole switch to connect small direct or single phase alternating current motors to the line, if the rating is not greater than $\frac{1}{4}$ H. P. 110 volts, or $\frac{1}{2}$ H. P., 220-550 volts. They close the circuit at low vacuum and open the circuit at high vacuum. They are used on systems containing air, gas, water or other fluids which are not injurious to the rubber diaphragm. Special regulators that close at high vacuum and open at low vacuum can be furnished. Prices and vacuum limitations, for reverse operation, on application.

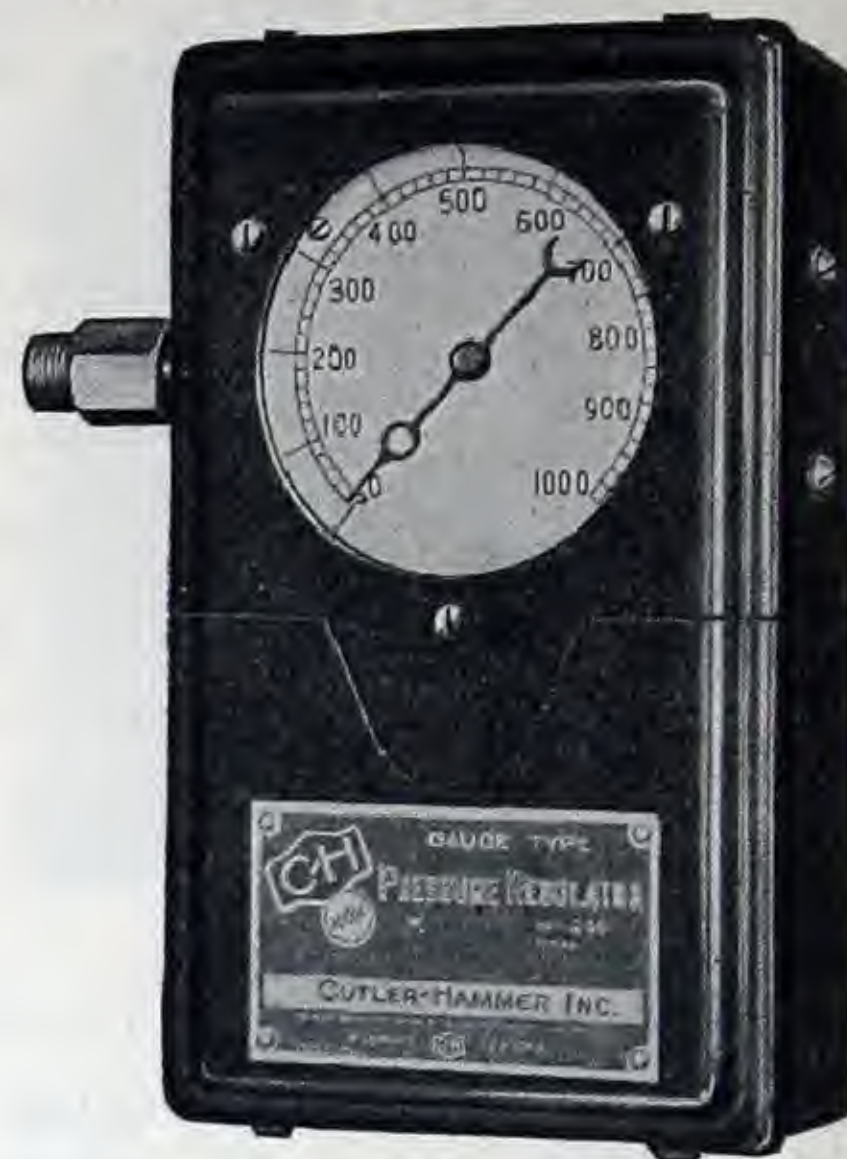
Price includes a complete vacuum regulator as illustrated
*Adjustment

List Number	Vacuum to close	Vacuum to open	List Price	Lbs. Boxed
10005H1	6	9	\$26.25	30

*This is standard factory adjustment. Other settings can be obtained if ordered.

CUTLER-HAMMER A.C. AND D.C. ENCLOSED PRESSURE SWITCHES

Gauge Type—For Pressures Above or Below
Atmospheric



Enclosed View

STANDARD FEATURES OF DESIGN

1. Full automatic operation.
2. Arranged to provide two wire control.
3. Low voltage release.
4. Accurate adjustment—uniform operation.
5. Brass Bourdon tube.
6. For vacuum, pressure, or hydraulic applications.
7. Relay and gauge have silver contacts.
8. Safety enclosing case arranged for conduit wiring.

Capacity Limitation

1. Pressure and hydraulic type, the maximum setting of the "high" contact is 70% of the maximum capacity of the gauge. Vacuum type adjustable up to full gauge scale.

GENERAL DESCRIPTION

These gauge type pressure switches are for use as pilot switches with automatic starters controlling A.C. or D.C. motors driving pumps, compressors, etc. The standard pressure switch may be used on systems containing liquids and gasses which are not injurious to the brass Bourdon tube. This includes water, air, steam, sulphur dioxide (dry), acetylene, carbon dioxide, carbon monoxide, helium, hydrogen and illuminating gas. A steel Bourdon tube can be furnished as an optional feature in place of the standard brass tube for use with liquids and gasses such as ammonia, alcohol, benzol, chlorine, creosote, cyanide, gasoline, helium, hydrogen, nitrogen, oxygen, ethylene and ethylene oxide. The pressure switch is easily installed so as not to be affected by fluctuations in pressure. Switches for either standard or reverse operation are furnished.

CUTLER-HAMMER
A.C. AND D.C. ENCLOSED
PRESSURE SWITCHES

ge Type—For Pressures Above or Below Atmospheric
ice includes a complete gauge type pressure switch.

Maximum Capacity of Gauge	Maximum Setting	*List Numbers Standard Operation —Opens circuit at high and closes circuit at low pressure or vacuum.		List Price
		Alternating Current	Direct Current	
0-30" Mercury	30"	10014H1	10014H23	\$78.00
0-25 lb.	17.5 lb.	10014H2	10014H24	78.00
0-50 lb.	35. lb.	10014H3	10014H25	78.00
0-100 lb.	70. lb.	10014H4	10014H26	78.00
0-150 lb.	105. lb.	10014H5	10014H27	78.00
0-250 lb.	175. lb.	10014H6	10014H28	78.00
0-500 lb.	350. lb.	10014H7	10014H29	90.00
0-750 lb.	525. lb.	10014H8	10014H30	90.00
ic 0-1000 lb.	700. lb.	10014H9	10014H31	100.50
ic 0-2500 lb.	1750. lb.	10014H10	10014H32	100.50
ic 0-10000 lb.	7000. lb.	10014H11	10014H33	100.50
, 20 lbs.				

Maximum Capacity of Gauge	Maximum Setting	*List Numbers Reverse operation —Closes circuit at high and opens circuit at low pressure or vacuum.		List Price
		Alternating Current	Direct Current	
0-30" Mercury	30"	10014H12	10014H34	\$78.00
0-25 lb.	17.5 lb.	10014H13	10014H35	78.00
0-50 lb.	35. lb.	10014H14	10014H36	78.00
0-100 lb.	70. lb.	10014H15	10014H37	78.00
0-150 lb.	105. lb.	10014H16	10014H38	78.00
0-250 lb.	175. lb.	10014H17	10014H39	78.00
0-500 lb.	350. lb.	10014H18	10014H40	90.00
0-750 lb.	525. lb.	10014H19	10014H41	90.00
c 0-1000 lb.	700. lb.	10014H20	10014H42	100.50
c 0-2500 lb.	1750. lb.	10014H21	10014H43	100.50
c 0-10000 lb.	7000. lb.	10014H22	10014H44	100.50
20 lbs.				

se list numbers are incomplete identification, inas-
s they do not include the coil for the relay. For
e identification, order must give voltage and if A.C.,
equency.

PRICE OPTIONAL FEATURE

ure switch with steel Bourdon tube, add. . \$42.00 List

CUTLER-HAMMER
AUTOMATIC VALVE CONTROL UNITS

Motor Operated—A. C. or D. C.—For Steam,
Water or Gas Valves

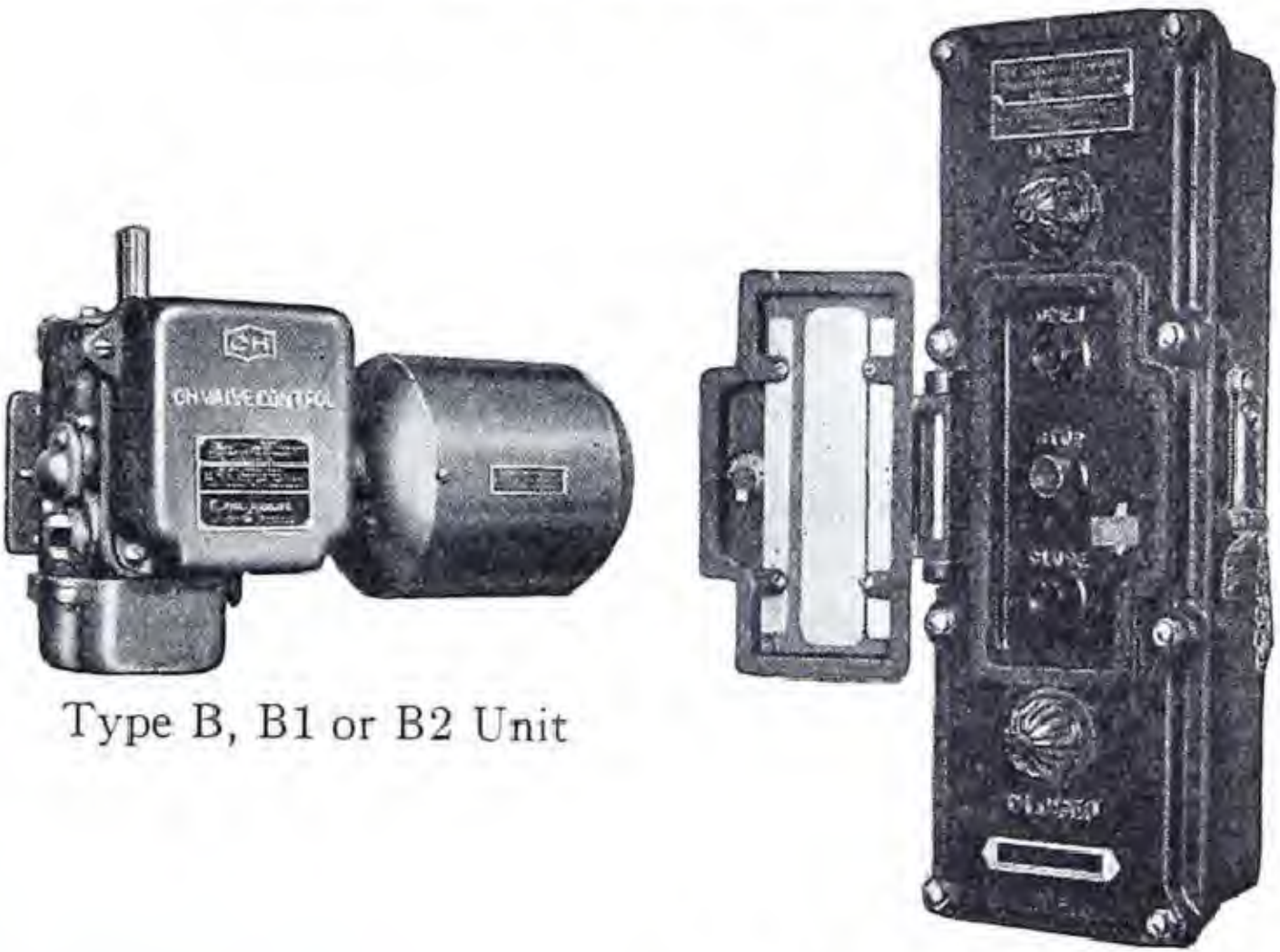
The C-H system of valve control consists of a valve actu-
ating mechanism driven by an electric motor. The mechan-
ism includes the gear reduction unit, limit switch mechanism,
declutching mechanism, terminal board, etc., for the safe,
dependable operation of valves. The motors are especially
designed for valve operating service, to furnish the high
torque required for seating or unseating valves. They are
steam proof and splash proof and can be installed out in the
weather if necessary. Motor insulation of type B units is
high temperature, weak acid resisting and has a rating of
75° C. rise above an ambient temperature of 49° C. The
opening and closing of the valve is controlled from one or
more pushbutton stations, conveniently located, close to or
at a distance from the valve.

The range of application is extremely broad. It includes
practically all types and sizes of valves from 3/4 inch up to
seventy-two inches and this range is covered by seven stand-
ard sizes of control units.

Since the first C-H valve control unit was developed and
installed many years ago, they have been used extensively
in connection with steam power plants, water pumping plants,
water storage tanks and reservoirs, sewage disposal systems,
hydro-electric plants, gas producing plants and in many
industries such as the steel industry—wherever a ready and
reliable means of controlling valves is necessary or desirable.

For controlling the above units there has been developed
a complete range of control stations and specially assigned
contactors.

C-H Valve Control Units



Type B, B1 or B2 Unit

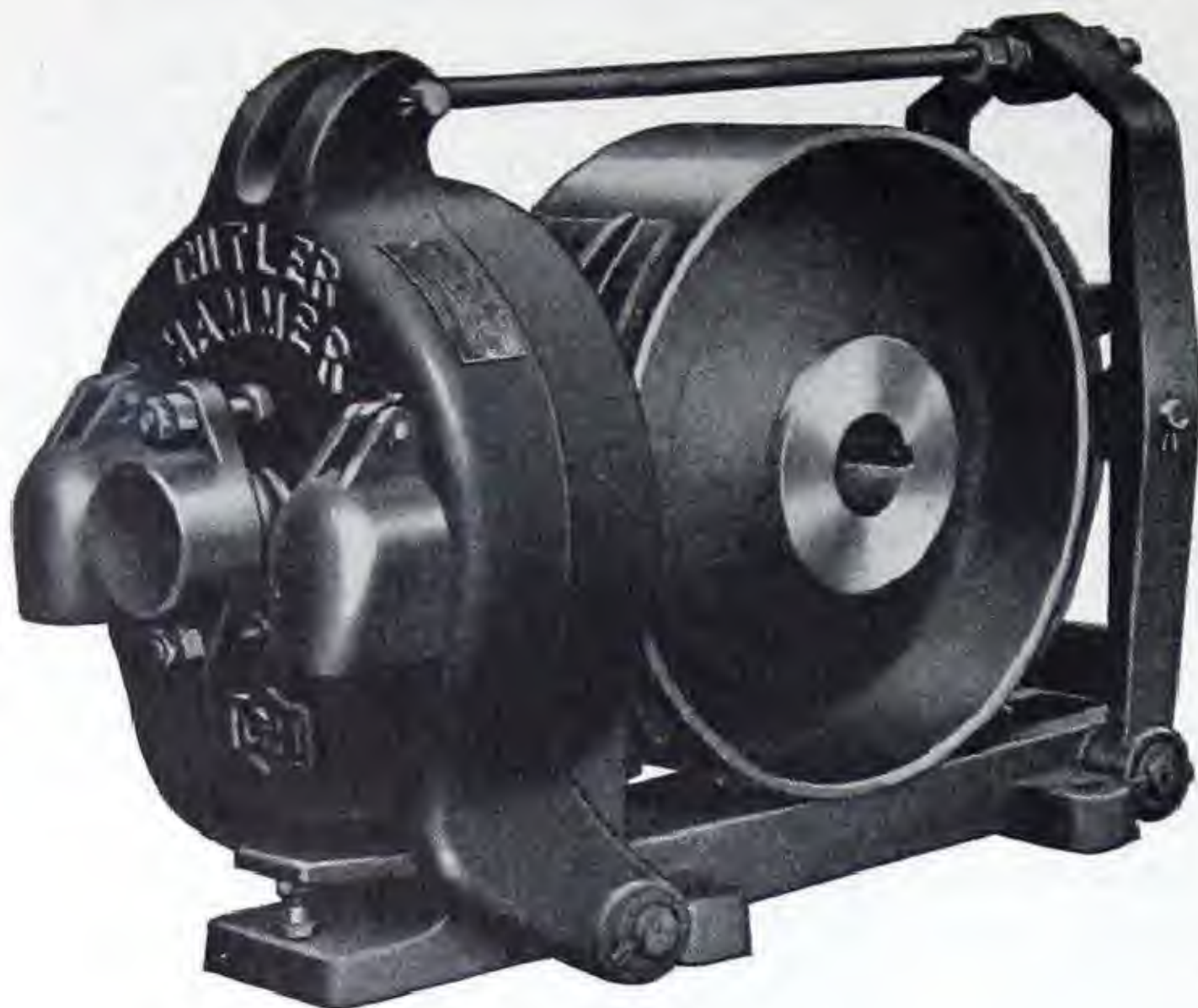
The Type K Control Station
with door open.

STANDARD FEATURES OF DESIGN

1. Splash-proof and weather-proof.
2. Universal motor 110 volts A.C. or D.C.
3. Reversing relays included in unit case.
4. Slow speed drive shaft in line with motor armature.
5. Adjustable limit switch—9 to 180 turns of slow speed shaft.
6. Suitable for Automatic Control from contacting tem-
perature or pressure devices.
7. Positive drive (does not have automatic declutching).

CUTLER-HAMMER D.C. MAGNETIC SHOE BRAKES

Type M—Automatic or Remote Control



The type M brake.

STANDARD FEATURES OF DESIGN

1. Direct current operated for 115, 230 or 550 volts.
2. Low head-room.
3. Direct magnet action.
4. Short magnet stroke.
5. Spring applied.
6. Magnet released.
7. 180 degrees braking surface.
8. Self-aligning brake shoes.
9. Pedestal mounted.
10. Weather-proof construction.

GENERAL DESCRIPTION

These D.C. magnetic shoe brakes are for use on any motor or drive shaft where automatic or remote control of braking is desired. They are used on cranes, hoists, roll tables, screw-downs, and other similar equipment. They are built in 8 standard sizes, from 8 to 36 inch, for use with motors up to 350 H.P. Series or shunt wound brakes can be supplied according to the service for which they are to be used.

The direct magnet action of these brakes eliminates the necessity of toggles, bell cranks and levers. The armature of the electro magnet is an integral part of one of the brake shoe arms. The magnet field is connected to the opposite shoe arm by a rod which passes over the brake wheel. When the brake is applied, the armature and field are forced apart by the spring located in the center of the magnet field and the brake shoe attached to the armature is forced against the wheel. Simultaneously, the magnet field pulls the opposite shoe against the wheel.

A short magnet stroke insures quick and quiet action with entire absence of shock on setting or hammer on release. The maximum magnet travel not to exceed .080 inch, or .040 inch for each shoe. Since the parts move through such short distances, the time of action is extremely short. There is no chance for bouncing or hammer blows when setting or releasing.

CUTLER-HAMMER D.C. MAGNETIC SHOE BRAKES

Type M—Automatic or Remote Control

PRICE OPTIONAL FEATURES

1. For vertical or ceiling mounting.
2. Wheels with special hub dimensions or other special features.

Information required with order

1. Brake size.
2. Type of winding—shunt or series.
3. Duty—if shunt wound, intermittent or continuous series wound, half hour or one hour.
4. Voltage, horsepower and speed of motor with which brake operates.
5. Motor—make, type and frame number.
(If brake is to be mounted on motor shaft, send a drawing of the motor showing dimensions and shaft extension details, if possible.)
6. If brake is not mounted on motor shaft, give:
 - a. Size of shaft in micrometer dimensions.
 - b. Shape of shaft—straight or tapered. If tapered send sketch showing: large diameter; taper diameter per foot of length; length of tapered portion for wheel.
 - c. Keyway width and depth.
 - d. Speed of shaft.
7. Functions required of brake.
8. Duty cycle—time on period and time off period.

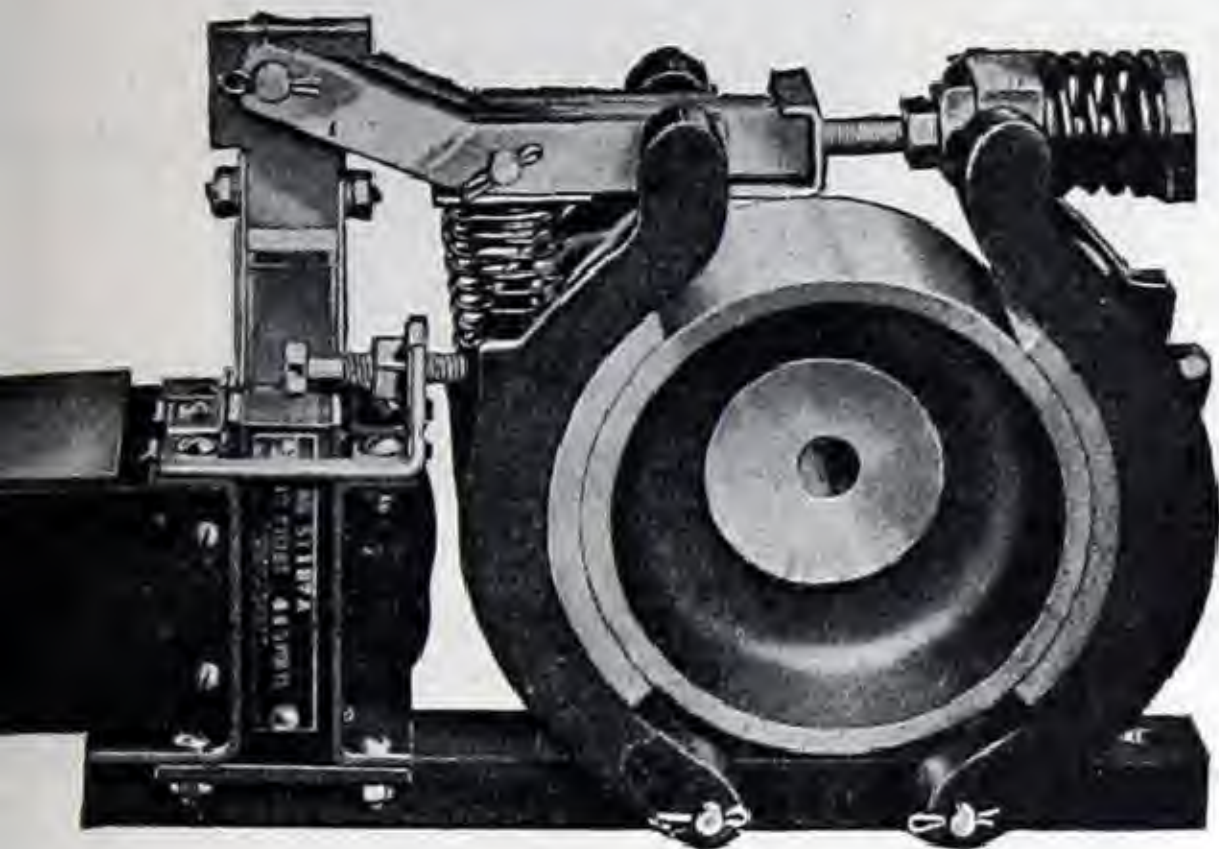
Prices on application.

SAVING WASTE IN INDUSTRY

Motor Control is far more important than either its size or cost indicates. It is the vital link between human intelligence and motorized machines. Modern Cutler-Hammer Motor Control quickly pays for itself through savings in speedier, more dependable production, better workmanship, power and maintenance economies, safety for men, motors and machines.

CUTLER-HAMMER A.C. AND D.C. SOLENOID OPERATED BRAKES

Type S—Automatic or Remote Control



Type S4 brake for A.C. service.

GENERAL DESCRIPTION

These S brakes are used on machine tools, conveyors, dumb lifts, overhead door hoisting equipment, elevators, presses, small cranes and hoists and similar applications. Small dependable brakes are required for stopping or holding the load. On the majority of applications, the brake is mounted on an extended shaft of the motor, although in some cases where this mounting is not possible the brake may be mounted on intermediate shafts of the transmission system.

STANDARD FEATURES OF DESIGN

- Spring applied, solenoid released.
- Relatively large diameter wheel—low brake shoe pressure.
- Liberal lining area.
- Molded brake lining riveted to brake shoes.
- Three adjustment points:
 - Braking torque adjusted by changing spring compression.
 - Lining wear and clearance adjustment.
 - Lining clearance equalizer.
- Available for all standard A.C. & D.C. commercial voltages.
- 80 degrees braking surface.
- Designed to conform with N.E.M.A. standards.
- Interchangeable mounting of A.C. & D.C. brakes.

Maximum Rating

Torque rating:—Up to 50 pounds feet continuous duty—75 pounds feet intermittent duty.

POWER OUT OF CONTROL ALWAYS MEANS WASTE!



Lightning is power—power out of control. Awesome—spectacular—destructive—but not nearly as costly as electric power out of control in industry. Lightning strikes but seldom, but improperly controlled power in industry's electric motors is wasted by the hour—every day—every week—every year.

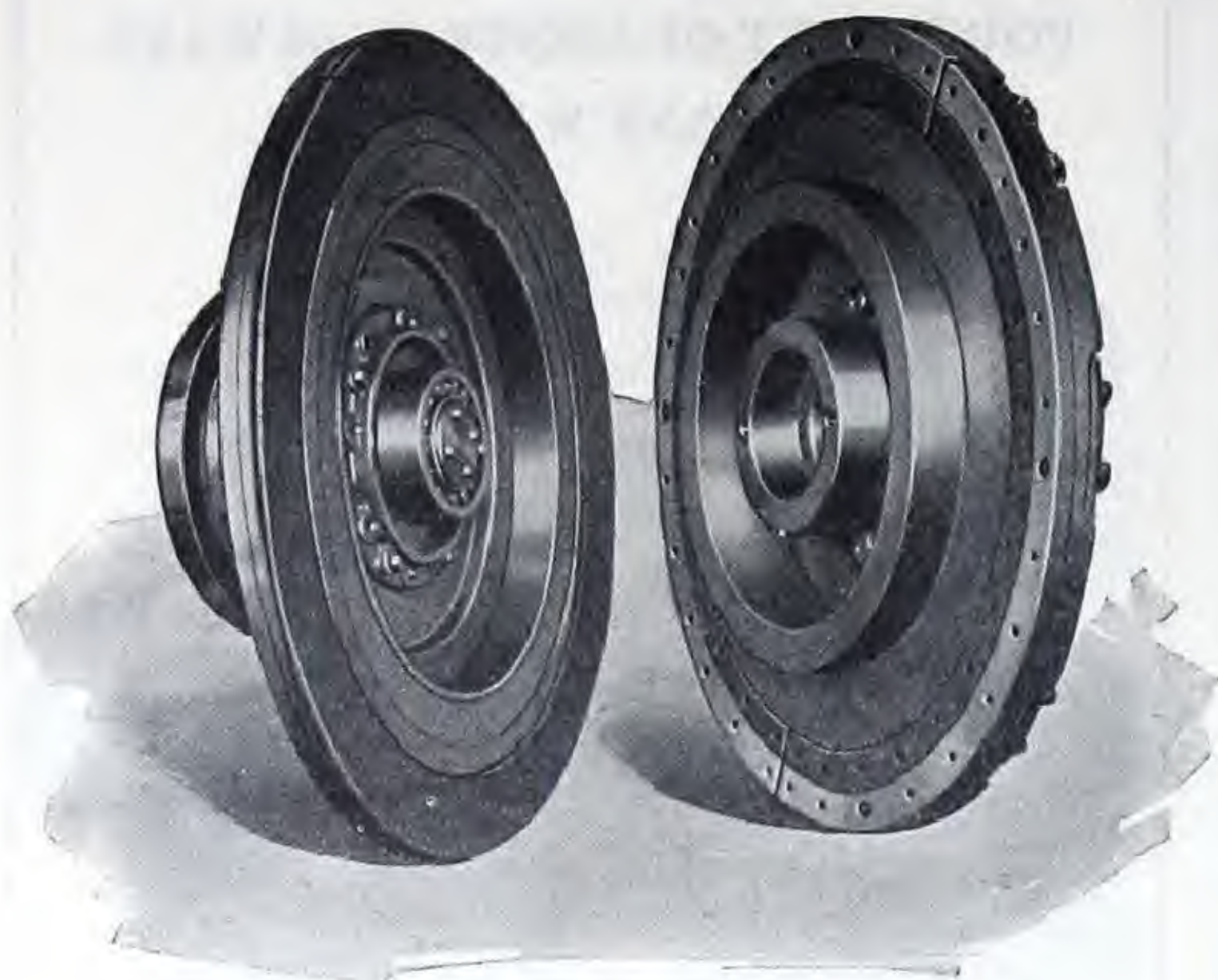


Motor control is the vital link between power and human intelligence. Modern Cutler-Hammer motor control quickly earns dividends through speedier and more dependable production, better workmanship, lower power and maintenance costs and greater safety for men, motors and machines.

The superiority of Cutler-Hammer motor control is recognized throughout industry. It provides every feature for efficient operation, low cost and safety. Be sure your plant capitalizes on its importance. Specify Cutler-Hammer control for every motor or motorized machine. Look for the trade-mark.



C-H. TYPE "L" MAGNETIC CLUTCHES



Showing Parts of Field and Armature members of Type "L" Clutch.

STANDARD FEATURES OF DESIGN

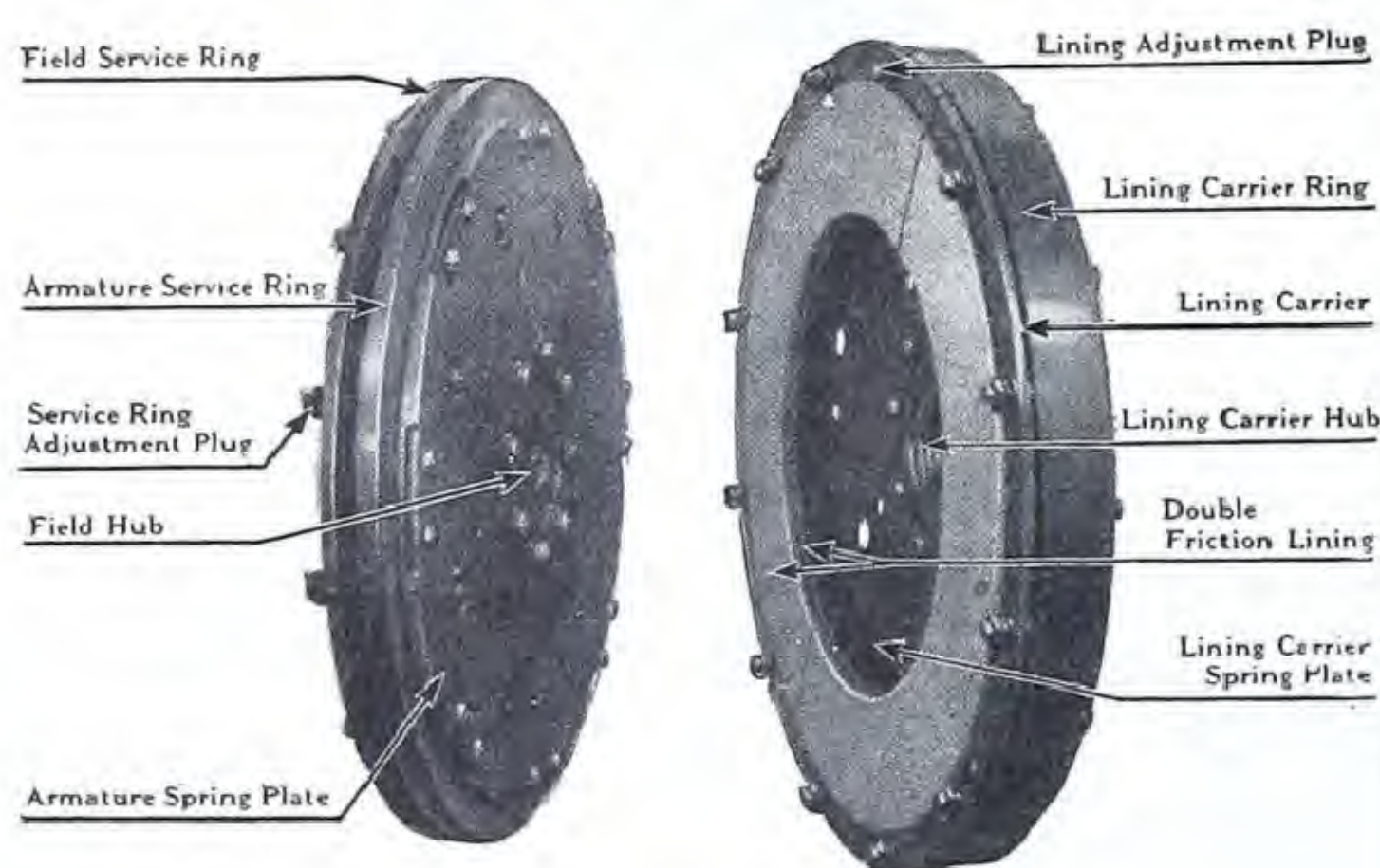
1. Magnetically engaged.
2. Automatic or remote control.
3. Operating on direct current.
4. For accelerator or coupling duty.
5. Friction lining wear indicator.
6. L shaped armature fits around magnet coil—less flux leakage, high efficiency.
7. Vacuum impregnated magnet coil.
8. Bronze collector rings resist corrosion.
9. Double carbon brushes—assure good contact at all times.
10. Roller type pilot bearing on clutches 14" in diameter and larger.
11. All fittings are cadmium plated—suitable for marine service.

GENERAL DESCRIPTION

The Cutler-Hammer Type "L" Clutch is an electrically controlled friction clutch used to connect and disconnect machinery from its source of power. It may be applied to almost any type of transmission machinery and it may be used anywhere that a mechanical clutch or coupling is used.

The simplicity of operation and control of the magnet clutch compared to that of the mechanical clutch makes possible to use the Type "L" Clutch on types of applications to which the mechanical clutch is not adapted.

C-H. TYPE "DL" DUPLEX MAGNETIC CLUTCHES



Showing Magnet and Lining Carrier Members of Type "DL" Clutch.

STANDARD FEATURES OF DESIGN

1. Magnetically engaged.
2. Automatic or remote control.
3. Operation on direct current.
4. For accelerator or coupling duty.
5. Double friction lining—greater lining area, high torque rating.
6. Friction lining wear indicator.
7. L shaped armature fits around magnet coil—less flux leakage, high efficiency.
8. Armature and field sections rotate together.
9. Vacuum impregnated magnet coil.
10. Bronze collector rings resist corrosion.
11. Double carbon brushes—assure good contact at all times.
12. Roller type pilot bearing on all sizes.
13. All fittings cadmium plated—suitable for marine service.

GENERAL DESCRIPTION

The Type DL magnetic clutch is an electrically controlled friction clutch used to connect and disconnect various types of machinery from their power source. This clutch is applicable to almost all classes of transmission drives and anywhere a mechanical clutch or coupling may be used. Its ease of

operation, from a local or remote point, simple trouble proof construction and easy maintenance make it preferred for most requirements and suitable for some applications which could not possibly use other forms of clutches.

GENERAL

No order for clutches can be considered complete if it does not include the following information:

Information required with order

(A) Construction information.

1. Size.
2. Type.
3. Voltage.
4. Driving shaft diameter in thousandths of an inch.
5. Driving shaft keyway width and depth.

6. Driven shaft diameter in thousandths of an inch.
7. Driven shaft keyway width and depth.

(B) For Selection Check

1. Horsepower to be transmitted.
 2. R. P. M. of the clutch.
 3. Type of machine to be driven.
 4. Type of driving machine.
 5. Operation for one complete cycle.
- Prices on application.

CUTLER-HAMMER CONTROLLERS FOR MAGNETIC CLUTCHES



Manual controller for use with small clutches, enclosed view

GENERAL DESCRIPTION

controller is a modified manual motor starter (No. 100). The panel is mounted in a dust-proof safety enclosing case arranged for wall type mounting. Conduit knockout is provided in the top and bottom of the case to permit conduit wiring.

Resistor is made up of cement imbedded units mounted back of the panel. These units cannot be harmed by vibration in a moist atmosphere.

Controller may be used with clutches driving any type of machine. The amount of resistance in series with the clutch is determined by the position of the rheostat arm. The clutch is under the control of the operator and the results depend upon his skill.

When this controller is used with clutches driving heavy loads the clutch is brought up to its full torque rating gradually, thereby accelerating the load without causing peak loads on the driving unit. On light inertia loads the clutch may be moved rapidly to the full torque position and the load will accelerate almost as fast as the clutch builds up.

Controllers are available arranged for manual or automatic operation and may be had with waterproof cases.

STANDARD FEATURES OF DESIGN

Manually operated.
Contacts removable from front of panel.
Safety enclosing case arranged for conduit wiring.
Outside operating lever with "on" and "off" indications.
Low voltage protection.
On application.

CUTLER HAMMER DIRECT CURRENT SOLENOIDS

Shunt Wound—For Miscellaneous Applications



Size D3 solenoid for wall mounting—
with protecting switch and resistor.

GENERAL DESCRIPTION

These direct current solenoids are for use in almost any service where straight line motion is to be produced automatically or from a remote point by means of an electric current. They are especially adapted to service such as operating brakes, valves, tripping mechanisms, mechanical clutches, and similar devices. Five standard sizes, designated as sizes D1, D2, D3, D4 and D5 take care of all general requirements.

STANDARD FEATURES OF DESIGN

1. For automatic or remote control.
2. For direct current circuits—115 or 230 volts.
3. Continuous or intermittent duty.
4. Vacuum impregnated moisture proof coils.
5. Fitted with clevis for attaching to operating mechanism.
6. Wall or floor type mounting.

OPTIONAL FEATURES

1. Coil for oil immersion.
2. Coils wound for special duty and voltages.
3. Series or compound wound coils.

CUTLER-HAMMER A.C. ELECTRONIC TIMING DEVICE

For Welder and Other Industrial Service



With door open to show construction.

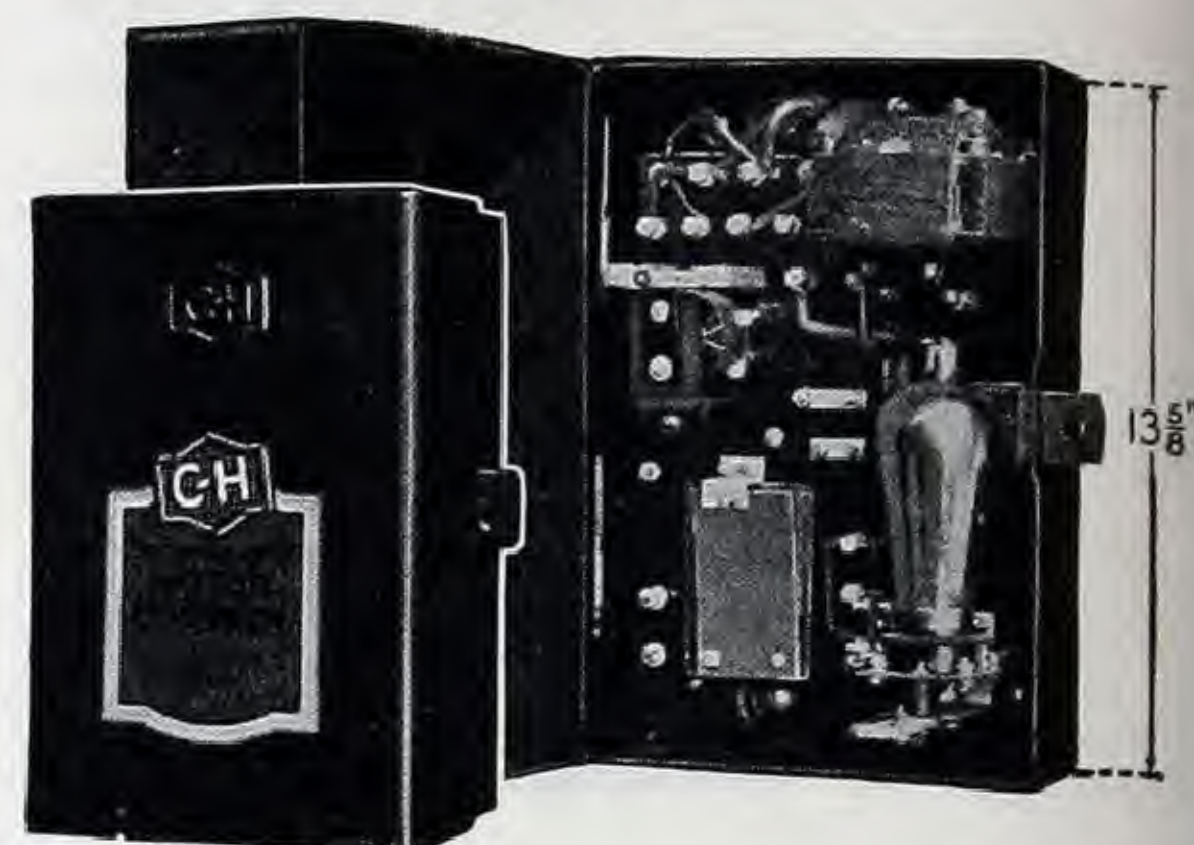
GENERAL DESCRIPTION

This electronic timing device is for use on welders or industrial machines which operate through a repeated cycle and where accurate, consistent timing of this cycle is desirable or necessary. Timing is controlled by means of an electronic tube and is easily adjustable over a wide range by means of a small dial.

STANDARD FEATURES OF DESIGN

1. Provides accurate, consistent timing by means of Thyatron (electronic) tube, for control of main magnetic contactor.
2. Wide range of time adjustment from 1/10 second to 16 seconds.
3. Easily and quickly adjusted for desired time element.
4. Time adjusting dial inside of enclosing case, prevents unauthorized tampering with setting.
5. Can be applied to any welder which has a magnetic main contactor.
6. Self-contained excitation transformer for tube.
7. Electronic tube designed for long life (10,000 hours average expected life).
8. Thermostatic protection of tube during 20 second warming up period.
9. Relay which handles control circuit to welder contactor has silver to silver contacts.
10. Relay contacts normally open—easily changed to be normally closed, to meet requirements.
11. Entire structure designed for industrial service.
12. Panel removable from case by simply removing four screws, and without disturbing conduit.
13. All terminals easily accessible.
14. Safety enclosing case arranged for padlocking (padlock not furnished.)
15. Conduit knockout holes in top, bottom, sides and back of enclosing case.

CUTLER-HAMMER A.C. PHOTO ELECTRIC CONTROL DEVICES



Control Panel

Containing electronic relay, condenser transformer and magnetic contactor

This actuates the electric motor or magnetic device to be operated.

GENERAL DESCRIPTION

The development of the photo electric tube for industrial purposes as a light responsive device has opened up its possibilities for applications almost too numerous to mention. Cutler-Hammer has undertaken to market such a device to meet these numerous demands and a bulletin is available describing in detail the essential units—a source of light, photo electric tube, and the necessary electrical control apparatus.

A.C. OR D.C. TRIP LIMIT SWITCH

Single Pole



Enclosed view
No. 10319H-1

With cover removed
to show construction

GENERAL DESCRIPTION

These single pole limit switches are for use in the control circuits of AC and DC controllers on various types of machinery where a small, exceptionally sturdy limit switch is desired and where the roller operated type of limit switch cannot be used. It can also be used as a pushbutton master switch. Its shape and small size permit its being mounted on or in an operating handle.

CUTLER-HAMMER

VOLTAGE AUTOMATIC STARTERS

Three Phase Synchronous Motors



Full voltage automatic synchronous motor starter, Low Tension Type.

DESCRIPTION OF OPERATION

starters are intended for use with slow speed synchronous motors driving compressors, ice machines, etc., conditions necessitate an automatic starter, or remote

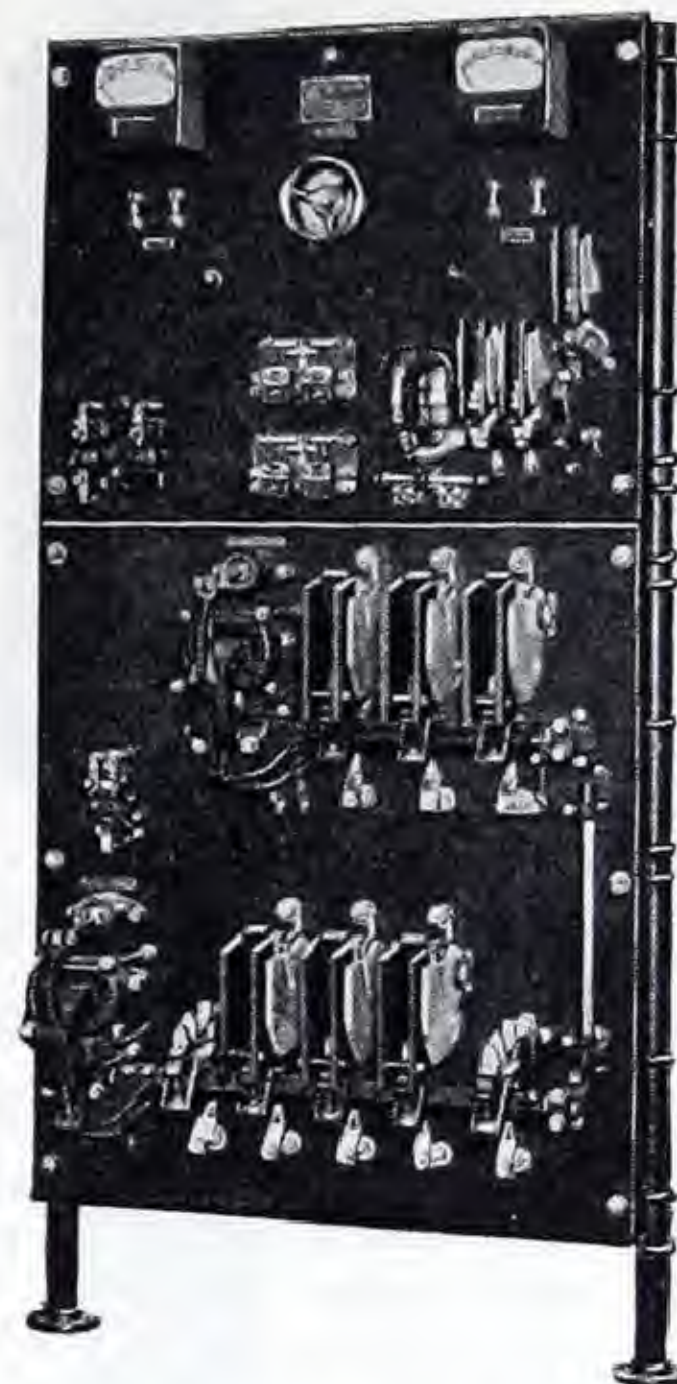
STANDARD FEATURES OF DESIGN

- Non-reverse, full-voltage, automatic starting.
- A.C. line ammeter, Weston rectangular type.
- D.C. field ammeter, Weston rectangular type.
- Undervoltage protection.
- Overload protection by hand reset thermal overload relay.
- Field excitation applied by frequency relay control.
- Field excitation removed if motor is pulled out of step.
- Pushbutton master switch for separate mounting.
- Control circuit fuses.
- Field discharge resistor included.
- Panel drilled for exciter rheostat and copper handwheel accessory. (Rheostat and handwheel not included.)
- Control circuit transformer included with high tension starters.

CUTLER-HAMMER

REDUCED VOLTAGE AUTOMATIC STARTERS

For Three Phase Synchronous Motors



Reduced Voltage Automatic Synchronous Motor Starter Type "D."

DESCRIPTION OF OPERATION

These starters are intended for use with medium and high speed synchronous motors driving pumps, blowers, grain elevators, motor generator sets, etc., when conditions necessitate an automatic starter, or remote control.

STANDARD FEATURES OF DESIGN

1. Non-reverse, reduced voltage, automatic starting.
2. A.C. Line Ammeter, Weston rectangular type.
3. D.C. field ammeter, Weston rectangular type.
4. Undervoltage protection.
5. Overload protection by hand reset thermal overload relay.
6. Transfer from low-voltage to full-voltage by frequency relay control.
7. Field excitation applied by frequency relay control.
8. Field excitation removed if motor is pulled out of step.
9. Pushbutton master switch for separate mounting.
10. Control circuit fuses.
11. Field discharge resistor included.
12. Panel drilled for List 11111 exciter rheostat, and copper handwheel accessory. (Rheostat and handwheel not included.)
13. Auto-transformer included.
14. Control circuit transformer included with high tension starters.

CUTLER-HAMMER A.C. OR D.C. ENCLOSED PRESSURE SWITCHES

Double Pole—Double Break—Diaphragm Type—For
Pressures Above Atmospheric
For Motor or Pilot Circuit Control



Enclosed view of switch with unloader

GENERAL DESCRIPTION

These enclosed double pole pressure switches are used with A.C. and D.C. motors driving pumps, compressors, etc. They handle the main circuit directly. For horsepower ratings in excess of those given in the table, the switch is used as a pilot device in the control circuit of a separate automatic starter. These switches close the circuit at low pressure and open the circuit at high pressure. They are used on systems containing air, gas, water and other fluids which are not injurious to the rubber diaphragm.

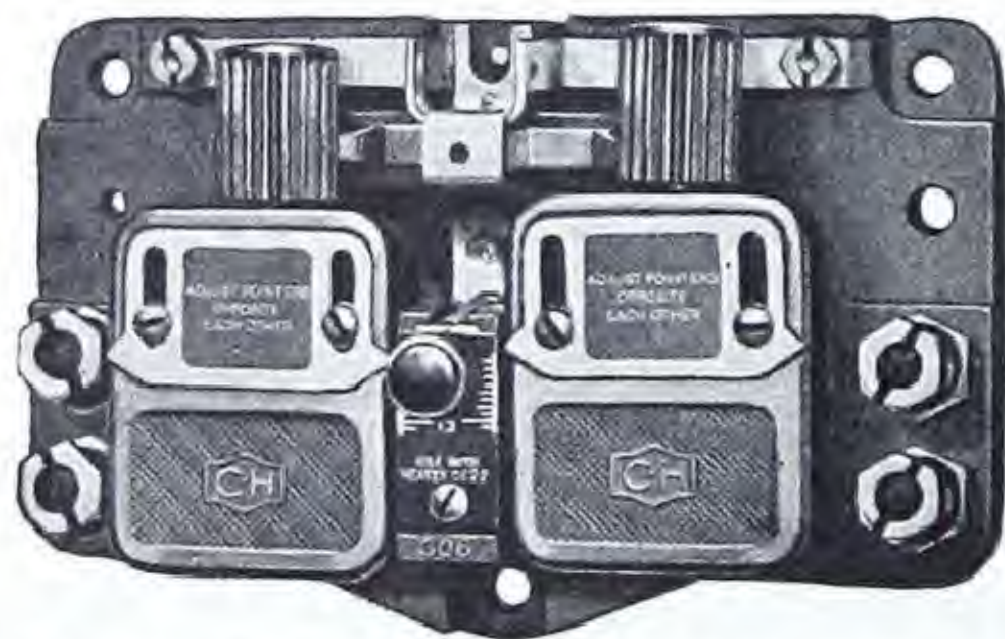
Horsepower Ratings

A.C. Single Phase—1½ H.P. 110 Volts; 3 H.P. 220 Volts.
A.C. Two and Three Phase—2 H.P. 110 Volts; 5 H.P. 220 Volts; 3 H.P. 440 and 550 Volts.
D.C.—1 H.P. 115 Volts; 2 H.P. 230 Volts; ¾ H.P. 550 Volts.
Prices on application.

C-H HEATER COILS

DUPLEX THERMAL OVERLOAD RELAY

For the Protection of A.C. or D.C. Electrical Circuits



Duplex Thermal Overload Relay without heater coils

GENERAL DESCRIPTION

Overload relays are of the thermal type. A heater coil in each relay is connected in series with the circuit to be protected. Each relay contains a thermal element consisting of a special alloy in which is inserted the pin holding the control circuit contacts in place. This alloy is melted by the heat from the overloads and allows the pin to turn, releasing the control circuit contacts, which in turn open the main line switch, stopping the motor. The relay may be reset after an overload by pushing the "reset" button, after the alloy hardens. The time taken to harden depends entirely on the amount of overload which caused it to melt.

Prices on application.

CUTLER-HAMMER A.C. OR D.C. HATCHWAY LIMIT SWITCHES

GENERAL DESCRIPTION

These hatchway limit switches are for use in the control circuit of alternating or direct current elevator controllers, steel mill controllers and similar equipment. They can be used as limit switches to start or stop the motor at a certain point or as a safety switch to stop the motor when the machine has travelled past its limit. The double pole construction provides for the opening of both sides of the control circuit and insures that the motor will stop even though one of the control lines may become grounded.

Prices on application.



Enclosed view with
rubber tired wheel.

A.C. OR D.C. DOOR SAFETY SWITCHES

For Use in Pilot Circuits of Automatic or
Semi-Automatic Controllers

GENERAL DESCRIPTION

These door safety switches are designed primarily for use in the control circuit of automatic and semi-automatic elevator controllers to prevent starting of the elevator car until all doors are closed. The switches with normally open contacts are used for this service. They are also used as limit switches in the control circuit of A.C. or D.C. automatic starters on applications, such as machine tools, conveyors, etc. The switches are single-pole and provide a double break in one side of the control circuit. Three types are furnished to take care of all mounting requirements.

Prices on application.



With cover removed to
show construction of
switch type A

WHAT IS MOTOR CONTROL?

Sometimes a group of buttons on a machine, sometimes a box on the wall, sometimes a whole room full of panels . . . Motor Control comes in a thousand different forms. Regardless of size, it starts, stops, regulates and protects motors and machines . . . four important duties.

A.C. OR D.C. LIMIT SWITCHES

Single Pole

GENERAL DESCRIPTION

These single pole limit switches are for use in the control circuits of A.C. or D.C. controllers on small machine tools, conveyors, dough mixers, wash machines and similar equipment where a small, exceptionally sturdy limit switch is desired. They can be used as limit switches, to start, stop or reverse the motor at a certain point or as a safety switch to stop the motor if the machine should accidentally travel past its limit of normal operation.

The sturdy construction and small size of these switches make them especially adaptable to small machines where the current in the control circuit of the controller does not exceed the capacity limitations of the switch.



Enclosed view

Price includes a complete limit switch.

	Type of Contacts	List Price	Lbs. Boxed
-H1	Normally closed.....	\$9.00	5
-H2	Normally open.....	9.00	5

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.
Motor Controls.

Condit Electrical Mfg. Corp.
Oil Circuit Breakers.

Ferranti Electric Ltd.
Transformers, Surge Absorbers.

J. P. Tubular Heater Co.
Electric Heating Systems.

Sangamo Electric Limited,
Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,
Cutouts and Disconnects.

Telegraph Condenser Co.
Power Static Condensers.

Weston Electric Instrument Corp.
Indicating Instruments of all kinds.
Radio Test Equipment.

Mather & Platt Ltd.
Motors and Generators, All Types, A.C. and D.C.
Complete line of Centrifugal Pumps.

A. Reyrolle & Co. Limited.
Metal Clad Switchgear.

Ilg Electric Ventilating Co.
Ventilating Fans and Blowers.

Hewittic Electric Co.
Rectifiers (Glass bulb).

C-H SPACE HEATER

"Two Feet of Electrical Heat"

A FEW OF THE MANY USES

- In steel plants.
- For crane cabs.
- For watchmen's houses.
- For elevators.
- For heating garages.
- To prevent freezing or compressed air.
- For protecting water supply lines.
- In sump pits.
- For heating airplane hangars.
- For protection of large fire extinguishers.
- For protecting fire plugs against freezing.
- For electric locomotives.
- For oil switches.
- For high tension lightning arresters.
- Eliminating moisture.
- Heating vaults.
- Preventing formation of ice.
- Keeping precise instruments warm.
- In watch adjusting rooms.
- Drying foundry molds.
- Keeping bees warm.
- For heating pipe organs.
- Keeping frost from shop windows.
- Keeping compounds fluid.
- Moulding bakelite products.



Side View

Top View

STANDARD FEATURES OF DESIGN

- 500 watts Capacity.
- Resistor unit of nickel chromium wire.
- Resistor unit imbedded in and supported by highly efficient refractory insulating material.
- Granular insulating material compacted under 180 tons pressure.
- Low coil temperature—longer life, less maintenance—will withstand voltage fluctuations.
- Heavy rust-resisting iron sheath.
- Flat shaped—easily applied as a conduction heater.
- Terminals well insulated from frame by large mica discs.
- Elongated mounting holes for easy installation.
- Every heater tested on double-voltage before shipment to assure long life and perfect insulation.

OPTIONAL FEATURES

Heaters for other voltages; in special lengths; with higher or lower wattage rating; or to meet special operating or mounting conditions are available.

Ratings		List	Unit	Std.	Lbs. Boxed	List
Volts	Watts	Number	Pkg.	Pkg.	Package	Price
115	500	15510H1	10	50	100	\$3.30
230	500	15510H2	10	50	100	3.30

C-H LIFTING MAGNETS



The handling of steel and iron, both in the raw and finished state, is most economically accomplished by the use of lifting magnets. The initial investment for the magnet and crane, to handle it, can be paid for in a very short time. The cost of operation thereafter will average from 15 to 25 per cent of the older methods.

The greater the lift, the fewer the trips—consequently the greatest saving will be accomplished by that magnet which will handle the most material per lift throughout a day's operation.

The importance of this "all-day" lifting capacity is readily recognized by those who are in closest touch with the crane men and yard foreman. It is interesting to note the preference for Cutler-Hammer magnets by those who operate the magnets and use them every day.

The development of Cutler-Hammer high duty lifting magnets covers years of experiments by engineers who have devoted their time exclusively to the improvements of lifting magnets, and today there is offered to the trade a structure which will give high all-day lifting capacity and withstand the abuse to which magnets are subjected.

Lifting Capacities of Lifting Magnets

"Red Top"

Circular Type

The figures for lifting capacity in the table below are based on the average lifts obtained when the magnet has attained the maximum temperature on all-day cycle of half-time excitation. When magnets are not being operated continuously, the lifting values are considerably higher.

Lifting Capacity, Lbs.

Class of Material	Size of Magnet				
	65"	55"	45"	39"	24"
Skull Cracker Balls with Std. Magnet...	30000	20000	16000	12000	4000
Skull Cracker Balls with spe. Pole Shoe.	40000	30000	24000	18000	6000
Slabs—up to.....	60000	50000	35000	20000	6500
Machine Cast Pig from Stock Pile.....	3300	2400	1400	830	275
Sand Cast Pig from Stock Pile.....	2800	2280	1275	750	250
Machine Cast Pig from Railroad Cars.	2800	2280	1275	750	250
Sand Cast Pig from Railroad Cars.....	2650	2170	1150	680	225
Broken Scrap.....	1800	1300	1000	600	200
Cast Iron Borings.....	2300	1500	1100	600	200
Steel Turnings.....	1100	750	450	300	100

C-H LIFTING MAGNETS

(Continued)

Direct Current Required for Excitation:

Standard Cutler-Hammer Magnets are designed for operation on 220-volt direct current circuits, but, can be wound for 110 volts, if desired.

For 500-volt circuits a 220-volt magnet is used in series with a fixed resistance.

Where alternating current only is available it can be readily and efficiently transformed to direct current by a motor-generator set or rotary converter. Where steam only is available, an engine or turbo-generator set is used. Gas or oil engines may also be employed.

Capacity Ratings of Lifting Magnets

"Red Top"

Circular Type

Magnet Size Inches	Net Weight Pounds	D.C. Current Amperes at Working Temperature 220 Volts	Dimensions Three Point Chain Suspension Head	
			Room Required	Outside Diam. of
18	445	1.9	23"	19½"

For handling light finished parts, and light iron and steel castings.

24	630	6.9	29"	24"
----	-----	-----	-----	-----

Similar to the 18-inch. This magnet can also handle skull cracker balls up to 8000 pounds.

39	3730	24	39"	38½"
----	------	----	-----	------

For general service in handling pig iron, scrap, etc., where large capacity is not required. Sometimes used with locomotive cranes.

High Duty

45	3730	33	45"	46½"
----	------	----	-----	------

Designed primarily for use with locomotive cranes. It handles a fair average load and yet is not a heavy magnet, nor does it require so large a current as to bring an undue strain on the crane boiler which must supply steam for the turbo-generator set.

55	5630	40	50"	55"
----	------	----	-----	-----

Very popular for general work—used extensively in open hearth steel plants for handling stock.

65	9160	58	56"	65½"
----	------	----	-----	------

Used where large tonnage is to be handled.

Prices on application.

CUTLER-HAMMER A.C. OR D.C. THEATRE DIMMERS

Non-Interlocking Construction—Circular and Rectangular Types for Church, Lodge and Similar Small Installations



Standard wall mounting dimmer—Circular type.

SPECIAL FEATURES OF DESIGN

General

Manually operated.
Continuous duty.
Dimming to dull cherry red on rated wattages.

Circular Type

For two or three wire systems.
Arranged for wall mounting.
All live parts enclosed.

Rectangular Type

For two wire systems only.
Arranged for mounting at right angles to wall or floor.
Light intensity indicator.
Single unit type only—no multiple plates.
Lug on operating lever for easy interlocking with other plates in bank.
Light weight—easily portable.

GENERAL DESCRIPTION

Circular Type

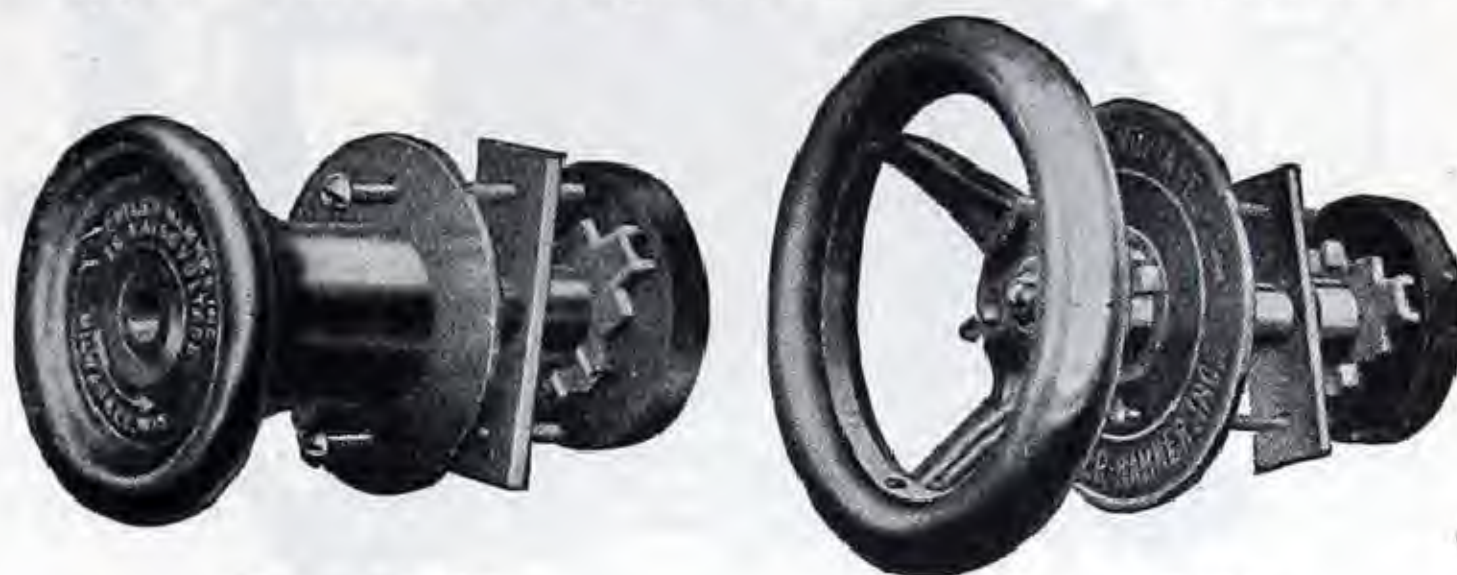
These circular type theater dimmers are used principally in churches, lodge halls and small theaters where only few lights require dimming. They are the non-interlocking construction and capable of controlling metallic filament lamps up to a total of 5280 watts.

Mounting arrangements.—The standard circular type dimmer is arranged for mounting flat against a wall or switchboard. However, edgewise mounting brackets and rear-of-board accessories can be furnished to meet special mounting conditions.

Edgewise mounting.—An edgewise mounting bracket can be supplied for installations where space limitations make it absolutely necessary to mount these dimmers at right angles to the wall. This type of mounting is particularly adapted to installations requiring a number of dimmers. It is a simple method of locating them in a group for convenient control.

CUTLER-HAMMER A.C. OR D.C. THEATRE DIMMERS

Non-interlocking construction—circular and rectangular types. For church, lodge and similar small installations.



Type 10410
Rear-of-board mounting
accessories with Ther-
moplox handwheel.

Type 10410
Rear-of-board mounting
accessories with copper
handwheel.

GENERAL DESCRIPTION—Continued

Rear-of-board mounting with handwheel drive: Circular type dimmers may also be mounted at the rear of the switchboard and driven from the front by means of a set of hand-wheel accessories.

These prices include a complete wall mounting dimmer.

List No.	Total Watt. in Lamps	Max. Amps. Per Plate	Ohms Per Plate	No. of Steps	No. and Size of Plates	List Price	Lbs. Boxed
Circular Type—110 Volts—2 Wire							
11311H 1	200	1.75	200	24	1-10"	\$15.00	20
11311H 2	360	3.15	110	24	1-10"	15.00	20
11311H 3	500	4.4	80	24	1-10"	15.00	20
11311H 4	660	5.7	60	40	1-12"	19.50	25
11311H 5	900	7.8	44	40	1-12"	19.50	25
11311H 6	1100	9.6	36	60	1-15"	22.50	30
11311H 7	1320	11.5	30	60	1-15"	22.50	30
11311H23	1800	7.8	44	60	2-15"	38.25	60
11311H24	2200	9.6	36	60	2-15"	38.25	60
11311H25	2640	11.5	30	60	2-15"	38.25	60

Circular Type—220 Volts—2 Wire

11311H 9	200	.87	800	24	1-10"	\$15.00	20
11311H10	360	1.56	450	24	1-10"	15.00	20
11311H11	500	2.2	320	24	1-10"	15.00	20
11311H12	660	2.9	240	40	1-12"	19.50	25
11311H13	900	3.9	180	40	1-12"	19.50	25
11311H14	1100	4.8	145	60	1-15"	22.50	30
11311H15	1320	5.8	121	60	1-15"	22.50	30
11311H33	1800	3.9	180	60	2-15"	38.25	60
11311H34	2200	4.8	145	60	2-15"	38.25	60
11311H35	2640	5.8	121	60	2-15"	38.25	60

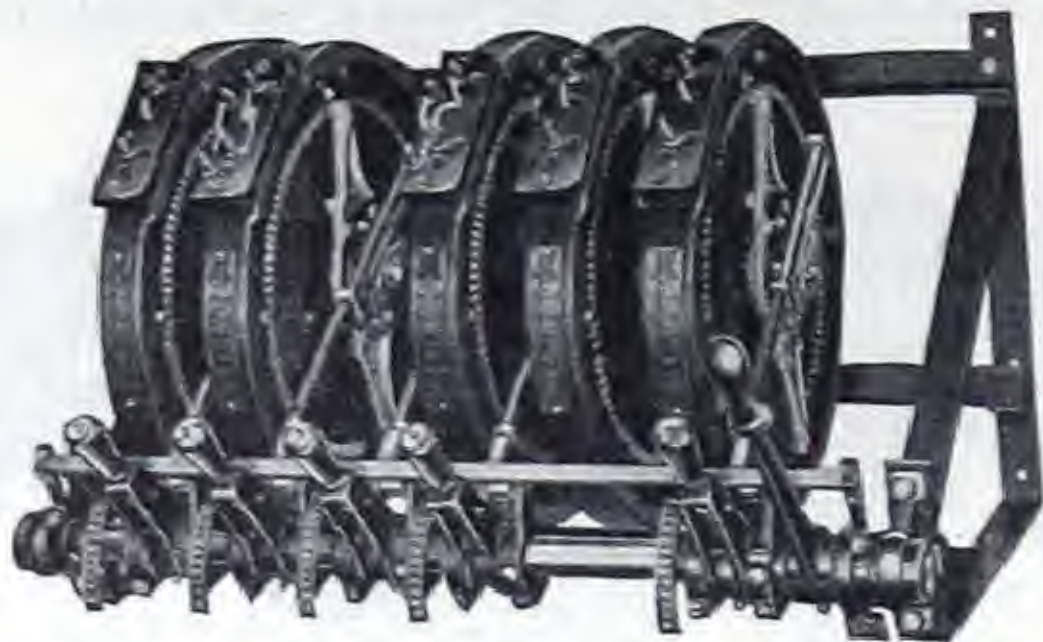
Circular Type—110-220 Volts—3 Wire

		*	*				
11311H36	400	1.75	200	24	2-10"	\$30.75	40
11311H37	720	3.15	110	24	2-10"	30.75	40
11311H38	1000	4.4	80	24	2-10"	30.75	40
11311H39	1320	5.7	60	40	2-12"	40.50	50
11311H40	1800	7.8	44	40	2-12"	40.50	50
11311H24	2200	9.6	36	60	2-15"	66.75	60
11311H25	2640	11.5	30	60	2-15"	66.75	60

*On the 110-220 volt 3-wire system, the data under "Maximum Amps." and "Total Ohms," is given for one side only of a 3-Wire Circuit.

A. C. or D. C. "SIMPLICITY" THEATER DIMMERS—INTERLOCKING TYPE

For Small and Large Installations



A typical C-H Dimmer Bank showing construction of dimmer plates

Proper theater lighting has always been recognized as essential to successful dramatic production. Proper dimming, brightening and blending of stage and auditorium lights give the producer the means to obtain any desired lighting effect—to create the necessary atmosphere which will transport his audience to the scene of action. The decorative scheme of the theater may actually be changed to be never twice alike, yet always a marvel of delicate beauty. There really is no limit to the possibilities of correct mobile lighting—it is used successfully in movie, vaudeville, and legitimate; small, average and large sized houses; school and church auditoriums; club rooms; show windows, and many other places.

The importance of correct lighting makes it imperative that the dimming equipment which controls the lighting effects, be of a design which gives smooth, flickerless dimming and subtle color blending over the full range of control, from "full bright" to "black out"—plus such features as long life, trouble free service, silent operation, control from a centralized point, high efficiency, and flexibility to allow the insertion of additional units for possible future requirements.

Cutler-Hammer theater dimmers are designed to provide all of these important features. Construction details are carried out with the greatest accuracy, to obtain the best possible operating characteristics. They are built especially for the continuous, severe, long-hour service to which moving picture houses in particular subject them. They have the ability to withstand accidental or temporary abnormal loads, such as often exist in theater practice.

THE C-H DIMMER PLATE

- 1—Designed for continuous duty.
- 2—For two or three wire systems.
- 3—Wattage dissipation equalized over entire plate.
- 4—Welded joint between segments and resistance wire eliminate heating at joint.
- 5—One hundred and ten steps of resistor give extremely fine variations in lamp brilliancy.
- 6—Extra wide "Cophite" self-lubricating contact brushes give large contact area on segments, easy operation and quiet action.
- 7—Extra large contact segments in full height position.
- 8—Flickerless dimming on all types of lamps.
- 9—Solderless copper strip connections between brushes and contact lever—no flimsy pigtail.
- 10—Adjustable rack and pinion drive.
- 11—Terminals mounted on solid block of insulation with large clearance to ground.

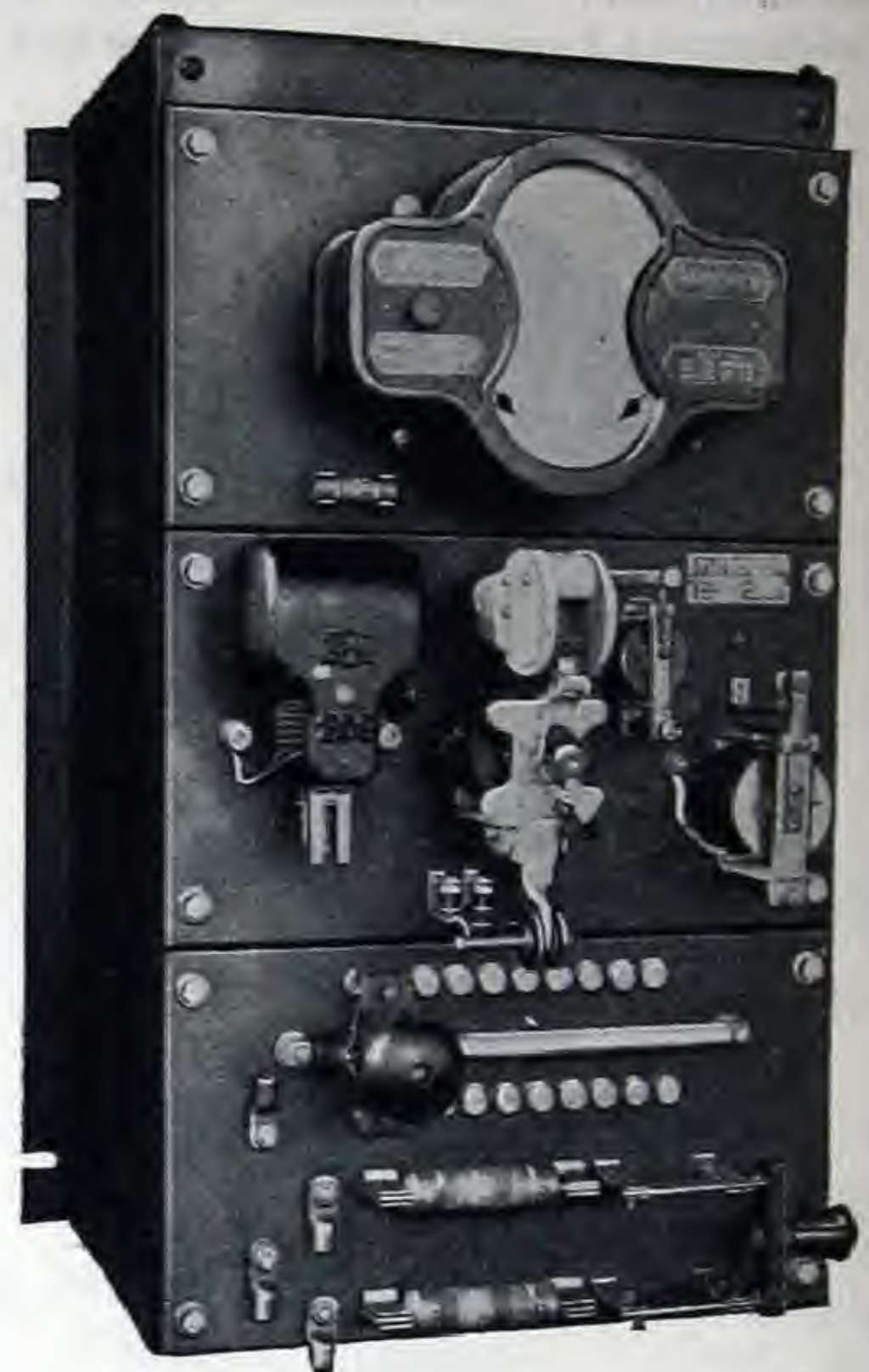
Various arrangements for mounting and operation are available with this dimmer equipment.

Application to the nearest office should be made for complete details.

Prices on application.

D.C. BATTERY CHARGING EQUIPMENT

Constant Current Method—Individual Type



No. 11412

GENERAL DESCRIPTION

This apparatus is designed for constant current charging. The variable rheostat is used to start the charge at the rate specified by the battery manufacturer and the rate can be maintained at the normal rate by adjusting the rheostat finally reaching the point where the voltage reaches a definite value. For Edison batteries this is the point where the charge is terminated. For lead batteries the rheostat is then re-adjusted and the charge continued at the finishing rate, also specified by the battery manufacturer, until the voltage of the battery reaches the full charge value.

This design is particularly adapted for use in small private garages where but one or two vehicles are to be charged and complete equipment having automatic protective features is desired. It is furnished with a Weston Model 38 Duplex Ammeter and Voltmeter.

STANDARD FEATURES OF DESIGN

1. Main line knife switch and fuses.
2. Variable resistor.
3. Self-contained resistor.
4. Resistor is moisture resisting.
5. Reverse current protection.
6. Automatic resumption of charge after supply failure.
7. Prevention against starting charge at excessive rate.
8. Duplex meter for reading battery voltage and charging current.
9. Trip relay for operation from ampere-hour meter.

Prices on application.

C-H. UNIT TYPE RESISTORS

Miscellaneous Applications on A. C. or D. C. Circuits

STANDARD FEATURES OF DESIGN

- Resistor is moisture resisting.
- Porcelain base.
- Resistance wire has low temperature coefficient.
- Cement imbedded resistor.

GENERAL DESCRIPTION

These unit type resistors can be used for innumerable applications on any alternating or direct current, lighting or power circuit, where a resistance is required. Many sizes and types of units are listed, in order to provide a convenient and economical unit for every capacity and for every condition of mounting, service, environment, etc. Both tubular and non-tubular units are included.

The General Construction of these units is the same as that used on Cutler-Hammer controlling devices. The resistance wire is wound on a porcelain base and covered with a protective coating. The wire used has a negligible temperature coefficient, and is wound by machine to a definite pitch with extreme accuracy. The cement covering protects the resistor against corrosion from moisture and air and provides greater thermal capacity as well as a large and efficient radiating area. These units cannot be harmed by installation in a moist atmosphere.

Information required with order.

- Type of unit.
- Resistance in ohms.
- Ampere capacity.
- Voltage.
- Whether unit is to be mounted in free air, in a ventilated enclosure, or in an unventilated enclosing case.

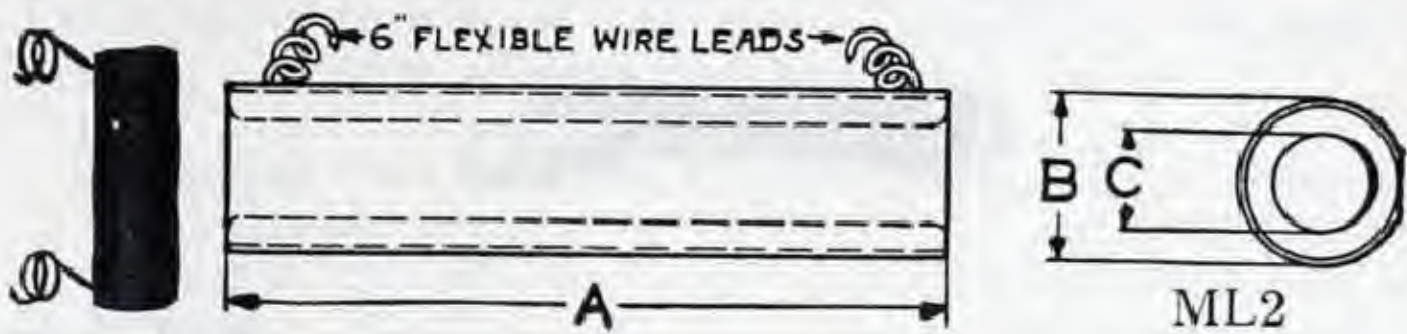
PROVE IT IN YOUR PLANT



Select one lagging machine or a group of such machines. Ask a C-H engineer to recommend Motor Control changes and judge by results only. See production re-evaluated, steps saved, delays reduced. Such a test will disclose the true importance of Motor Control in your plant and pay real dividends for years to come.

C-H. UNIT TYPE RESISTORS

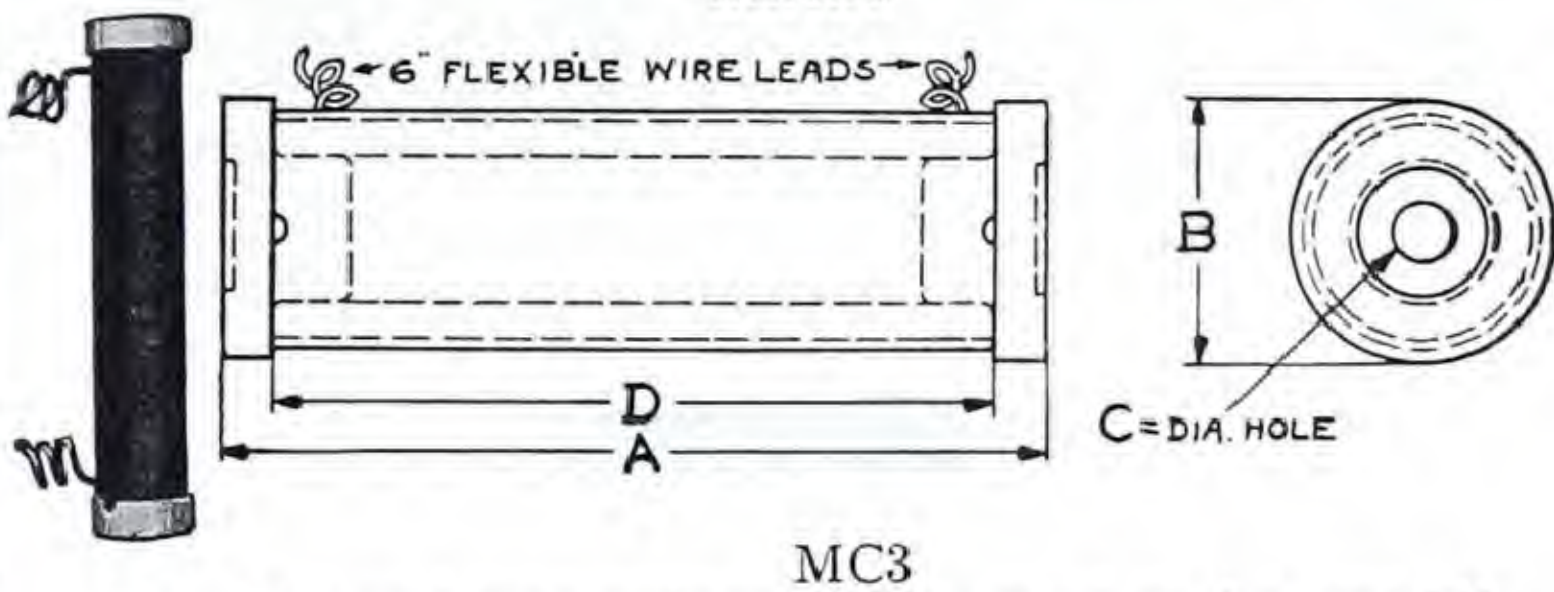
For miscellaneous applications on A.C. or D.C. circuits.
TYPE ML—PLAIN UNITS WITH WIRE LEADS



Price includes a complete unit type resistor as illustrated.
The Type ML is the simplest form of resistance unit. It consists simply of the porcelain base unit with two flexible wire leads and has a hollow center, for mounting on rods.

Type	Watts	Max. Ohms	Approximate Dimensions in Inches			List Price	Net Wt., Oz.
			A	B	C		
ML2	30	500	2	1 1/16	1 1/32	\$0.55	1
ML3	60	1250	3 1/2	1 3/16	7/16	0.60	1 1/2
ML4	100	2250	6	1 3/16	7/16	0.75	2 1/2
ML5	150	3500	6	1 3/16	3/4	0.85	3 1/2
ML6	200	4700	8	1 3/16	3/4	0.90	5

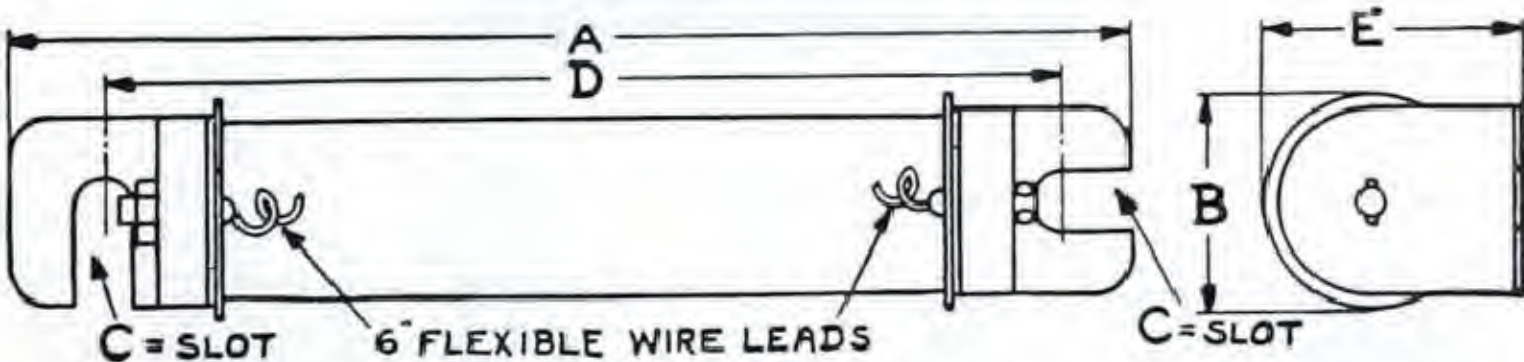
TYPE MC—UNITS WITH END CAPS AND WIRE LEADS



Type MC unit type resistors are the same as the type ML except that a cap or bushing is provided at each end to facilitate mounting. The addition of the end caps makes a much neater mounting arrangement.

Type	Watts	Max. Ohms	Approximate Dimensions in Inches				List Price	Net Wt., Oz.
			A	B	C	D		
MC3	60	1250	4	7/8	5/32	3 1/2	\$0.85	2
MC4	100	2250	6 1/2	7/8	5/32	6	1.05	3
MC5	150	3500	6 1/2	1 1/4	9/32	6	1.15	4
MC6	200	4700	8 1/2	1 1/4	9/32	8	1.20	6

TYPE MB—UNITS WITH INSULATED MOUNTING BRACKETS



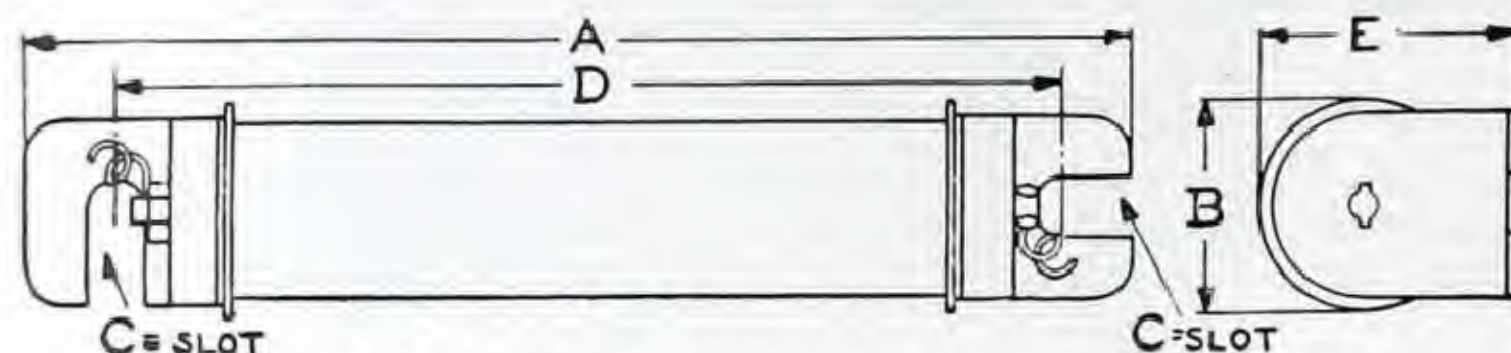
The Type MB unit is also provided with mounting brackets and is the same as the type ME except that the brackets are insulated from the winding. Flexible wire leads serve for connecting the unit into the circuit and the brackets provide an easy method of mounting and proper spacing from the mounting supports, for good ventilation.

Type	Watts	Max. Ohms	Approximate Dimensions in Inches					List Price	Net Wt., Oz.
			A	B	C	D	E		
MB3	60	1250	5 3/8	7/8	3/16	4 3/4	7/8	\$1.05	3
MB4	100	2250	7 7/8	7/8	3/16	7 1/4	7/8	1.20	3 1/2
MB5	150	3500	7 7/8	1 1/4	5/16	7 1/8	1 9/16	1.35	6
MB6	200	4700	9 7/8	1 1/4	5/16	9 1/8	1 9/16	1.50	7

C-H. UNIT TYPE RESISTORS

For miscellaneous applications on A.C. or D.C. circuits.

TYPE ME—UNITS WITH LIVE MOUNTING BRACKETS

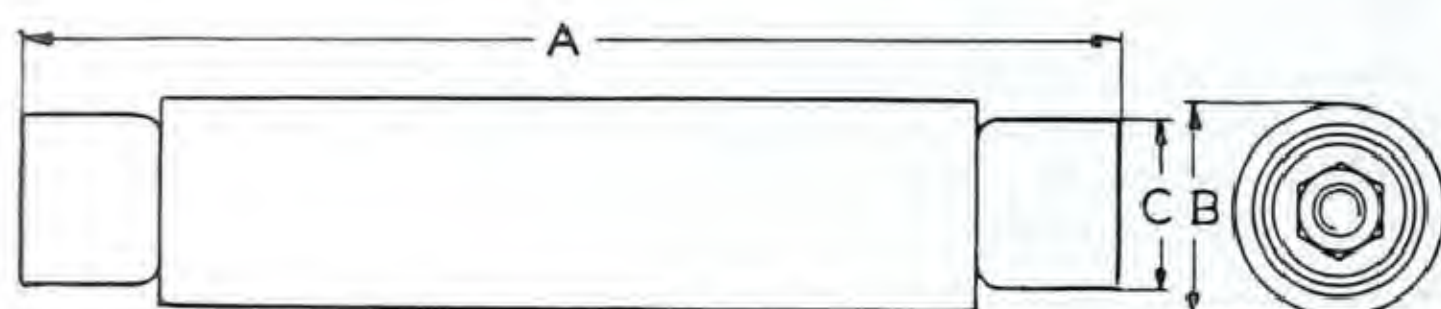


The Type ME Unit is provided with mounting brackets or ears which are electrically connected to each end of the resistor winding. The brackets serve as supports and as a means of connection to the circuit.

		Approximate Dimensions in Inches					List Price	Net Wt., Oz.
Type	Watts	Max. Ohms	A	B	C	D		
ME2	30	500	$3\frac{3}{8}$	$\frac{11}{16}$	$\frac{3}{16}$	$2\frac{3}{4}$	\$0.65	2
*MEC3	60	1250	$5\frac{3}{8}$	$\frac{7}{8}$	$\frac{3}{16}$	$4\frac{3}{4}$	0.70	3
*MEC4	100	2250	$7\frac{7}{8}$	$\frac{7}{8}$	$\frac{3}{16}$	$7\frac{1}{4}$	0.80	$3\frac{1}{2}$
ME5	150	3500	$7\frac{7}{8}$	$1\frac{1}{4}$	$\frac{5}{16}$	$7\frac{1}{16}$	0.90	6
ME6	200	4700	$9\frac{7}{8}$	$1\frac{1}{4}$	$\frac{5}{16}$	$9\frac{1}{16}$	1.00	7

*These two sizes can be furnished, in large quantities, without the end caps at a slight saving.

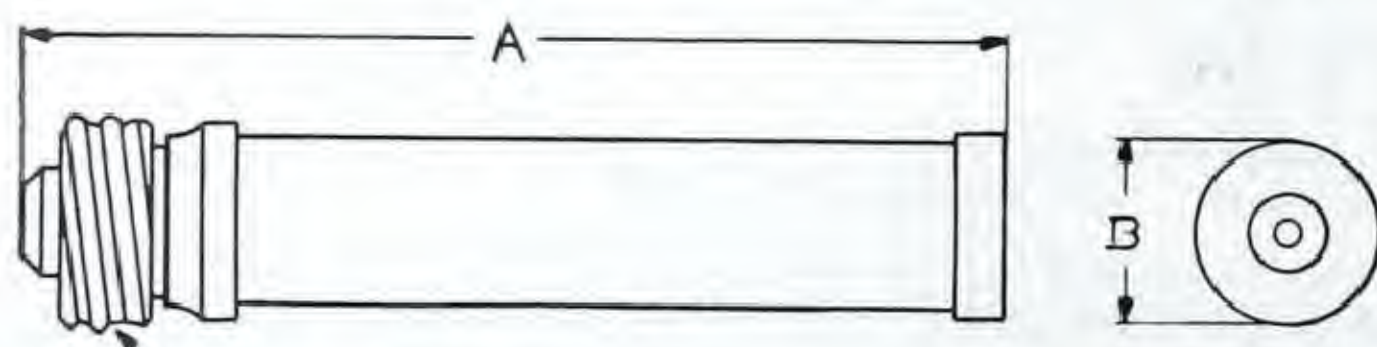
TYPE MF—UNITS WITH FUSE FERRULES



The Type MF unit is fitted with ferrules to fit standard fuse clips. It is particularly adapted to installations requiring resistor units which are easily removed.

			Approximate Dimensions				Net
Type	Watts	Max. Ohms	A	B	C	List Price	Weight Oz.
MF2	30	500	3	$\frac{11}{16}$	$\frac{9}{16}$	\$0.75	2
MF3	60	1250	$4\frac{1}{2}$	$\frac{13}{16}$	$\frac{9}{16}$	0.80	$2\frac{1}{2}$
MF4	100	2250	7	$\frac{13}{16}$	$\frac{9}{16}$	0.90	$3\frac{1}{2}$
MF5	150	3500	$7\frac{3}{8}$	$1\frac{3}{16}$	$\frac{13}{16}$	0.95	6
MF6	200	4700	$9\frac{3}{8}$	$1\frac{3}{16}$	$\frac{13}{16}$	1.10	7

TYPE MS—UNITS WITH STANDARD SCREW BASE



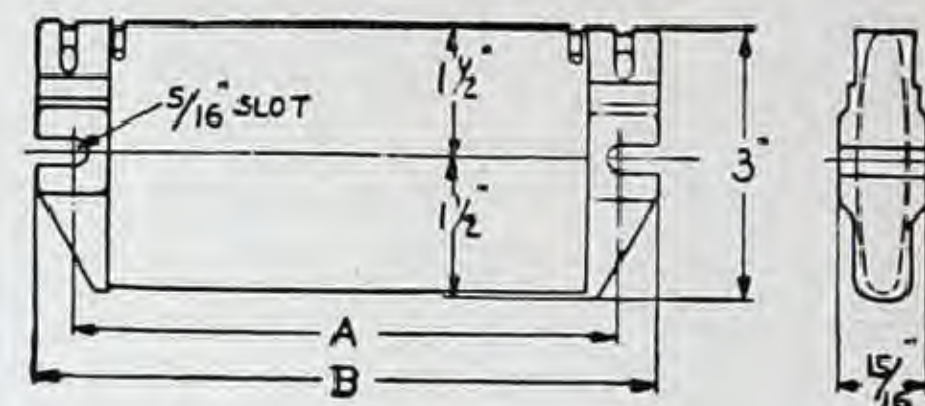
The Type MS unit is similar to those listed above, but it is provided with a screw base to fit standard lamp sockets.

		Approximate Dimensions in Inches			List Price	Net Weight Ounces
Type	Watts	Max. Ohms	A	B		
MS3	60	1250	4 $\frac{7}{8}$	$\frac{15}{16}$	\$1.05	3
MS4	100	2250	7 $\frac{3}{8}$	$\frac{15}{16}$	1.87	3 $\frac{1}{2}$
MS5	150	3500	7 $\frac{7}{16}$	1 $\frac{1}{4}$	2.02	6
MS6	200	4700	9 $\frac{7}{16}$	1 $\frac{1}{4}$	2.10	7

C-H. UNIT TYPE RESISTORS

For miscellaneous applications on A.C. or D.C. circuit

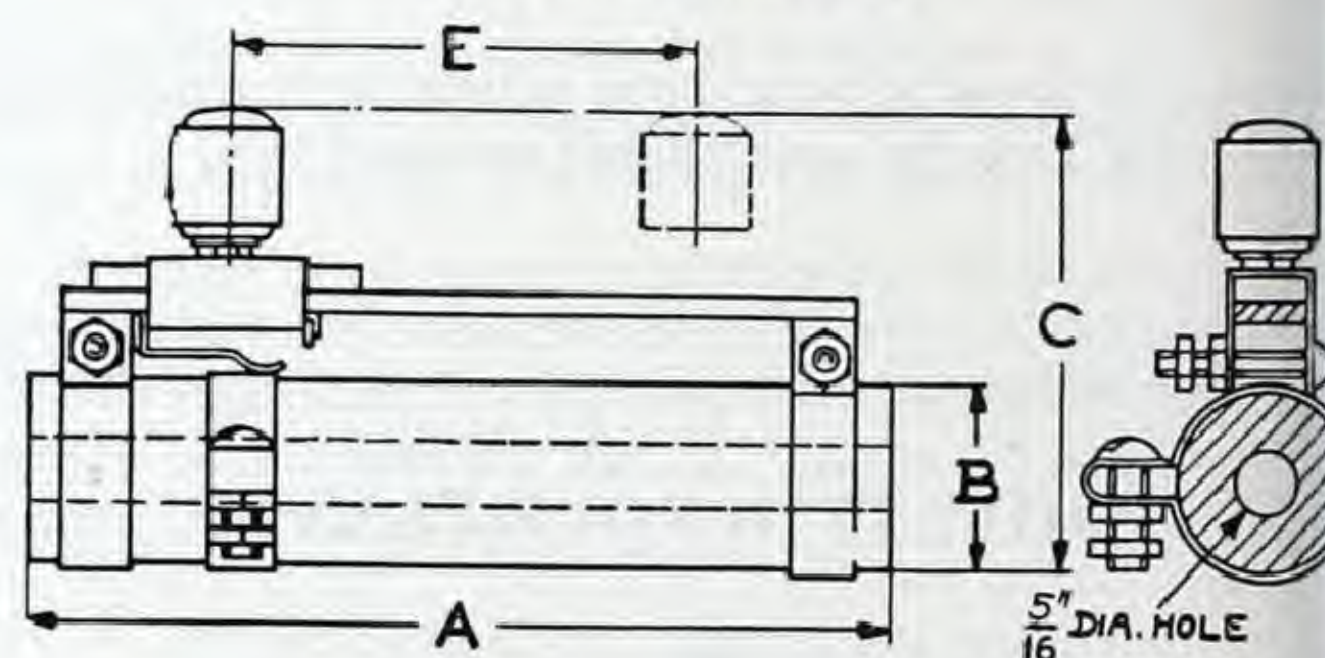
TYPE Y—FLAT, OPEN TYPE UNITS



ADJUSTABLE UNITS

The type Y units are open type, flat in shape and have greater mass than the round type. Their physical qualities make them well suited to mounting in commercial motor control equipment and the mass provides greater heat absorbing capacity, making them particularly desirable for intermittent duty applications.

		Approximate Dimensions in Inches			List Price	Net Weight Ounces
Type	Watts	Max. Ohms	A	B		
Y35	70	4400	$5\frac{7}{16}$	$4\frac{3}{4}$	On Application	1
Y37	95	5000	7	$6\frac{5}{16}$		1



The types D, E, F and G (special) adjustable units are composed of standard open type units and a movable slider contacting with one side of the winding, which is left bare. This type of unit is applicable to motor driven adding machines, bookkeeping machines and other small motor driven machines where a definite motor speed is essential and voltage variations must be compensated for.

		Approximate Dimensions in Inches					List Price	Net Weight Oz.
Type	Watts	Max. Ohms	A	B	C	E		
D special	40	300	4	$\frac{7}{8}$	$2\frac{1}{8}$	$2\frac{3}{16}$	\$2.47	1
E special	75	600	$5\frac{3}{4}$	$1\frac{1}{8}$	$2\frac{3}{8}$	$3\frac{7}{8}$	2.62	1
F special	150	1400	9	$1\frac{3}{8}$	$2\frac{5}{8}$	$6\frac{7}{8}$	2.85	2
G special	210	2000	$11\frac{3}{4}$	$1\frac{1}{2}$	$2\frac{3}{4}$	$9\frac{3}{4}$	3.37	3

C-H. UNIT TYPE RESISTORS

For miscellaneous applications on A.C. or D.C. Circuits
Type R—ENCLOSED UNIT WITH A MIDDLE TAP



Type R

Type R is completely enclosed in a metal housing, particularly adapted to service under conditions of heat and vibration.

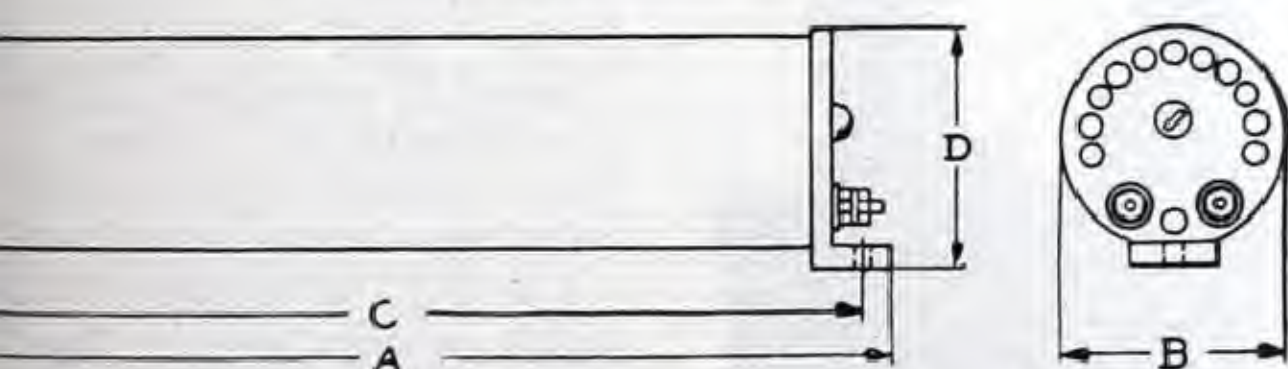
Continuous Ampere Capacity

Ohms	Mounted in Unventilated Enclosing Case		Mounted in Unventilated Enclosing Case		Mounted in Free Air		List Price	Net Wt., Oz.
	50 Watts	62½ Watts	75 Watts	100 Watts	125 Watts	150 Watts		
0.30	13.0	14.5	16.0	17.5	19.0	20.5	\$1.15	7
0.45	10.5	11.8	13.0	14.5	16.0	17.5	1.15	7
0.65	8.8	9.8	11.0	12.5	14.0	15.5	1.15	7
0.90	7.5	8.3	9.1	10.5	11.8	13.0	1.15	7
1.20	6.5	7.2	7.9	9.1	10.5	11.8	1.15	7
1.80	5.3	5.9	6.5	7.5	8.8	10.0	1.15	7
2.60	4.4	4.9	5.4	6.5	7.5	8.8	1.15	7
3.60	3.7	4.2	4.6	5.4	6.5	7.5	1.15	7
5.20	3.1	3.5	3.8	4.6	5.4	6.5	1.15	7
7.20	2.7	3.0	3.2	4.0	4.6	5.4	1.15	7
11.	2.1	2.4	2.6	3.2	3.8	4.6	1.15	7
16.	1.8	2.0	2.2	2.8	3.2	3.8	1.15	7
24.	1.4	1.6	1.8	2.2	2.6	3.2	1.15	7
33.	1.2	1.4	1.5	1.8	2.2	2.6	1.15	7
50.	1.0	1.1	1.2	1.5	1.8	2.2	1.15	7
70.	0.85	0.95	1.0	1.3	1.5	1.8	1.15	7
100.	0.7	0.79	0.86	1.1	1.3	1.5	1.15	7
140.	0.60	0.67	0.73	0.9	1.1	1.3	1.15	7
280.	0.42	0.47	0.52	0.6	0.7	0.8	1.15	7
550.	0.30	0.34	0.37	0.4	0.5	0.6	1.15	7
750.	0.26	0.29	0.32	0.3	0.4	0.5	1.15	7
1000.	0.22	0.25	0.27	0.2	0.3	0.4	1.15	7
1500.	0.18	0.20	0.22	0.1	0.2	0.3	1.15	7
2000.	0.16	0.18	0.19	0.1	0.1	0.2	1.65	7
3000.	0.13	0.14	0.16	0.1	0.1	0.1	1.65	7

TYPE C—ENCLOSED UNIT



Type CE



Type C enclosed unit consists of a standard resistor completely enclosed in a metal housing and provided with mounting feet. This unit has been found especially useful in machines or appliances which require protecting resistors and where the resistor must be mounted externally. It meets with the specifications of the Underwriters' Laboratories for such mounting.

Max. Watts	Ohms	Dimensions in Inches				List Price	Net Wt., Oz.
		A	B	C	D		
60	4000	7 7/8	2	8 1/4	2 3/16	\$2.40	16
115	8000	11 1/4	2 1/2	10 5/8	2 1/8	3.15	36
160	12500	14	2 1/2	13 3/8	2 1/8	3.75	48

C-H. UNIT TYPE RESISTORS

For miscellaneous applications on A. C. or D.C. Circuits

Table for determining size of resistance units required for known ampere and resistance values.

Determine the amount of resistance required, in ohms, and find this resistance value in the left hand column of the table. In the same row, find the maximum amperes which the unit must carry. At the top of the table, in the same column as the ampere value, the size of the smallest unit, in terms of watts, that will provide the desired characteristics will be found.

Resistance in Ohms	30 Watts	40 Watts	60 Watts	75 Watts	95 Watts	100 Watts
	Ampere Capacities					
3	3.17	3.65	4.48	5.00	5.36	5.48
5	2.45	2.83	3.47	3.88	4.36	4.48
10	1.74	2.00	2.45	2.74	3.08	3.17
15	1.42	1.63	2.00	2.24	2.51	2.58
20	1.23	1.42	1.74	1.93	2.18	2.24
25	1.10	1.27	1.55	1.74	1.95	2.00
30	1.00	1.16	1.42	1.59	1.77	1.82
40	.87	1.00	1.23	1.38	1.54	1.58
50	.77	.89	1.10	1.22	1.38	1.42
60	.71	.82	1.00	1.12	1.26	1.29
75	.63	.73	.89	1.00	1.13	1.16
100	.55	.63	.77	.87	.97	1.00
125	.49	.57	.69	.77	.87	.89
150	.45	.52	.63	.70	.79	.82
175	.41	.48	.59	.65	.73	.76
200	.39	.45	.55	.61	.69	.71
250	.35	.40	.49	.55	.62	.63
300	.32	.37	.45	.50	.56	.58
400	.27	.32	.39	.43	.49	.50
500	.24	.28	.35	.39	.44	.45
600	....	.26	.32	.35	.40	.41
700	....	.24	.29	.33	.37	.38
800	....	.22	.27	.31	.35	.36
900	....	.21	.26	.29	.33	.34
1000	....	.20	.24	.27	.31	.32
1200	....	.18	.22	.25	.28	.29
1400	....	....	....	.23	.26	.27
1600	....	....	....	.22	.24	.25
1800	....	....	....	.20	.23	.24
2000	....	....	....	.19	.22	.23

Resistance in Ohms	115 Watts	150 Watts	160 Watts	200 Watts	210 Watts
3	....	....	....	....	....
5	4.80	....	....	....	....
10	3.39	3.88	4.00	4.48	4.59
15	2.77	3.17	3.27	3.65	3.75
20	2.40	2.74	2.83	3.17	3.24
25	2.15	2.45	2.53	2.73	2.90
30	1.95	2.24	2.31	2.58	2.65
40	1.70	1.93	2.00	2.24	2.29
50	1.52	1.74	1.79	2.00	2.05
60	1.39	1.59	1.63	1.82	1.87
75	1.24	1.42	1.46	1.63	1.67
100	1.07	1.23	1.27	1.42	1.45
125	.96	1.10	1.13	1.27	1.30
150	.88	1.00	1.03	1.16	1.19
175	.81	.93	.96	1.07	1.10
200	.76	.87	.89	1.00	1.02
250	.68	.77	.80	.89	.92
300	.62	.71	.73	.82	.85
400	.54	.61	.63	.71	.73
500	.48	.55	.57	.63	.65
600	.44	.50	.52	.58	.59
700	.41	.46	.48	.53	.55
800	.38	.43	.45	.50	.51
900	.36	.41	.42	.47	.48
1000	.34	.39	.40	.45	.46
1200	.31	.36	.37	.41	.42
1400	.29	.33	.34	.38	.39
1600	.27	.31	.32	.35	.36
1800	.25	.29	.30	.33	.34
2000	.24	.27	.28	.32	.33

FERRANTI INSTRUMENT TRANSFORMERS

General

Instrument Transformers are used to reduce currents and voltages to such values that they can be measured conveniently and economically with standard ammeters and voltmeters. By their use all high voltage leads are kept away from the switchboard panels and the possibility of a dangerous shock to the operator is reduced.

Instrument Transformers are usually divided into two classes, known as Potential and Current Transformers. The primary winding of the potential transformer is connected in parallel with the circuit whose voltage is to be measured or controlled. The primary winding of the current transformer is connected in series with the circuit carrying the current to be measured or controlled.

All Ferranti Instrument Transformers are designed to meet the standard specifications of the Canadian Engineering Standards Association, the American Institute of Electrical Engineers and the National Electric Light Association, and are given a high potential, induced voltage, polarity and ratio test before leaving the factory.

TANKS

The transformer tanks are made of a rust-resisting copper-bearing sheet steel and are fitted with cast iron or steel plate covers. Where at all possible, the indoor type transformers are fitted with wall or pipe mountings. All outdoor transformers can be supplied with pole or platform mountings.

BUSHINGS

The bushings are made of wet process porcelain and are designed to withstand the stresses that may exist under operating conditions.

CAUTION

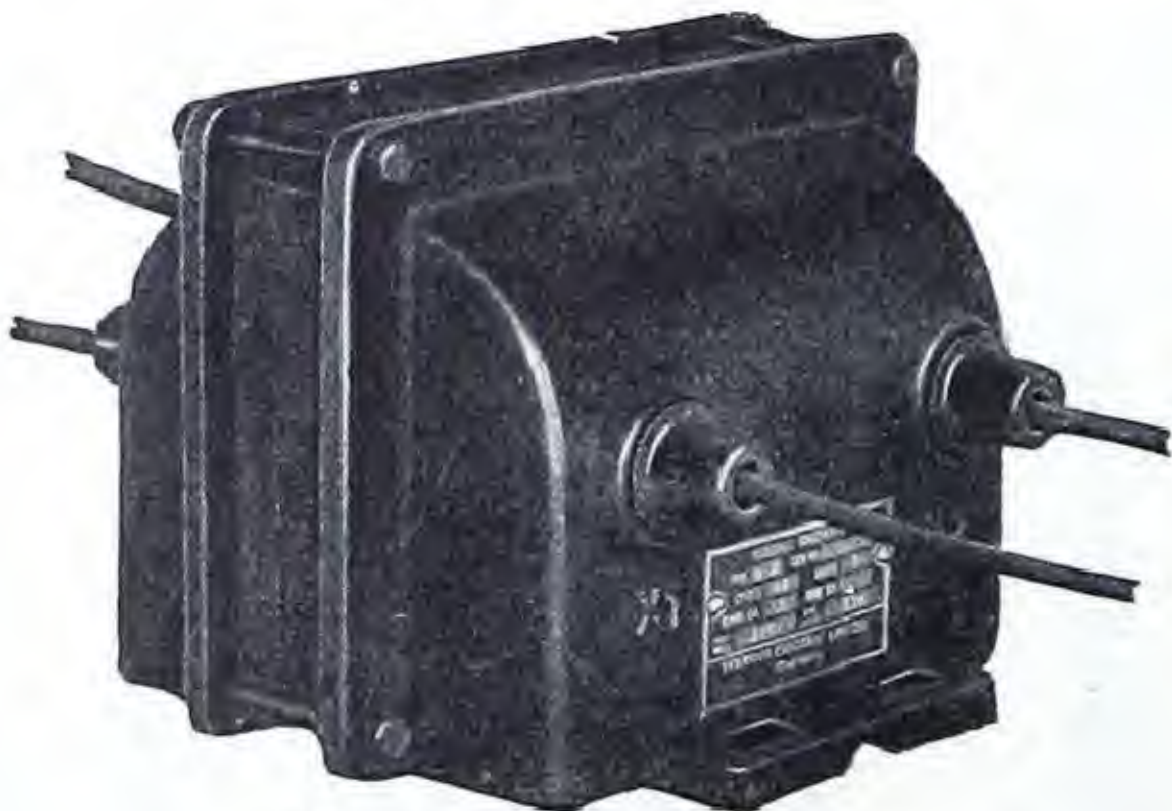
Potential transformers should never be short circuited.

Current transformers should never be operated with the secondary open circuited.

Failure to observe the above ruling may result in very serious damage to the transformer.

Types P2 and PA2

Dry Type Potential Transformers for indoor service
up to 2500 volts



Type P2-50 without fuses

All Ferranti potential transformers are completely enclosed. The coils are protected from injury by end plates which also serve as core clamps. In the model with fuses both high and low tension bushings are on the same side, so that there are no cross-over leads from the fuses to the transformer proper.

The bases of these transformers have been made suitable for wall or pipe mounting.

These types are suitable for connection on 2300 volt delta or 2300/4000Y volt three-phase four-wire star-connected lines. They are compensated at 50 per cent of nominal rating U.P.F.

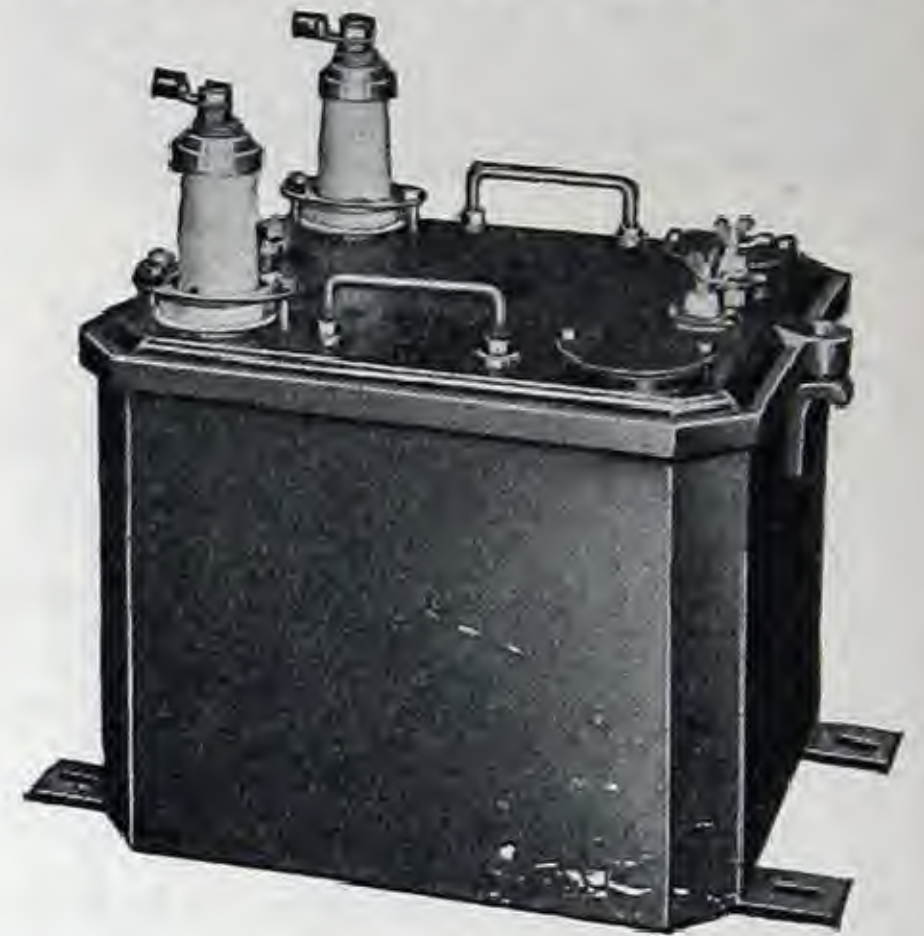
Prices on application.

FERRANTI INSTRUMENT TRANSFORMERS

Types PA4 and PA7 (Dry Type)
Types POA4 and POA7 (Oil-filled)
Type PA13 (Oil-filled)

25 AND 60 CYCLES

Potential Transformers for Indoor Service



The Type PA4 potential transformer is mounted in a steel case with welded seams, similar to the illustration except that it is rectangular. It is suitable for wall or platform mounting. Types PA7 and PA13 are similar in appearance but the bushings are suitable for the higher voltages. Types POA4 and POA7 are oil-filled but similar in appearance to the corresponding dry type transformers.

The Types PA4 and POA4 are suitable for connection on lines up to 4500 volts delta. For 4600/8000Y volt three-phase four-wire star-connected lines special transformers are used with the same prices and dimensions as the PA7 or POA7, whichever is desired. Types PA7 and POA7 are not suitable for use on 6600/11400Y volt three-phase four-wire, star-connected lines. Type PA13 is an oil-filled potential transformer for indoor service up to 15,000 volts and is rated 200 v.-a. capacity. These types are compensated at 100 v.-a. unity power factor. They can all be supplied with fuses if specified.

Types P22 and P27 Oil-filled Potential Transformers for indoor service—200 V.-A. Capacity



The Type P22 Potential Transformer is mounted in a steel tank with welded seams. This tank is rectangular in shape with rounded corners instead of octagonal as shown in the illustration. Also, a steel cover is used instead of a cast-iron cover, as shown. The Type P27 is similar in appearance except that it has larger bushings. Both types can be supplied with or without fuses and are suitable for platform mounting only. The fuses supplied are for mounting separately on the wall.

The Type P22 is suitable for use on lines up to 22000 volts delta, while Type P27 is suitable for use on lines up to 27000 volts delta.

Both types are compensated at 100 v.-a. unity power factor.

Prices on application.

INSTRUMENT TRANSFORMERS

Type PW2-50, PWA2-100, PWA2-200, PWA4 and PWA7 (25 and 60 cycles)

Compound-Filled Potential Transformers for Outdoor Service



Type PW2-50, PWA-100, PWA2-100 and PWA2-200

These transformers are supplied in a round steel tank. Welded covers are used. These transformers are furnished with hangers welded to the cases and they are suitable for pole mounting. The higher voltage units are similar in appearance, but the bushings are suitable for the voltage required. The high tension leads are brought out on the side opposite the pole.

Types PW2-50, PWA2-100 and PWA2-200 are suitable for connection on lines up to 2500 volts delta or on 2300/4000Y volt three-phase, four-wire, star-connected lines. Type PWA4 is suitable for connection on lines up to 4400 volts delta. For 4600/8000Y volt three-phase, four-wire, star-connected lines special transformers are used with prices and dimensions the same as for the Type PWA7. The Type PWA7 is suitable for connection on lines up to 7500 volts delta. For 6600/11000Y volt three-phase, four-wire, star-connected lines special transformers are used with prices and dimensions the same as the Type PWA13.

Types PWA13, PW22 and PW27

Oil-Filled Potential Transformers for Outdoor Service. 200 v.-a. Capacity

These transformers are supplied in welded steel tanks and are furnished with hanger straps welded on. Hangers can be supplied for pole mounting. As an alternative, the transformers can be furnished with straps on the bottom for hanging to the transformer for floor mounting.

The Type PWA13 transformers normally have the high tension leads brought out through bushings set in pockets on the side opposite the pole. If specified this type can be supplied with bushings through the cover for use in substations.

Types PW22 and PW27 are supplied in oval steel tanks with bolted steel covers. These types have the high tension leads brought out through the cover.

Outgoing leads are normally supplied on the secondary but if specified any of these types can be furnished with a conduit opening for the secondary leads.

The Type PWA13 potential transformer is suitable for connection on lines up to 15000 volts delta.

The Type PW22 is suitable for connection on lines up to 10000 volts delta and the Type PW27 for lines up to 27,000 volts delta.

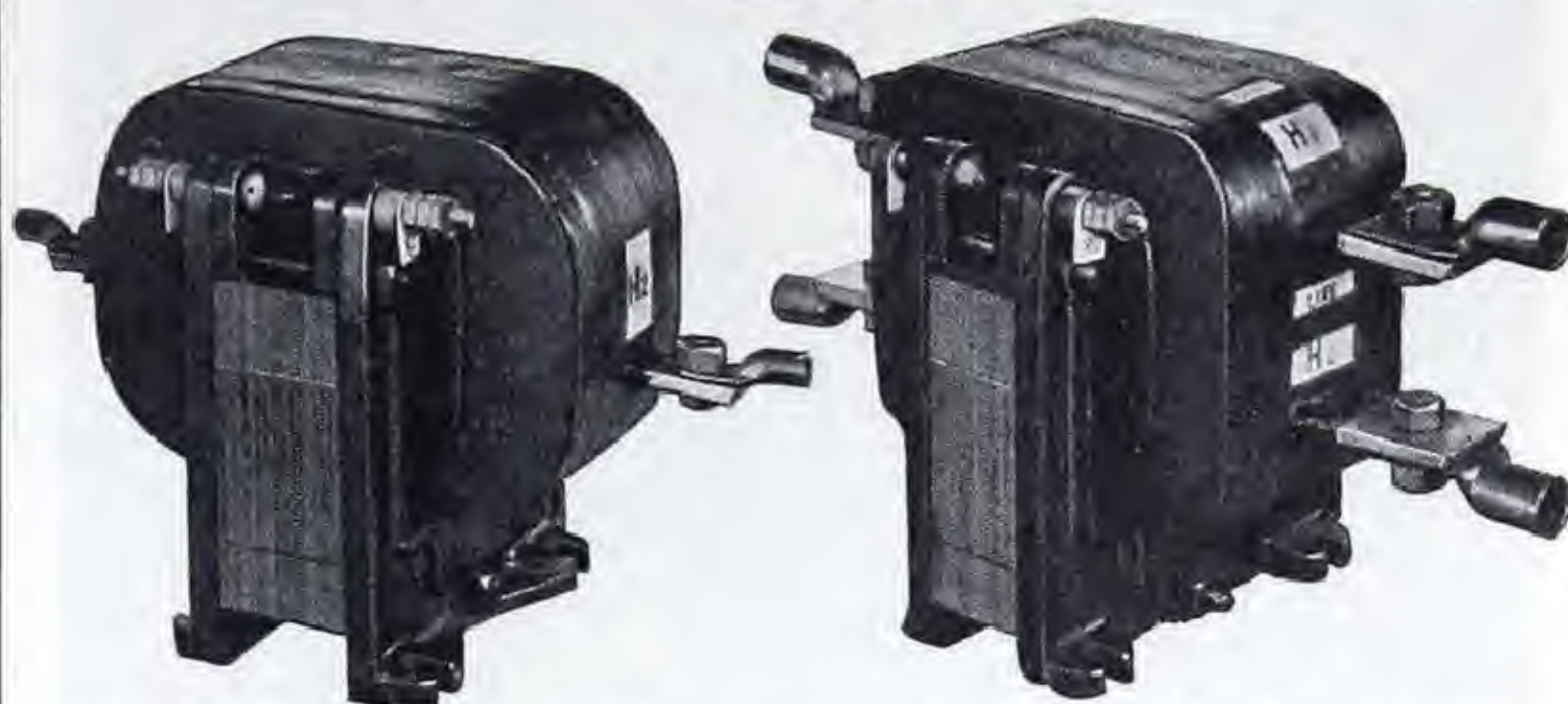
Prices on application.

FERRANTI

CURRENT TRANSFORMERS

Dry Type Current Transformers for indoor service up to 15000 volts

TYPE G-5



G-5 Single Ratio, 2-wire

G-5 Single Ratio, 3-wire

The Type G-5 Current Transformer is supplied with form-wound coils and with the laminations firmly secured with cast-iron clamps.

On the primary, the ends of the coil are soldered into substantial cast copper lugs which provide the outgoing terminals. These are mounted on the centre line of the transformer with the contact faces parallel to the mounting plane. This insures that both of the primary terminals will be in line. The secondary terminals are firmly secured to prevent them from turning when making connections.

This type can be supplied suitable for pipe mounting. It can be furnished for either single ratio two-wire or three-wire, or double ratio two-wire. The single ratio three-wire has the same dimensions as the double ratio two-wire.

Double wound secondaries can also be supplied, and prices, dimensions and characteristics will be sent on request.

Type GW5, GWA7 and GWA15

Single ratio compound-filled Current Transformers for Outdoor Service



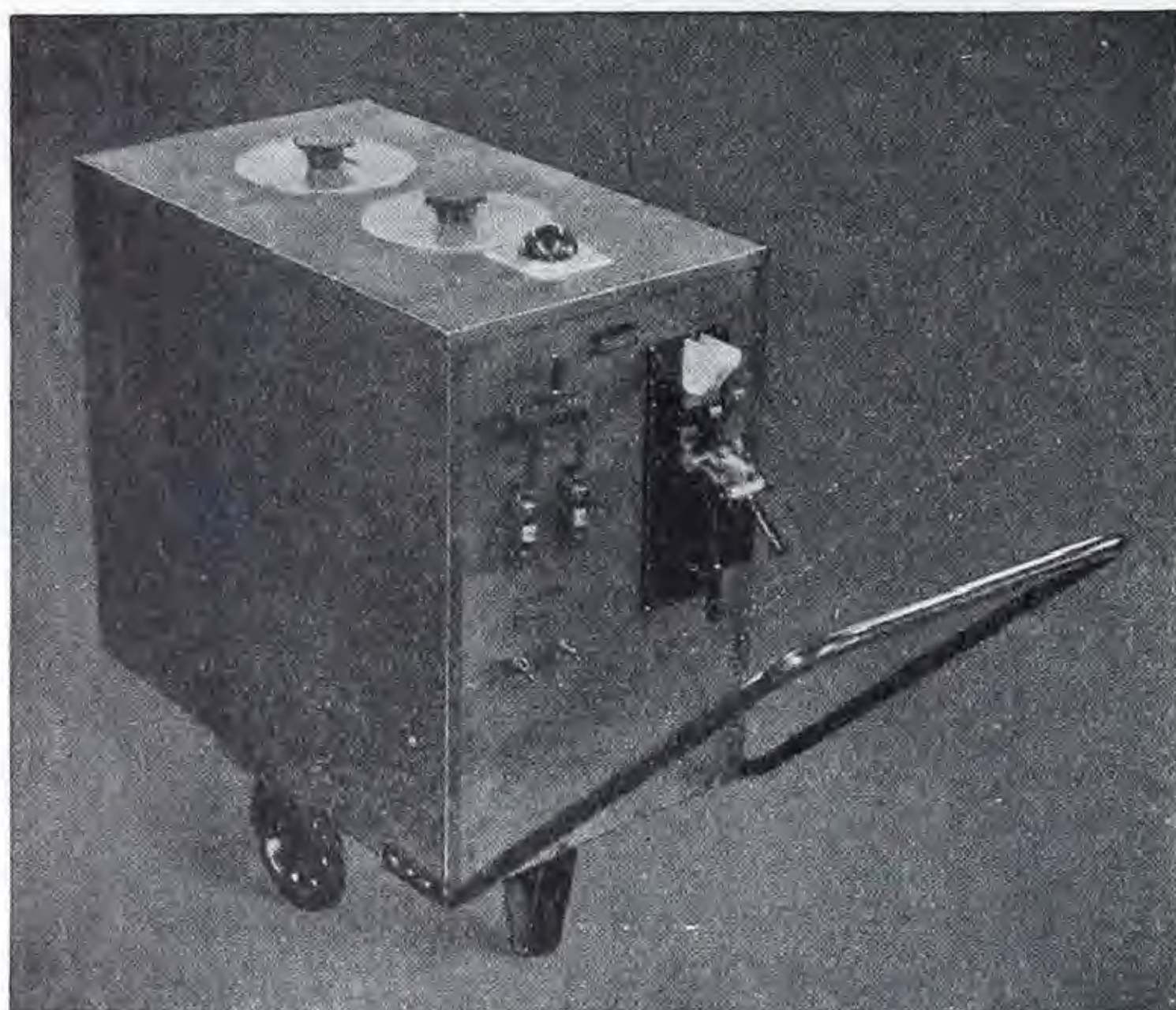
These types are supplied in a round steel case with a steel cover. The transformer is furnished with hangers welded to the case and is suitable for pole mounting. The high tension leads are brought out on the side opposite the pole.

The type GW5 Current Transformer is suitable for connection on 2300/4000Y volt three-phase four-wire star-connected lines and on delta lines up to 4400 volts. For 4600/8000Y volts three-phase four-wire star-connected lines the Type GWA7 Current Transformer is used. The Type GWA7 is also used on lines up to 7500 volts delta. For 6600/11400Y volt three-phase four-wire star-connected lines use Type GWA15.

The characteristic curves for the Type GW5 are the same as for the Type G5 Current Transformer. The characteristic curves for the Type GWA7 are the same as for the Type GA7 transformers.

Prices on application.

FERRANTI OUTDOOR METERING EQUIPMENTS



Outdoor Metering Equipment

Where service is being supplied to a power customer at 2300 volts and in other cases where it is desirable to meter on the high tension side of an outdoor substation, outdoor metering equipments can often be used to advantage.

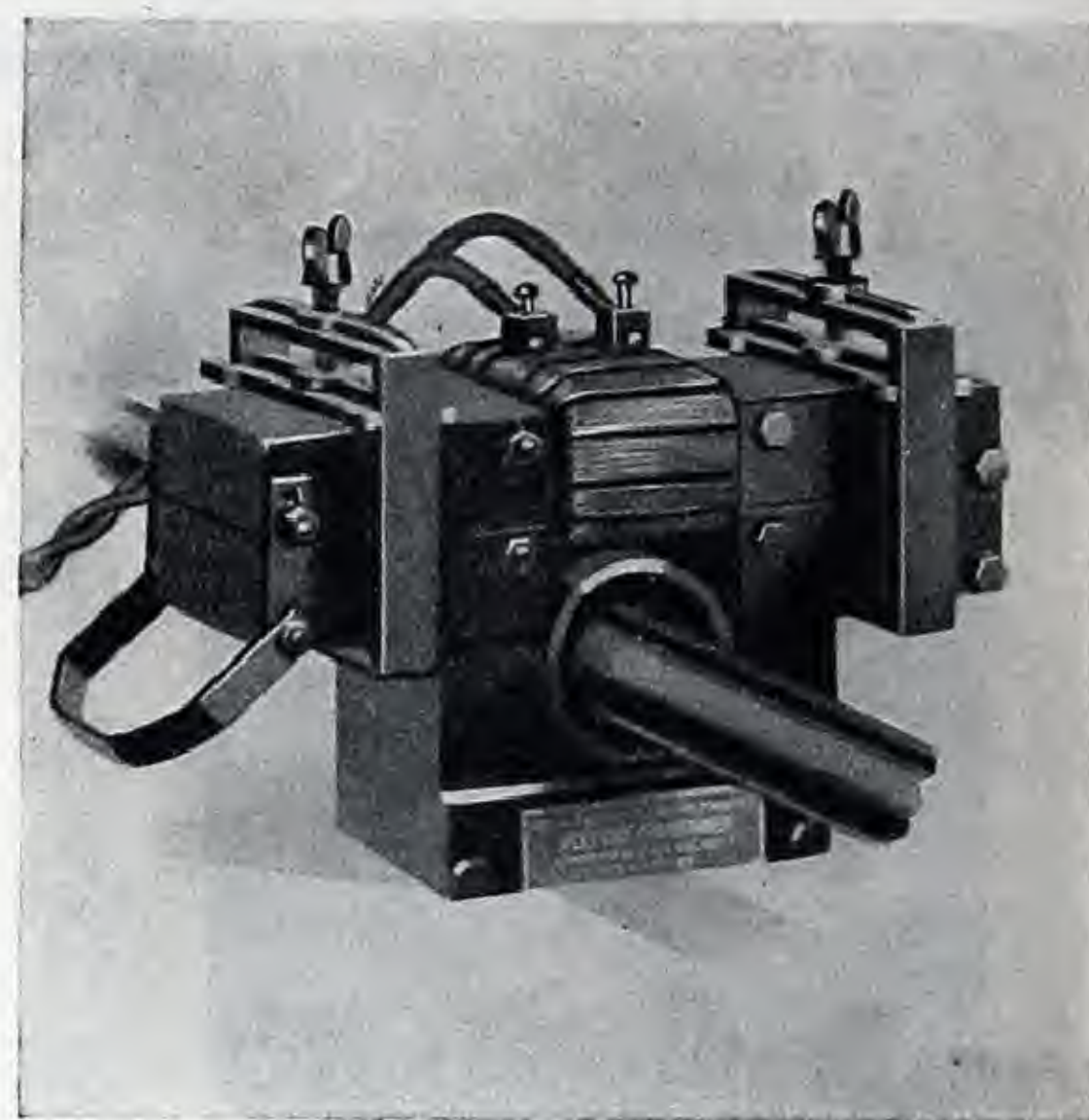
Ferranti outdoor metering equipments are available either for three-phase three-wire 2300 volt services, or three-phase four-wire 2300/4000Y volt, star-connected lines.

The three-phase, three-wire equipment consists of two current transformers and a three-phase, 50 volt-ampere potential transformer, all suitably mounted in one welded steel tank. The three-phase, four-wire 2300/4000Y metering equipment consists of three current transformers and two single-phase, 50 volt-ampere potential transformers in one tank. The primary leads are brought out on the side of the tank away from the pole and in the case of the three-phase, three-wire equipment there are five primary leads, while in the case of the three-phase, four-wire equipment there are seven primary leads. The secondary or instrument leads are brought out on the reverse side, that is, on the side next to the pole.

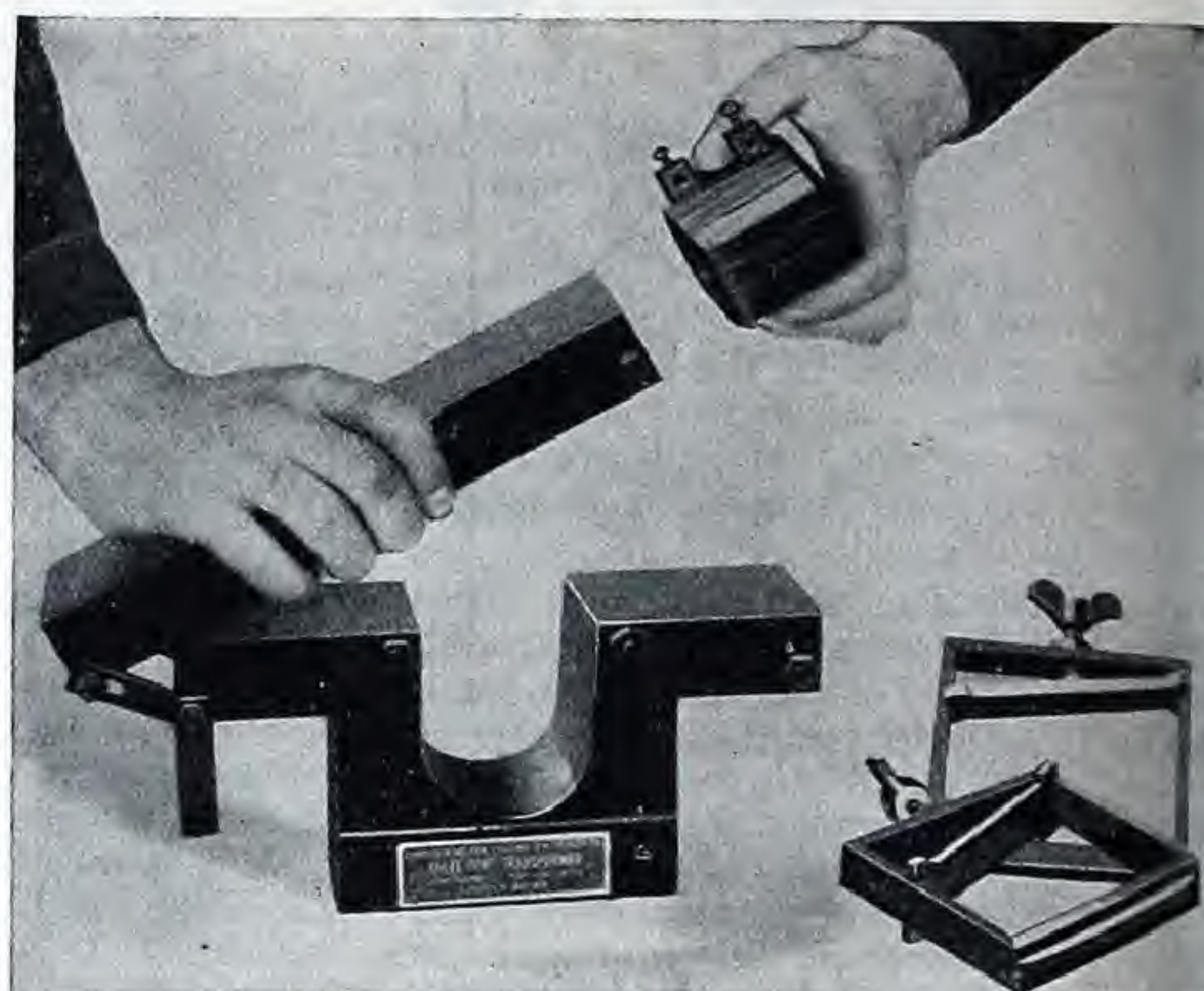
These equipments are normally supplied with a conduit entrance for the secondary or instrument leads. This conduit entrance is furnished on the side of the tank next to the pole. If specified, outgoing leads can be supplied on the secondary instead of the conduit entrance.

Prices on application.

LINCOLN SPLIT CORE TRANSFORMER AND DEMAND AMMETER For Transformer Testing



Lincoln Split Core Transformer



View showing how different coil ratios are obtained simply by slipping one coil off and another on.

A transformer too small for the load it carries is liable to burn out. If too large, your investment is too high; it causes a lowered power factor and increases your fixed charges. It is just as necessary that each phase carries its proper proportion of the total load.

It is not necessary to discontinue the service to run the test. It is not necessary to take readings at intervals during the test—one reading at the end of the run is all that is required.

This meter uses the well-known thermal principle, except that there are no potential coils. None are necessary, as it measures amperage and not kw. which burns out a transformer.

The load is integrated over the standard ten-minute period. During the time of test (over a period long enough to make certain the maximum demand has been reached) the fluctuating indicator (the red hand) shows the average amperes for the ten-minute period immediately previous to the time reading. The white indicator, which moves only to the right, shows the maximum load since the meter was last reset. If a continuous record of the demand is wanted, a graphic demand ammeter may be used.

Standard coil ratios available are 1000/5, 500/5, 250/5, 150/5 and 100/5.

Lincoln Split Core Transformer with one coil	List Price \$68.
Same with Demand Ammeter	96.
Additional Coils	5.

FERRANTI DISTRIBUTION TRANSFORMERS

Distribution Transformer Standards

Distribution Transformers include all capacities up to and including 200 kv-a. in voltages not exceeding 15,000. Standard frequencies are 25 and 60 cycles per second. For special capacities the 25 cycle prices cover those from 25 to 35 cycles, while, 60 cycle prices cover frequencies from 50 to 60 cycles.

Standard kv-a. ratings as given below are based on the transformers giving their rated kv-a. output continuously without exceeding 50°C rise, measured by rise of resistance. Transformer with a special heating guarantee of 40°C rise on full load continuous operation may be supplied at increased price. A standard transformer with 50°C rise on full load continuous operation, will carry 125% load for two hours immediately following continuous normal load with a safe temperature rise. A transformer guaranteed for 40°C rise on full load will carry a similar overload with a temperature rise not exceeding 55°C.

Standard sizes, voltage ratings and taps of transformers for the various system voltages are given below. The standard taps are reduced capacity, i.e., the capacity of the transformer on taps is reduced in proportion to the reduction in voltage of the tap used. Full capacity taps can be supplied at increased prices. Transformers with taps for Scott connection are higher in price than standard.

Distribution transformers will operate successfully on voltages 10% above or 5% below the rated voltage at normal

special high voltage ratings other than those given in the table below. The prices are the same as the following corresponding standard voltages:

Three-Phase Connected	Single-Phase Y-Connected	Use price of standard transformer of the following voltage class:
Voltage based on Transformer's maximum High Voltage Rating		
0—2800	400—4850	2300
1—4600	4851—8000	4600
1—8000	8001—12500	6900
1—12500		11000
1—15000		13200

Series-multiple arrangement is supplied without extra charge in the cases specified in the table below. Other series-multiple arrangements are charged at higher prices than standard.

Polarity of Ferranti Distribution Transformers is given in accordance with C.E.S.A. standards.

Tests:

Unfinished copies of test sheets of factory commercial tests (including heat run) are supplied free of charge on request. Witness tests are charged for extra.

Heat runs are made on a sufficient number of transformers of each design and rating to be sure that that transformer is within its guarantee, and further production of that transformer is then given commercial tests only. In the heat run the transformer is operated at rated kv-a. on full load until thermometer readings of cooling air and top winding temperatures indicate that a maximum temperature rise has been attained. These temperatures are determined by thermometer and by the rise of resistance method, and no provision is made to instant of shutdown. The high-voltage hot resistance is taken first, then the low-voltage hot resistance, and not more than four minutes is allowed to elapse from the instant of shutdown until the last readings have been taken. The highest rise, whether determined by thermometer or by rise of resistance method, is taken as the temperature of the transformer. For standard distribution transformers this is 50°C. In these tests the cooling air temperature must be lower than 10°C nor over 40°C, and it is assumed that the temperature rise is the same for all cooling air temperatures between these limits.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Ordinary commercial factory tests on each transformer include dielectric tests, induced voltage tests, core and copper losses, exciting current, impedance volts, polarity and ratio.

The dielectric test specified for the particular voltage rating is applied between the high voltage windings and the low voltage windings, the latter being connected to the core. A similar test at proper voltage is applied between the low voltage windings and the core. Each of these tests is applied for one minute and the r.m.s. value of the voltage applied is specified. The test is applied at a temperature in the windings of 60°C to 90°C. If the transformers are tested without oil, they may be tested at room temperature.

The induced voltage test is double voltage at suitable frequency applied for a period of 7200 cycles to test the insulation between turns and between the layers of the windings, and in no case is it applied for less than one minute.

The efficiency guarantees are based on losses, as measured by wattmeter and corrected to a reference temperature of 75°C in accordance with A.I.E.E. Standardization Rules.

STANDARD SIZES, VOLTAGE RATINGS AND TAPS OF TRANSFORMERS FOR THE VARIOUS SYSTEM VOLTAGES

For Supplying Service Voltages 600 and below						
Stand. Syst. Volt.	Stand. Sizes for each Voltage Class	Transformer High Voltage Ratings For Operation from Various Standard Voltage Systems	On Full Winding	Approximately on Taps	Transformer Low Voltage Ratings for Supp. Service Voltages 600 and Below	
440	3 to 100 incl.	440	420	400	380	110/220
		460	440	420	400	115/230
		480	458	436	414	120/240
575	3 to 100 incl.	550	525	500	475	110/220 or 220/440
		575	550	525	500	115/230 or 230/460
		600	575	550	525	120/240 or 240/480
2300	3 to 200 incl.	2200	2100	2000	1900	110/220 or 220/440 or 550
		2300	2200	2100	2000	115/230 or 230/460 or 575
		2400	2290	2180	2070	120/240 or 240/480 or 600
4600	3 to 200 incl.	4400	4200	4000	3800	110/220 or 220/440 or 550
		4600	4400	4200	4000	115/230 or 230/460 or 575
		4800	4580	4360	4140	120/240 or 240/480 or 600
6900	3 to 200 incl.	6600	6300	6000	5700	110/220 or 220/440 or 550
		6900	6600	6300	6000	115/230 or 230/460 or 575
		7200	6870	6540	6210	120/240 or 240/480 or 600
11000	5-10 to 200 incl.	11000	10500	10000	9500	110/220 or 220/440 or 550
		11500	11000	10500	10000	115/230 or 230/460 or 575
13200	5-10 to 200 incl.	13200	12600	12000	11400	110/220 or 220/440 or 550
		13800	13200	12600	12000	115/230 or 230/460 or 575



Ferranti Distribution Transformer standard 2300 volt 60 Cycle transformer 150 Kv-a supplied in the smaller sizes.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Transformer Oil

Oil is used in a transformer to:

- (1) give added insulation to the windings.
- (2) absorb and carry off heat.

The use of oil in a transformer gives added insulation between parts of the winding as well as from the windings to other parts such as the core and the case.

During the transformation of current in a transformer, losses are involved which result in considerable heating. This heat is carried by convection currents in the oil to the tank, which in turn radiates it to the atmosphere.

There are other cooling agents, but oil is recognized as an efficient and practical heat-conducting medium. The effectiveness is of course increased if the oil is cooled by means of the circulation of cold water through coils of seamless pipe immersed in the oil above the transformer coils; this is done in large power transformers to cut down the size and initial cost.

It is of great importance that the transformer oil shall be of the highest quality. There must be no suspended matter in the oil which might help to form a bridge over which the current can pass, resulting in damage to the transformer.

Water is one of the worst enemies, and even the most minute trace of moisture in the oil will lower its insulating value. Therefore, the transformer oil must be absolutely free from moisture.

The oil must not sludge in service. Sludging is usually caused by the oxidation of unsaturated hydro-carbons. When sludge starts forming it acts as a catalyzer in accelerating the formation of additional sludge. This results in over-heating which may eventually cause a breakdown of the fibrous insulations of the transformer.

Sulphur will corrode the exposed copper parts of the transformer and eventually cause trouble. Mineral acids are equally dangerous. Transformer oil should not contain free sulphur or mineral acids.

The specific gravity is a guide to the analyst in connection with the other physical tests.

The Saybolt universal viscosity test is given at 37.8°C, the standard A.S.T.M. temperature; this is approximately 10% higher than if taken at 40°C, which is a temperature often specified for transformer oils.

The flash test indicates the lowest temperature at which the vapor from an oil will ignite momentarily, but not continue to burn when an open flame or lighted taper is brought near its surface.

The pour test is the lowest temperature at which the oil will pour or flow, when it is chilled without disturbance under certain specified conditions.

The characteristics of the oil supplied with Ferranti transformers are as follows:

Specific gravity at 15.5°C or 60°F.....	.89
Viscosity at 37.8°C or 100°F.....	60/65 seconds
Flashing temperature.....	275°F
Burning point.....	315°F
Pour test.....	-40°F, -40°C
Dielectric test between 1/2" discs 0.1 inches apart.....	22 KV.
Color.....	1 1/2-2
Impurities.....	none

No deduction from the net price of the transformer is allowed for the omission of the oil. The oil is always shipped separately in the case of distribution transformers and not in the transformer tank, this prevents slopping of the oil in shipment. Because of the compound impregnation the windings do not have to be dried out after shipment, even though they have not been covered with oil.

Prices on application.

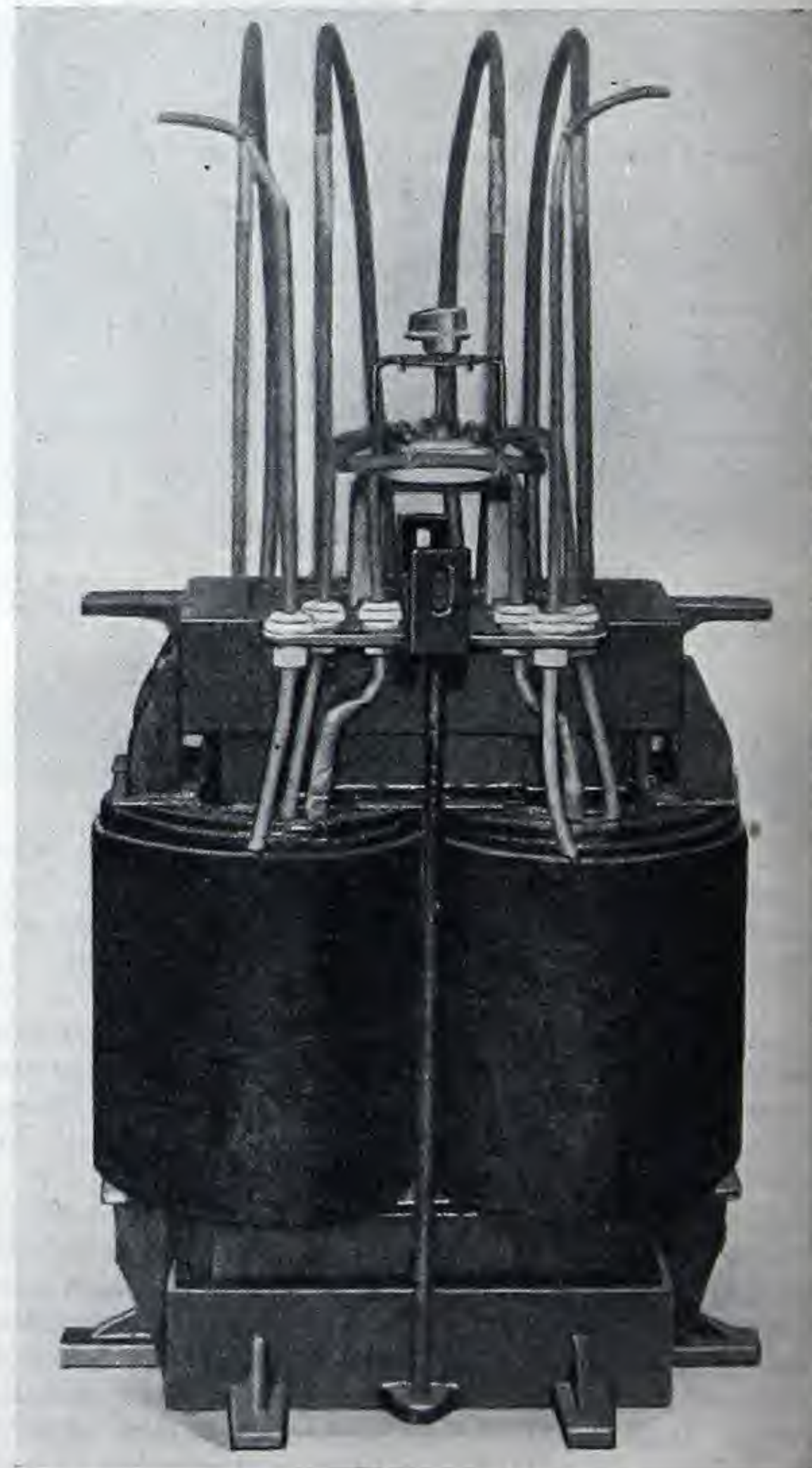
FERRANTI DISTRIBUTION TRANSFORMERS

Transformer Oil



Ferranti Distribution Transformer with the handhole open, showing the handle of the tapping switch.

The oil may be shipped in cans for transformers up to kv-a. 25 cycles and 25 kv-a. 60 cycles. In larger sizes or for a number of transformers the oil is usually shipped in return drums. The price includes the cost of the cans, and no charge is given for their return. The returnable drums are shipped separately and the full amount is credited on return of drums in good condition, within 180 days after original shipping date.



Core and coils of a Ferranti core-type distribution transformer

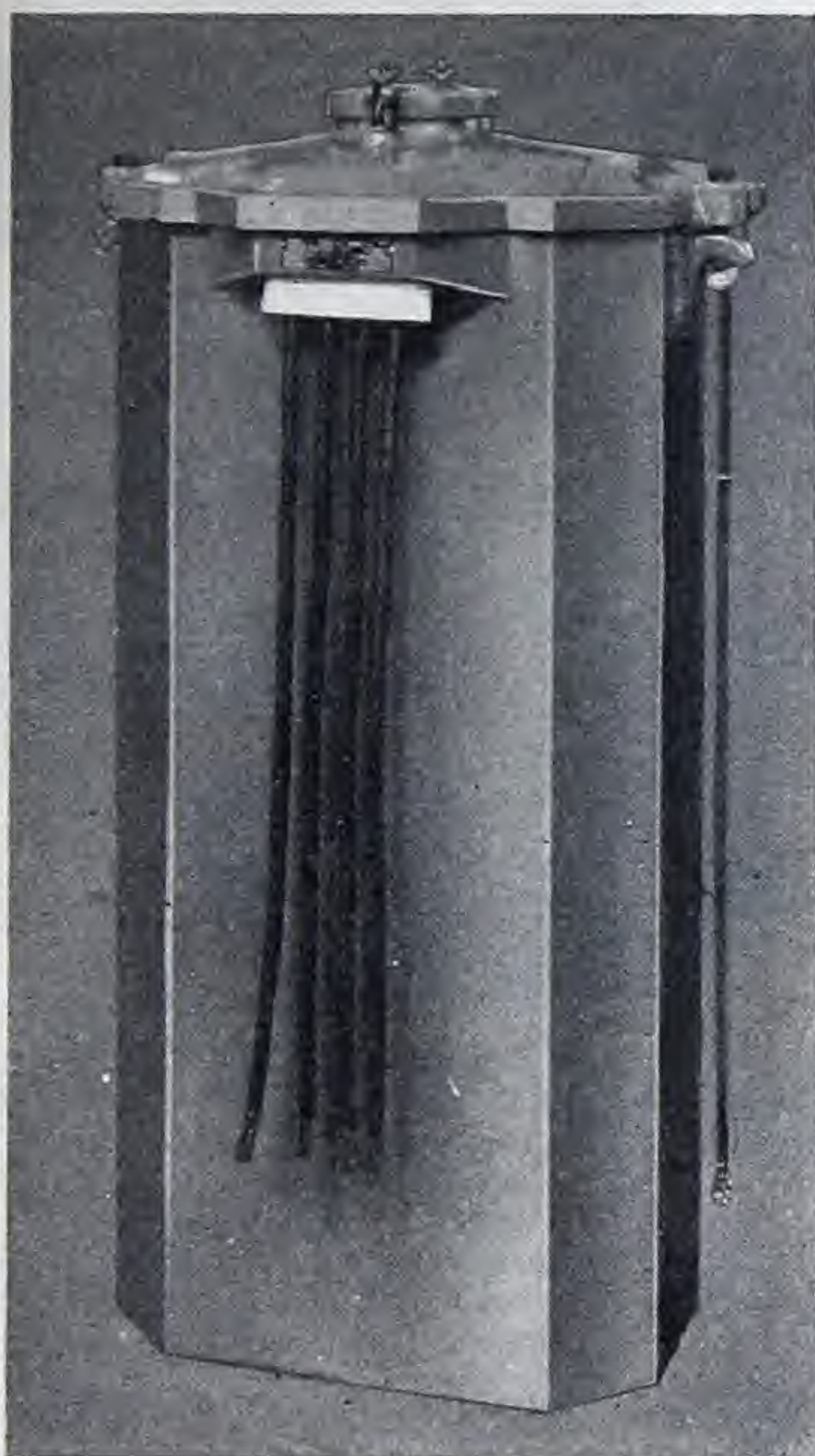
Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS

110/220 Volts 2200—110/220 Volts 2200—550 Volts
 115/230 Volts 2300—115/230 Volts 2300—575 Volts
 120/240 Volts 2400—120/240 Volts 2400—600 Volts
 25 and 60 Cycles



The illustration shows a 25 kv-a. 25 cycle standard 2300 volt Ferranti Distribution Transformer in an octagonal tank which is applied in this voltage in capacities above 37½ kv-a. 60 cycles and above 15 kv-a. 25 cycles; tubes are added for extra capacity in capacities above 25 kv-a. 60 cycles and above 15 kv-a. 25 cycles; round tanks are used in capacities up to and including 37½ kv-a. 60 cycles and 15 kv-a. 25 cycles.

Tap holes in the cover for tap-changing are not supplied on round tanks as the covers are small and light and can be handled. Hanger straps are welded to the back of the tank and hangers are regularly supplied unless otherwise specified in capacities up to and including 50 kv-a.

Tap-changers are reduced capacity. Insulation tests are made with transformer filled with oil and are as follows:

From high voltage coils to low voltage coils and core, 10,000 volts for one minute.

From low voltage coils to core, 4,000 volts for one minute.

Insulation voltage induced at suitable frequency.

Efficiencies are based on wattmeter copper loss at 75 degrees centigrade.

Transformers of this rating are suitable for connection on 2300 or 2400 volt delta lines or on three-phase four-wire Y-connected lines 2200/3800Y, 2300/4000Y or 2400/4000Y volts.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS

60 CYCLES

2200/2100/2000/1900—110/220 Volts
 2200/2100/2000/1900—550 Volts
 550/525/500/475—110/220 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	35	91	96.0	96.3	96.2	94.8	3.2	1.7
5	45	131	96.6	96.9	96.9	95.9	2.8	1.9
7½	58	176	96.9	97.2	97.3	96.4	2.5	2.1
10	70	230	97.1	97.4	97.5	96.7	2.4	2.4
15	95	306	97.4	97.7	97.7	97.0	2.2	2.6
25	140	470	97.6	97.9	97.9	97.3	2.0	3.0
37½	199	645	97.8	98.0	98.1	97.5	1.9	3.2
50	261	830	97.9	98.1	98.1	97.5	1.8	3.4
75	360	1150	98.0	98.2	98.2	97.7	1.7	3.6
100	473	1475	98.1	98.3	98.3	97.8	1.6	3.8
150	690	2130	98.1	98.3	98.3	97.8	1.6	3.9
200	900	2735	98.2	98.4	98.4	97.9	1.5	3.9

60 CYCLES

2300/2200/2100/2000—115/230 Volts
 2300/2200/2100/2000—575 Volts
 575/550/525/500—115/230 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	39	83	96.1	96.3	96.1	94.4	2.9	1.5
5	50	120	96.7	97.0	96.9	95.6	2.5	1.7
7½	64	161	97.1	97.3	97.3	96.2	2.4	1.9
10	78	200	97.3	97.5	97.5	96.5	2.1	2.2
15	105	280	97.5	97.7	97.7	96.8	2.0	2.4
25	155	430	97.7	97.9	97.9	97.2	1.9	2.7
37½	221	590	97.9	98.1	98.1	97.3	1.7	2.9
50	280	760	98.0	98.1	98.1	97.4	1.6	3.1
75	400	1050	98.1	98.3	98.2	97.6	1.5	3.3
100	525	1350	98.2	98.3	98.3	97.6	1.5	3.5
150	765	1950	98.2	98.3	98.3	97.6	1.4	3.6
200	1000	2500	98.3	98.4	98.4	97.7	1.4	3.6

60 CYCLES

2400/2290/2180/2070—120/240 Volts
 2400/2290/2180/2070—600 Volts
 600/575/550/525—120/240 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	45	76	96.1	96.2	95.8	93.7	2.7	1.4
5	57	110	96.8	96.9	96.7	95.2	2.3	1.6
7½	73	148	97.1	97.3	97.1	95.8	2.1	1.8
10	89	193	97.2	97.4	97.3	96.0	2.1	2.0
15	120	266	97.5	97.6	97.5	96.5	1.9	2.2
25	177	395	97.8	97.9	97.8	96.9	1.7	2.5
37½	252	542	97.9	98.0	97.9	97.0	1.6	2.7
50	320	700	98.0	98.1	98.0	97.2	1.5	2.9
75	456	965	98.1	98.2	98.1	97.3	1.4	3.0
100	598	1240	98.2	98.3	98.2	97.4	1.4	3.2
150	872	1790	98.2	98.3	98.2	97.4	1.3	3.3
200	1140	2300	98.3	98.4	98.3	97.5	1.3	3.3

Prices on application.

FERRANTI TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS

25 CYCLES

2200/2100/2000/1900—110/220 Volts

2200/2100/2000/1900—550 Volts

550/525/500/475—110/220 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	34	138	94.6	95.3	95.6	94.6	4.7	2.0
5	45	203	95.3	95.9	96.2	95.6	4.2	2.1
7½	58	272	95.8	96.4	96.7	96.2	3.8	2.3
10	70	339	96.1	96.7	97.0	96.5	3.5	2.6
15	92	475	96.4	96.9	97.2	96.8	3.3	2.9
25	135	710	96.7	97.2	97.5	97.2	3.0	3.1
37½	193	1010	96.9	97.3	97.6	97.3	2.9	3.3
50	248	1285	97.0	97.5	97.7	97.5	2.7	3.5
75	360	1860	97.1	97.6	97.8	97.5	2.6	3.7
100	495	2400	97.2	97.6	97.8	97.5	2.5	3.8
150	765	3280	97.4	97.7	97.9	97.4	2.3	4.4
200	1027	4150	97.5	97.8	97.9	97.4	2.2	4.4

25 CYCLES

2300/2200/2100/2000—115/230 Volts

2300/2200/2100/2000—575 Volts

575/550/525/500—115/230 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	38	126	94.8	95.4	95.5	94.2	4.3	1.8
5	50	186	95.5	96.1	96.2	95.3	3.9	1.9
7½	64	249	96.0	96.5	96.7	95.9	3.5	2.1
10	78	310	96.3	96.8	97.0	96.3	3.3	2.4
15	102	435	96.6	97.0	97.3	96.7	3.1	2.6
25	150	650	96.9	97.3	97.5	97.0	2.8	2.8
37½	215	920	97.1	97.4	97.6	97.1	2.6	3.0
50	275	1175	97.2	97.5	97.7	97.3	2.5	3.2
75	400	1700	97.3	97.6	97.8	97.4	2.4	3.4
100	550	2200	97.3	97.7	97.8	97.3	2.4	3.5
150	850	3000	97.5	97.8	97.9	97.3	2.2	4.0
200	1140	3800	97.6	97.8	97.9	97.3	2.1	4.0

25 CYCLES

2400/2290/2180/2070—120/240 Volts

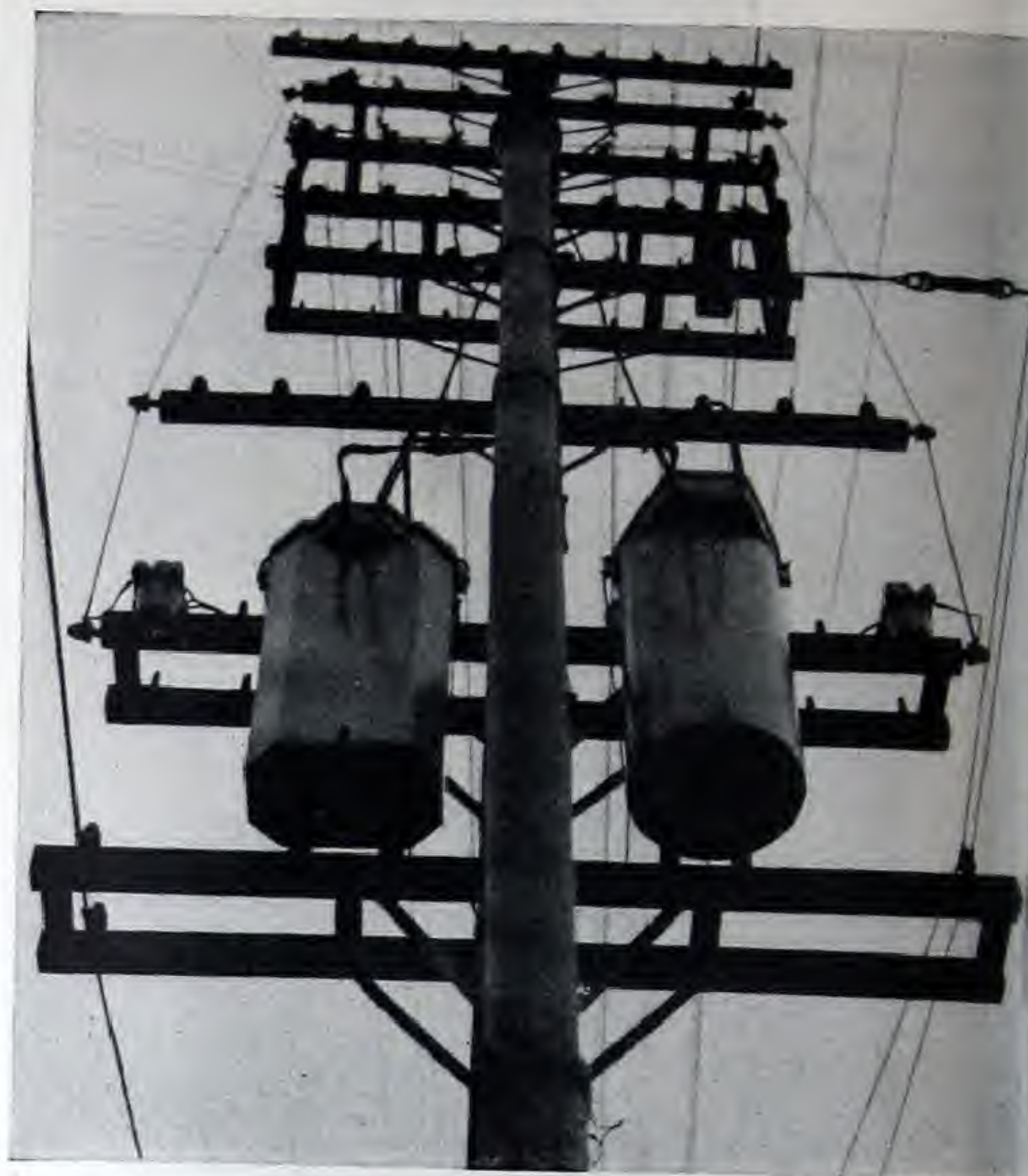
2400/2290/2180/2070—600 Volts

600/575/550/525—120/240 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies				% Regul. at 100% P.F.	% Reac. (app.)
			4/4	3/4	2/4	1/4		
3	43	116	95.0	95.4	95.4	93.7	4.0	1.7
5	57	171	95.6	96.1	96.1	94.8	3.6	1.8
7½	73	229	96.1	96.5	96.6	95.5	3.1	1.9
10	89	285	96.4	96.8	96.8	95.9	3.0	2.2
15	116	400	96.7	97.1	97.2	96.4	2.8	2.4
25	171	598	97.0	97.4	97.5	96.8	2.5	2.6
37½	245	842	97.2	97.5	97.6	96.9	2.4	2.8
50	314	1080	97.3	97.6	97.7	97.0	2.3	2.9
75	457	1560	97.4	97.7	97.7	97.1	2.2	3.1
100	628	2020	97.4	97.7	97.8	97.1	2.1	3.2
150	970	2750	97.6	97.8	97.8	97.1	2.0	3.7
200	1300	3490	97.7	97.9	97.9	97.0	1.9	3.7

Prices on application.

FERRANTI TRANSFORMERS



Prices on application.

FERRANTI

Ferranti Electric Limited is the Canadian branch of the world-famous British Company, Ferranti Ltd. of Hollinwood, established 1887. The large new factory at Mount Dennis, Toronto 9, is the most up-to-date plant in Canada and is fully equipped with manufacturing, testing, and research facilities. The Northern Electric Co. Limited sells the following Ferranti equipment throughout Canada:—

DISTRIBUTION TRANSFORMERS:

1. Dry type.
2. Oil-insulated, self-cooled.

POWER TRANSFORMERS:

1. Oil-insulated, self-cooled.
2. Oil-insulated, water-cooled.

TRANSFORMER ACCESSORIES:

1. Tapping switches.
2. Cable boxes.
3. Breathers.
4. Safe load indicators.

SURGE ABSORBERS:
for lightning protection.

MISCELLANEOUS TRANSFORMERS:

1. Portable testing equipments.
2. High voltage A.C. and D.C. testing equipments.
3. Oil testing equipments.

VOLTAGE REGULATORS:

1. Moving coil voltage regulators.
2. Automatic voltage boosters.
3. Automatic step-voltage boosters.

INSTRUMENT TRANSFORMERS:

1. Indoor and outdoor type potential transformers.
2. Indoor and outdoor type current transformers.
3. Outdoor metering equipments.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS



The illustration shows a 3 kv-a. 25 cycle standard 4600 volt Ferranti Distribution Transformer in a round tank which is supplied in this voltage in capacities up to and including 7½ kv-a. 60 cycles and 15 kv-a. 25 cycles. Octagonal tanks are used in the larger transformers and tubes are added for extra cooling in capacities above 25 kv-a.

Handholes in the cover are supplied in the octagonal tanks and hangers are regularly supplied unless otherwise instructed, in capacities up to and including 50 kv-a.

Transformers of this rating are supplied at the standard price with either single primary or series-multiple primary, but the taps available are different for each rating. All taps except the 2300 volt in the series-multiple) are reduced capacity.

Insulation tests are made with the transformer filled with oil and are as follows:

From high voltage coils to low voltage coils and core, 17,000 volts for one minute.

From low voltage coils to core, 4,000 volts for one minute.

Double voltage induced at suitable frequency.

Efficiencies are based on wattmeter copper loss at 75 degrees Centigrade.

Transformers of this rating are suitable for connection on 4600 volt delta lines, or on three-phase four-wire Y-connected lines 4600/8000Y volts.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS

60 CYCLES

4600/4395/4190/3985—115/230 Volts

4600/4395/4190/3985—575 Volts

4600/2300—115/230 Volts (with reduced capacity taps in primary for 4290/3980/1990 Volts).

KV-a.	Core Loss	Copper Loss	4/4	Efficiencies			Regul. at 100% P.F.	% Reac. (app.)
				3/4	2/4	1/4		
3	52	99	95.2	95.5	95.1	92.8	3.4	1.6
5	64	138	96.1	96.5	96.1	94.5	2.9	1.8
7½	79	180	96.6	96.8	96.7	95.4	2.6	2.0
10	94	222	96.9	97.2	97.1	95.9	2.4	2.4
15	123	290	97.3	97.5	97.4	96.3	2.1	2.6
25	178	435	97.6	97.8	97.7	96.8	1.9	2.8
37½	246	595	97.8	98.0	97.9	97.0	1.7	3.1
50	315	750	97.9	98.1	98.0	97.2	1.6	3.3
75	445	1075	98.0	98.2	98.1	97.3	1.6	3.5
100	590	1375	98.1	98.2	98.1	97.4	1.5	3.7
150	858	1950	98.2	98.3	98.2	97.4	1.4	3.8
200	1100	2550	98.2	98.3	98.2	97.5	1.4	3.8

25 CYCLES

4600/4395/4190/3985—115/230 Volts

4600/4395/4190/3985—575 Volts

4600/2300—115/230 Volts (with reduced capacity taps in primary for 4290/3980/1990 Volts).

KV-a.	Core Loss	Copper Loss	4/4	Efficiencies			Regul. at 100% P.F.	% Reac. (app.)
				3/4	2/4	1/4		
3	53	158	93.4	94.1	94.3	92.2	5.4	1.9
5	65	222	94.6	95.2	95.4	94.0	4.6	2.0
7½	80	290	95.3	95.9	96.0	95.0	4.0	2.2
10	97	355	95.7	96.2	96.2	95.5	3.7	2.5
15	129	480	96.1	96.6	96.7	95.9	3.4	2.8
25	180	700	96.6	97.0	97.2	96.5	3.0	3.0
37½	253	955	96.9	97.3	97.4	96.8	2.7	3.2
50	320	1210	97.0	97.4	97.6	96.9	2.6	3.4
75	460	1700	97.2	97.5	97.7	97.0	2.4	3.6
100	613	2150	97.3	97.6	97.7	97.1	2.3	3.8
150	920	3000	97.4	97.7	97.8	97.1	2.2	4.2
200	1220	3800	97.6	97.8	97.8	97.1	2.1	4.2

Prices on application.

Don't let lightning destroy your transformers.

Don't let lightning blow your fuses.

Don't let lightning interrupt your service.

Install Ferranti Surge Absorbers and smile.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS



The construction of the 6600 and 11,000 volt transformers is the same as the lower voltages except that the primary winding is divided into a larger number of coils. This limits the voltage impressed on individual coils and also the voltage between layers.

The illustration shows a 3 kv-a. standard 6600 volt Ferranti Distribution Transformer in a round tank, which is supplied in these voltages in capacities up to and including 25 kv-a. Tubes are added for extra cooling in capacities above 25 kv-a. Octagonal tanks are used in the larger transformers. The smallest 11,000 volt transformer standard rating is 5 kv-a.

Handholes are supplied in the cover in the octagonal tanks and unless otherwise instructed, hangers are regularly supplied in capacities up to and including 25 kv-a.

All taps are reduced capacity.

Insulation tests are made with the transformer filled with oil and are as follows:

From high voltage coils to low voltage coils and core, 25,000 volts for one minute.

From low voltage coils to core, 4,000 volts for one minute.

Double voltage induced at suitable frequency.

Efficiencies are based on wattmeter copper loss at 75 degrees Centigrade.

Transformers of the 6900 volt rating are suitable for connection on 6900 volt delta lines, or on three-phase four-wire Y-connected lines 6900/11,900Y volts.

Transformers of the 11,000 volt rating are suitable for connection on 11,000 volt delta lines. The high potential test for 11,000 volt transformers is 26,000 volts for one minute.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

Guarantees for Standard Distribution Transformers

60 CYCLES 6900/6600/6300/6000—115/230 Volts
6900/6600/6300/6000—575 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies			1/4	% Reg-ulation at 100% P.F.	% Re-actance (ap-prox.)
			4/4	3/4	2/4			
3	52	99	95.2	95.5	95.1	92.8	3.4	1.6
5	64	138	96.1	96.5	96.1	94.5	2.9	1.8
7½	79	180	96.6	96.8	96.7	95.4	2.6	2.0
10	94	222	96.9	97.2	97.1	95.9	2.4	2.4
15	123	290	97.3	97.5	97.4	96.3	2.1	2.6
25	178	435	97.6	97.8	97.7	96.8	1.9	2.8
37½	246	595	97.8	98.0	97.9	97.0	1.7	3.1
50	315	750	97.9	98.1	98.0	97.2	1.6	3.3
75	445	1075	98.0	98.2	98.1	97.3	1.6	3.5
100	590	1375	98.1	98.2	98.1	97.4	1.5	3.7
150	858	1950	98.2	98.3	98.2	97.4	1.4	3.8
200	1100	2550	98.2	98.3	98.2	97.5	1.4	3.8

60 CYCLES 11000/10500/10000/9500—110/220 Volts
11000/10500/10000/9500—550 Volts

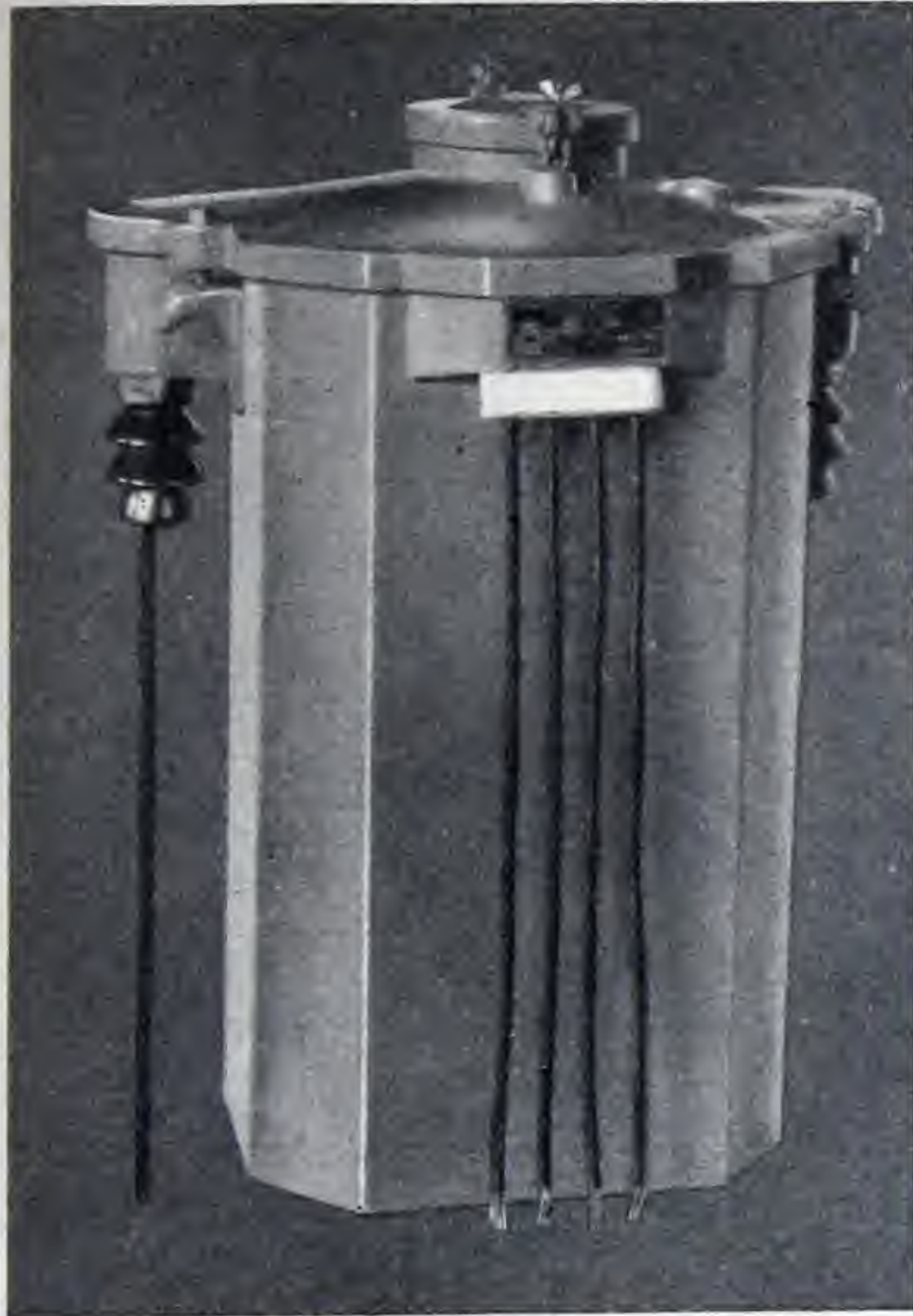
KV-a.	Core Loss	Copper Loss	Efficiencies			1/4	% Reg-ulation at 100% P.F.	% Re-actance (ap-prox.)
			4/4	3/4	2/4			
5	78	155	95.5	95.8	95.5	93.4	3.2	1.9
10	110	250	96.5	96.8	96.6	95.2	2.6	2.5
15	142	300	97.1	97.3	97.2	95.9	2.1	2.7
25	200	435	97.5	97.7	97.6	96.5	1.9	2.9
37½	270	600	97.7	97.9	97.8	96.8	1.8	3.2
50	350	750	97.8	98.0	97.9	96.9	1.6	3.5
75	490	1050	98.0	98.1	98.0	97.1	1.5	3.7
100	635	1360	98.1	98.1	98.1	97.2	1.5	3.8
150	920	2000	98.1	98.2	98.1	97.3	1.5	4.0
200	1200	2600	98.1	98.2	98.1	97.3	1.4	4.0

Prices on application.

FERRANTI TRANSFORMERS

Electrical Data

GUARANTEES FOR STANDARD DISTRIBUTION TRANSFORMERS



The construction of the 13,200 volt transformers is the same as the lower voltages except that the primary winding is divided into a larger number of coils. This limits the voltage impressed on individual coils and also the voltage between turns.

The illustration shows a 37½ kv-a. 60 cycle standard 13,200 volt Ferranti Distribution Transformer in an octagonal tank. A round tank is used in the small sizes, and tubes are welded to the octagonal tank in the large sizes for extra cooling. Handholes in the cover are supplied in the octagonal tanks and ladders are regularly supplied unless otherwise instructed, for capacities up to and including 25 kv-a.

All taps are reduced capacity.

Insulation tests are made with the transformer filled with oil and are as follows:

From high voltage coils to low voltage coils and core, 4000 volts for one minute.

From low voltage coils to core, 4000 volts for one minute.

Double voltage induced at suitable frequency.

Efficiencies are based on wattmeter copper loss at 75 degrees centigrade.

Transformers of this rating are suitable for connection on 13,200 volt delta circuits.

Prices on application.

FERRANTI TRANSFORMERS

Electrical Data

Guarantees for Standard Distribution Transformers

60 CYCLE 13200/12600/12000/11400—110/220 Volts
13200/12600/12000/11400—550 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies			1/4	% Reg-ulation at 100% P.F.	% Re-actance (approx.)
			4/4	3/4	2/4			
5	78	155	95.5	95.8	95.5	93.4	3.2	1.9
10	110	250	96.5	96.8	96.6	95.2	2.6	2.5
15	142	300	97.1	97.3	97.2	95.9	2.1	2.7
25	200	435	97.5	97.7	97.6	96.5	1.9	2.9
37½	270	600	97.7	97.9	97.8	96.8	1.8	3.2
50	350	750	97.8	98.0	97.9	96.9	1.6	3.5
75	490	1050	98.0	98.1	98.0	97.1	1.5	3.7
100	635	1360	98.1	98.1	98.1	97.2	1.5	3.8
150	920	2000	98.1	98.2	98.1	97.3	1.5	4.0
200	1200	2600	98.1	98.2	98.1	97.3	1.4	4.0

25 CYCLE 13200/12600/12000/11400—110/220 Volts
13200/12600/12000/11400—550 Volts

KV-a.	Core Loss	Copper Loss	Efficiencies			1/4	% Reg-ulation at 100% P.F.	% Re-actance (approx.)
			4/4	3/4	2/4			
5	80	275	93.2	94.0	94.5	93.8	5.6	2.1
10	115	400	95.1	95.7	95.8	94.7	4.1	2.6
15	147	525	95.7	96.2	96.4	95.4	3.6	2.9
25	210	750	96.3	96.7	96.9	96.0	3.1	3.1
37½	290	990	96.7	97.1	97.2	96.4	2.8	3.3
50	365	1250	96.9	97.2	97.3	96.6	2.6	3.5
75	520	1700	97.1	97.4	97.5	96.8	2.4	3.6
100	675	2150	97.3	97.5	97.6	96.9	2.3	3.8
150	990	3000	97.4	97.7	97.7	97.0	2.2	4.4
200	1300	3800	97.5	97.8	97.8	97.0	2.1	4.4

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Electrical Data

Dimensions for Standard O.I.S.C. Distribution Transformers
25 and 60 Cycles Single-Phase

Small and Medium Sized Transformers

550—110/220 Volts

575—115/230 Volts

600—120/240 Volts

4600—115/230 Volts

4600—575 Volts

4600/2300—115/230 Volts

2200—110/220 Volts

2300—115/230 Volts

2400—120/240 Volts

6900—115/230 Volts

6900—575 Volts

(11000 Volt transformers have same dimensions as 13200 Volts).

2200—550 Volts

2300—575 Volts

2400—600 Volts

13200—110/220 Volts

13200—550 Volts

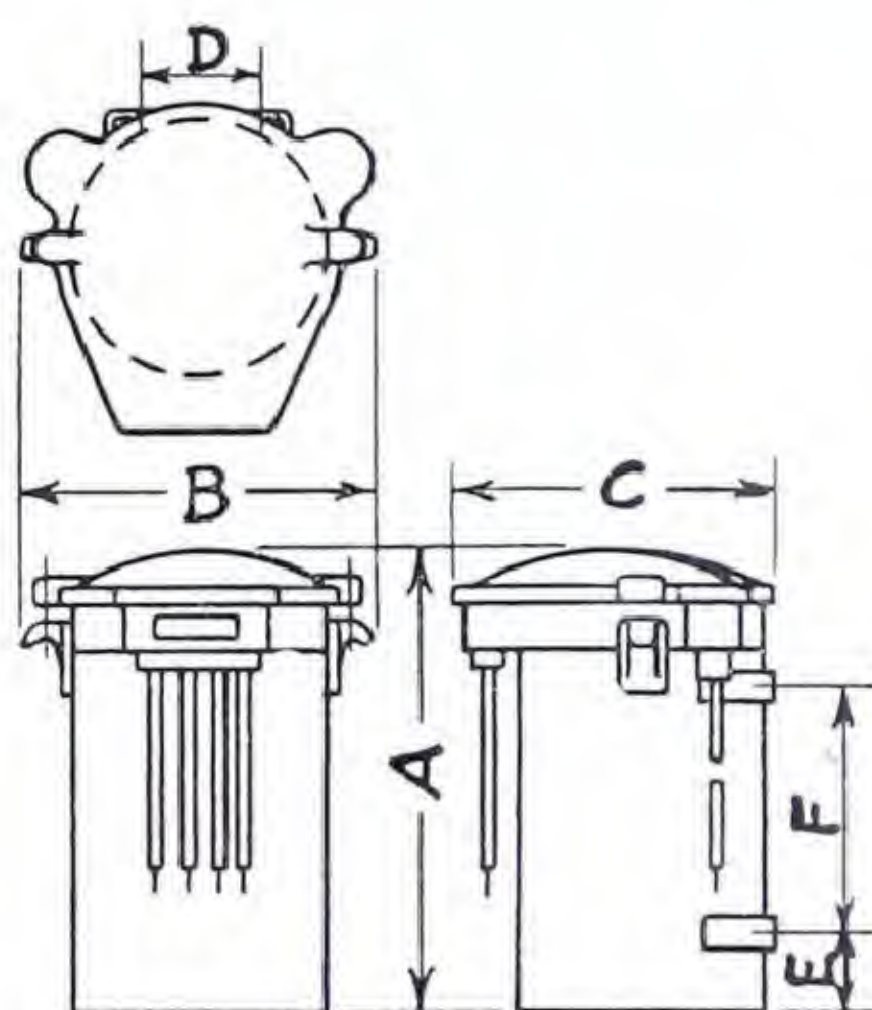


Fig. 1

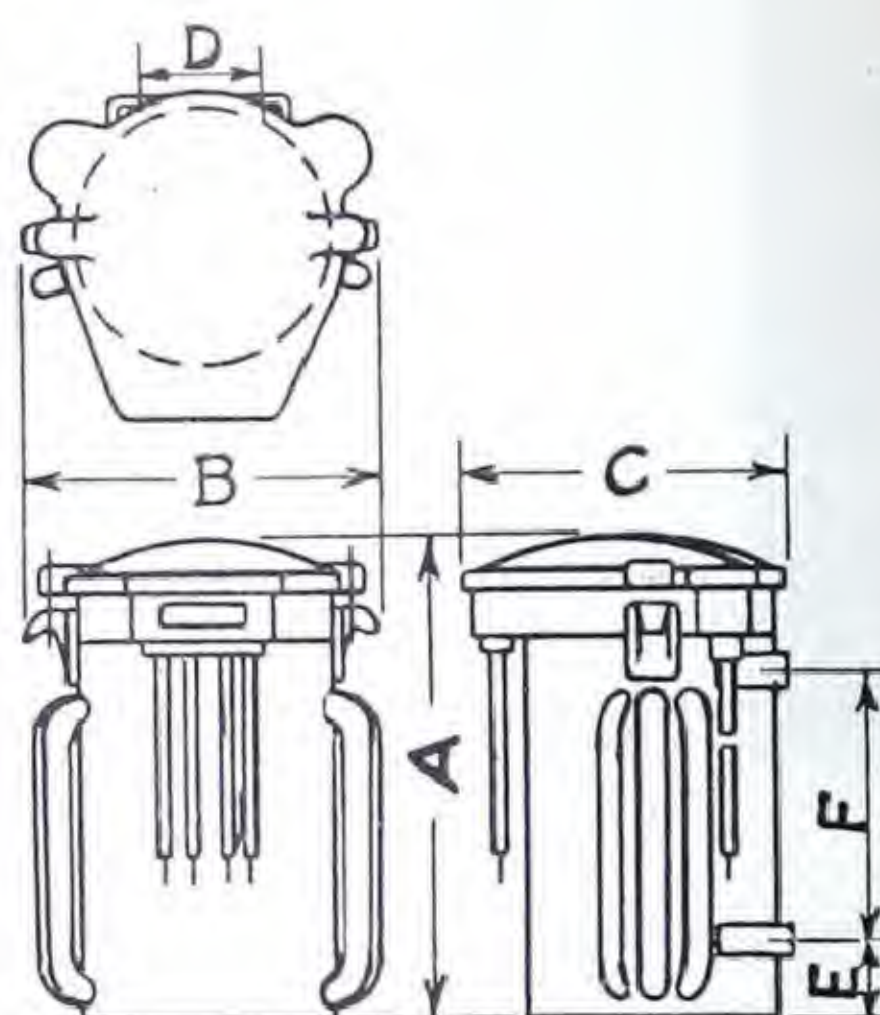


Fig. 2

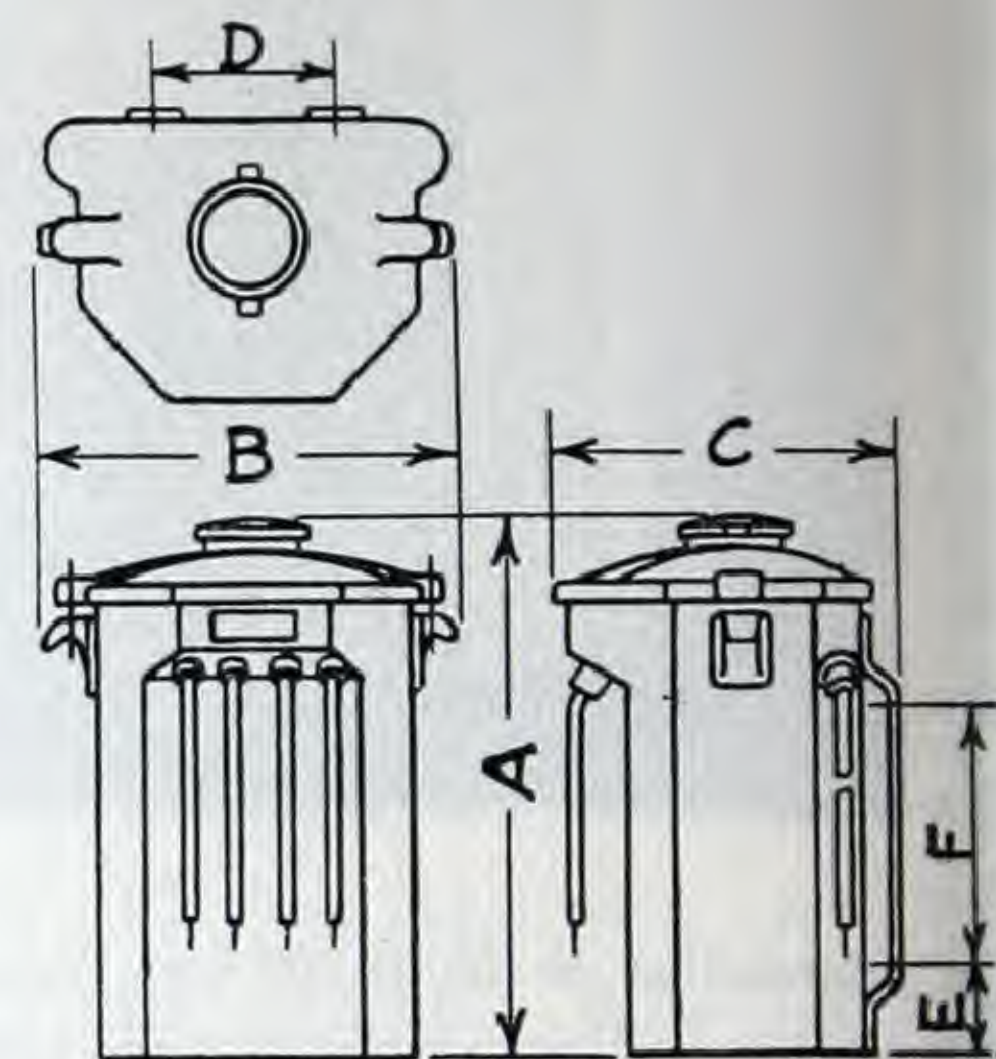


Fig. 3

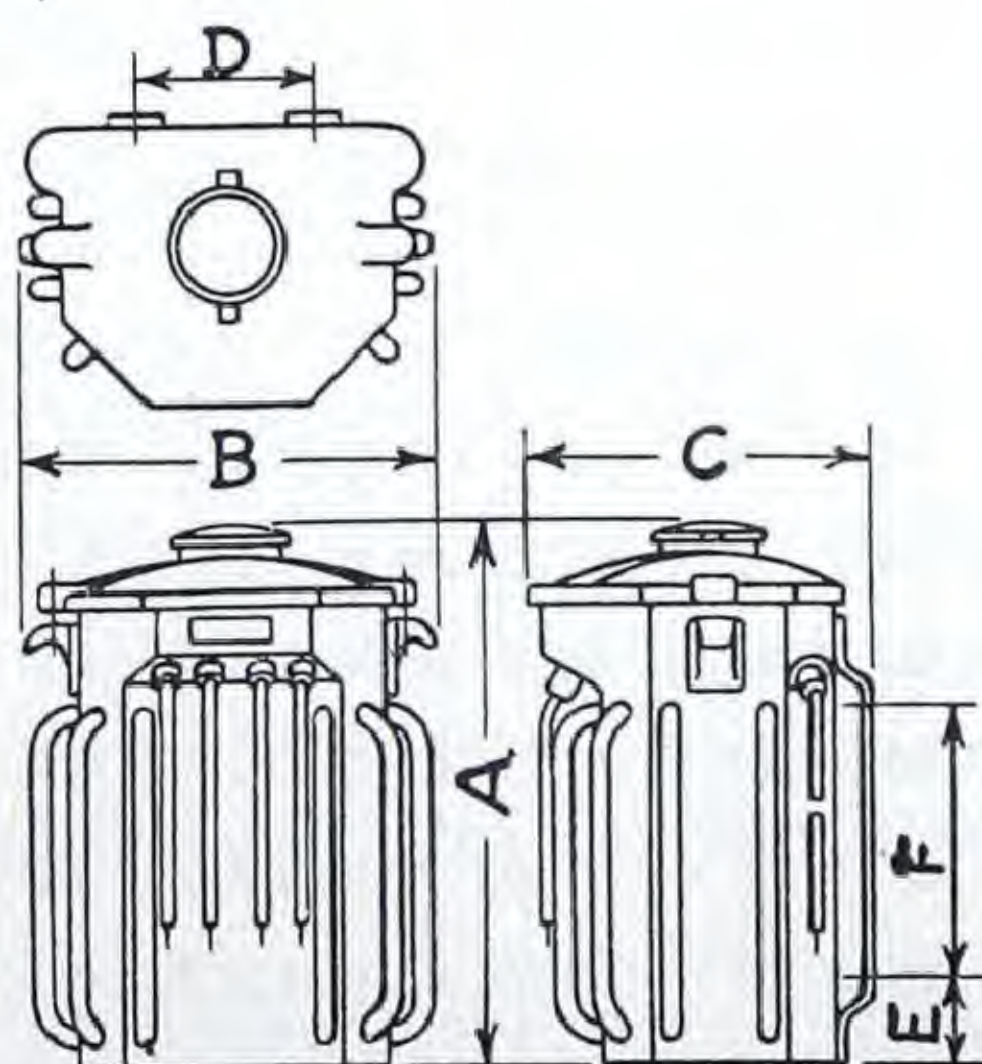


Fig. 4

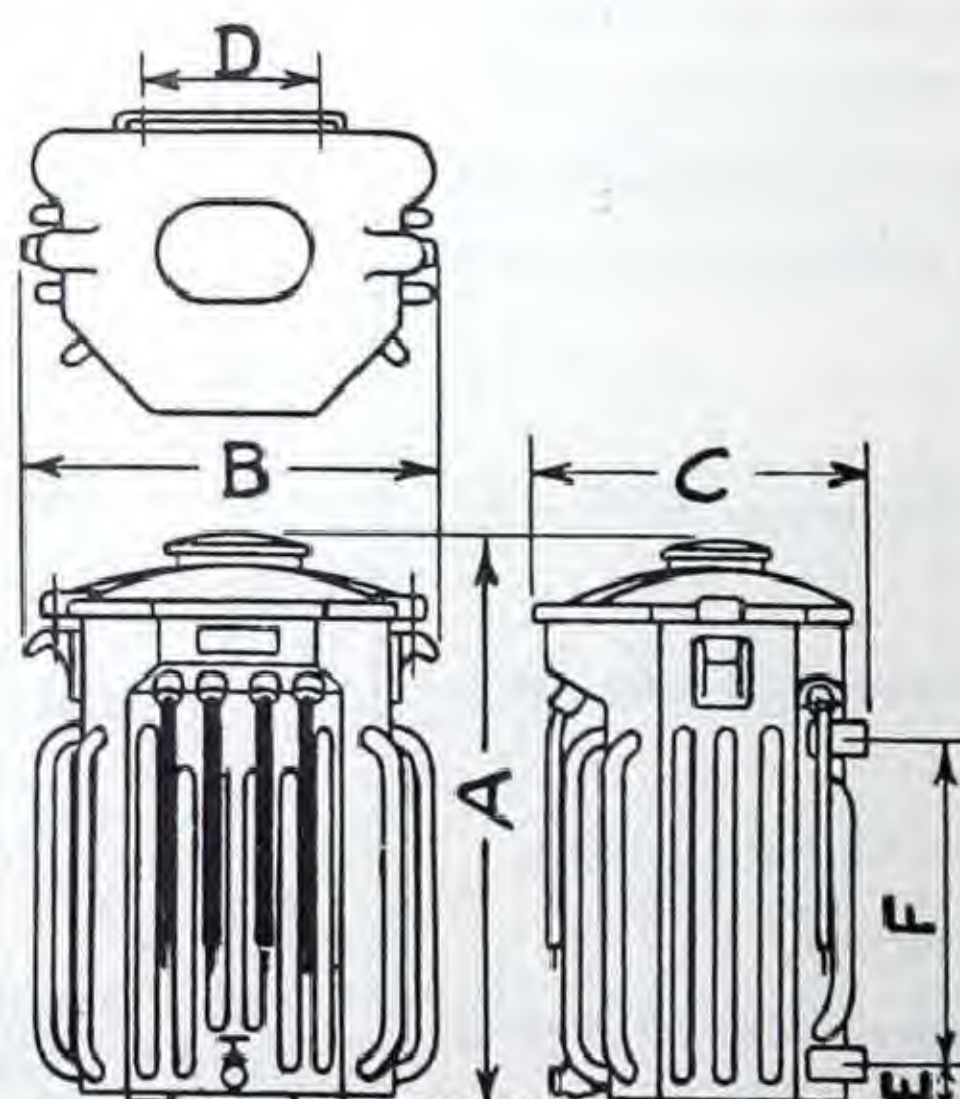
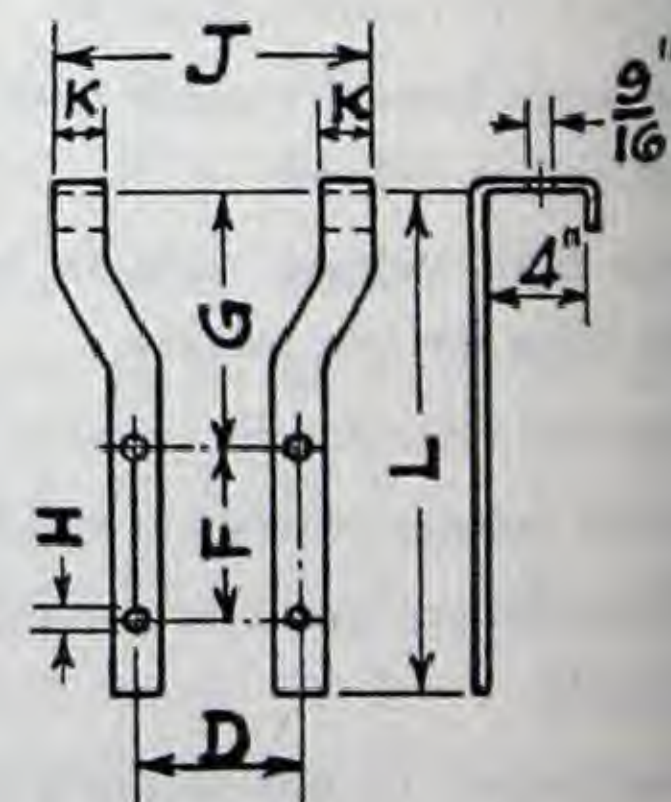


Fig. 5



Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Dimensions for Standard O.I.S.C. Distribution Transformers

SINGLE-PHASE—SMALL AND MEDIUM CAPACITIES

2300—4600—6900—13200 Volts

25 and 60 Cycles

	Kv-a.	Fig. No.	Dimension in Inches								Hangers	K	L	Gal. of Oil	Wgt. of Oil	Approx. Total Weight
			Transformer	Tank												
			A	B	C	D	E	F	G	H	J					
60 Cycles	3	1	22	15½	14½	6½	3¾	11¼	10	11/16	12½	2	24½	4½	40	210
	5	1	23⅛	15½	14½	6½	3¾	12⅜	10	11/16	12½	2	25⅝	5	44	275
	7½	1	23¾	16¾	15¾	6½	4	12½	10¼	11/16	12½	2	26¼	6	53	325
	10	1	28	16¾	15¾	6½	4	16¾	10¼	11/16	12½	2	30½	7	62	450
	15	1	33¾	19	17¾	7½	5¼	20¼	11¼	11/16	13½	2	36¼	12½	111	550
	25	1	40¼	25	21¼	10	5¼	26¾	11¼	11/16	17½	2½	42¾	23	205	750
60 Cycles	37½	2	43¼	25	21¼	10	5¼	29¾	11¼	11/16	17½	2½	45¾	24½	218	1100
	50	4	51¾	29½	22½	12	6	32¾	16	13/16	21	3	54¼	42	374	1400
25 Cycles	3	1	27¾	19	17¾	7½	5¼	14¼	11¼	11/16	13½	2	30¼	8½	75	350
	5	1	30¼	19	17¾	7½	5¼	16¾	11¼	11/16	13½	2	32¾	9½	84	450
	7½	1	31½	22¼	19¼	9½	5¼	18	11¼	11/16	15½	2	34	11½	102	500
	10	1	32¾	22¼	19¼	9½	5¼	19¼	11¼	11/16	15½	2	35¼	11	98	600
	15	1	36¼	25	21¼	10	5¼	22¾	11¼	11/16	17½	2½	38¾	16½	147	850
	25	3	50¼	27½	20	11	6	31¼	16	11/16	20	3	52¾	29	258	1200
25 Cycles	37½	4	51¾	29½	22½	12	6	32¾	16	13/16	21	3	54¼	38	338	1600
	50	5	59	29½	22½	12	6½	39	16½	13/16	21	3	61½	48½	432	2000
60 Cycles	3	1	27¼	17½	15¾	6½	4	16	10¼	11/16	12½	2	29¾	6	53	210
	5	1	29½	17½	15¾	6½	4	18¼	10¼	11/16	12½	2	32	6½	58	275
	7½	1	32	19¼	17¾	7½	5¼	18½	11¼	11/16	13½	2	34½	11	98	325
	10	1	33¾	19¼	17¾	7½	5¼	20¼	11¼	11/16	13½	2	36¼	11	98	450
	15	1	36¼	23⅜	19¼	9½	5¼	22¾	11¼	11/16	15½	2	38¾	14	125	550
	25	1	41	25	21¼	10	5¼	27½	11¼	11/16	17½	2½	43½	19	169	750
60 Cycles	37½	2	44	25	21¼	10	5¼	30½	11¼	11/16	17½	2½	46½	23½	209	1100
	50	4	52½	29½	22½	12	6	33½	16	13/16	21	3	55	40	356	1400
25 Cycles	3	1	32¼	19¼	17¾	7½	5¼	18¾	11¼	11/16	13½	2	34¾	10½	93	350
	5	1	35	23⅜	19¼	9½	5¼	21½	11¼	11/16	15½	2	37½	13	116	450
	7½	1	36½	23⅜	19¼	9½	5¼	23	11¼	11/16	15½	2	39	13	116	500
	10	1	38	23⅜	19¼	9½	5¼	24½	11¼	11/16	15½	2	40½	13½	120	600
	15	1	43	25	21¼	10	5¼	29½	11¼	11/16	17½	2½	45½	21	187	850
	25	3	52½	29½	22½	12	6	33½	16	13/16	21	3	55	36	320	1200
25 Cycles	37½	4	52½	29½	22½	12	6	33½	16	13/16	21	3	55	38	338	1600
	50	5	60¼	29½	22½	12	6½	39¼	17½	13/16	21	3	62¾	48½	432	2000
60 Cycles	3	1	27¾	18¾	15¾	6½	4	16½	10¼	11/16	12½	2	30¼	6	53	300
	5	1	29⅛	20¾	17¾	7½	5¼	15⅝	11¼	11/16	13½	2	31⅝	9½	84	375
	7½	1	30¾	20¾	17¾	7½	5¼	17¼	11¼	11/16	13½	2	32¾	9½	84	430
	10	1	33¼	23½	19¼	9½	5¼	19¾	11¼	11/16	15½	2	35¾	13	116	580
	15	1	37¾	23½	19¼	9½	5¼	24¼	11¼	11/16	15½	2	40¼	17½	156	700
	25	1	45	25	21¼	10	5¼	31½	11¼	11/16	17½	2½	47½	21	187	950
60 Cycles	37½	3	51¾	32	22¼	12	6	32¾	16	13/16	21	3	54¼	28¼	254	1350
	50	4	53¾	32	22¼	12	6	34¾	16	13/16	21	3	56¼	39	347	1700
60 Cycle	5	1	33⅞	21¼	17¾	7½	5¼	20⅛	11½	11/16	13½	2	36⅜	12	107	475
	10	1	36½	23½	19¼	9½	5¼	22¾	11½	11/16	15½	2	39	15	133	700
	15	1	40	23½	19¼	9½	5¼	26¼	11½	11/16	15½	2	42½	19½	173	830
	25	1	46¼	25	21¼	10	5¼	32½	11½	11/16	17½	2½	48¾	24	214	1140
	37½	3	52⅜	32	22½	12	6	33⅜	16	13/16	21	3	54⅞	32	285	1150
	50	4	54⅜	32	22½	12	6	35⅜	16	13/16	21	3	56⅞	39	347	1900
25 Cycle	5	1	34	23½	19¼	9½	5¼	20¼	11½	11/16	15½	2	36½	12½	111	670
	10	1	37	25	21¼	10	5¼	23¼	11½	11/16	17½	2½	39½	16	142½	1030
	15	3	43¼	30	20	11	6	24¼	16	11/16	20	3	45¾	21	187	1330
	25	4	54⅜	32	22½	12	6	35⅜	16	13/16	21	3	56⅞	36	320	1740
	37½	4	54⅜	32	22½	12	6	35⅜	16	13/16	21	3	56⅞	38	338	2150
	50	5	62¼	32	22½	12	6½	41¼	17½	13/16	21	3	64¾	52	463	2820

Dimensions and weights are approximate—not to be worked to.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Dimensions for Standard O.I.S.C.
Distribution Transformers

Single Phase, Larger Capacities
2300, 4600, 6900, 13200 Volts, 25 and 60 Cycles.

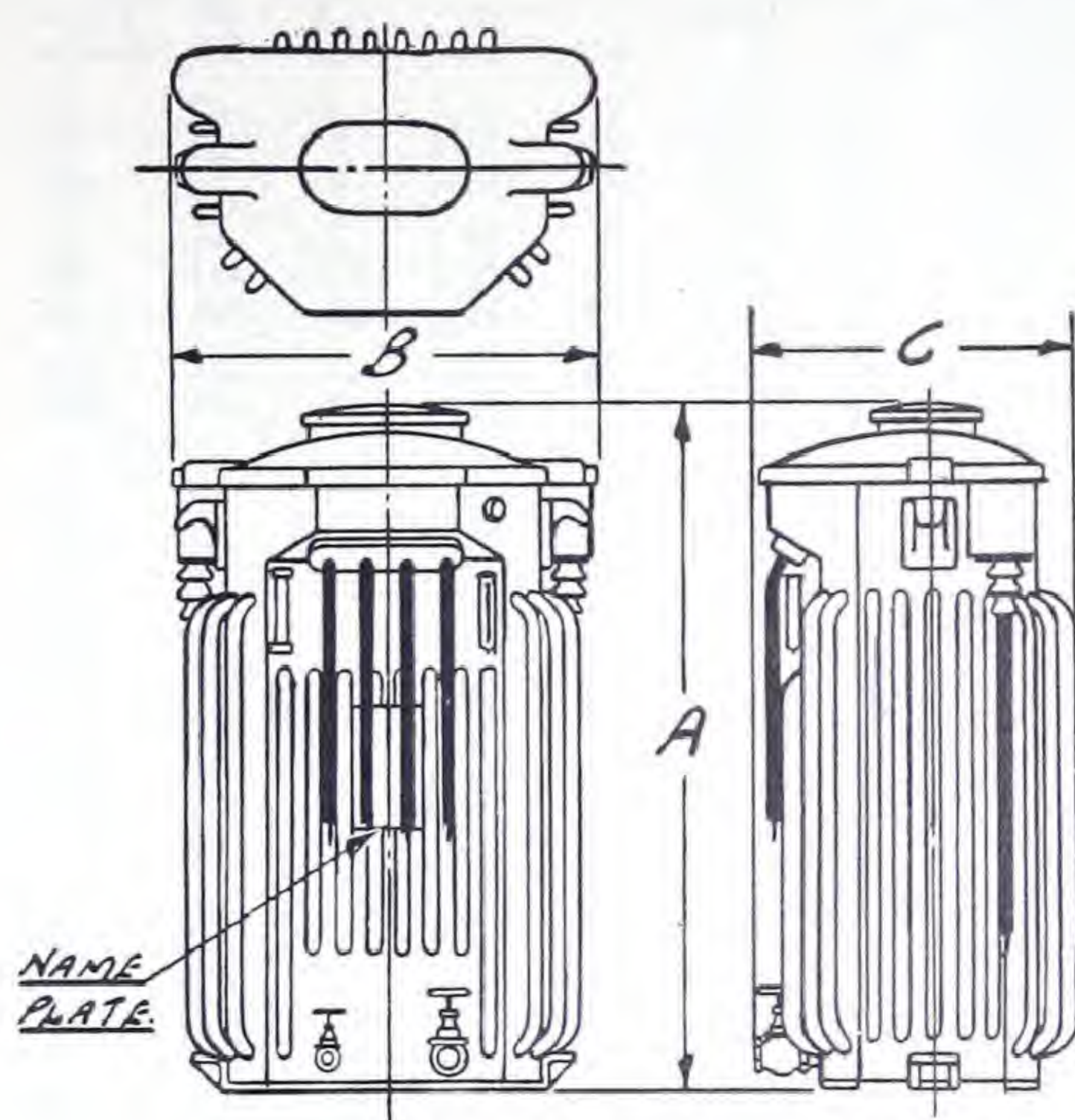


Figure 1.

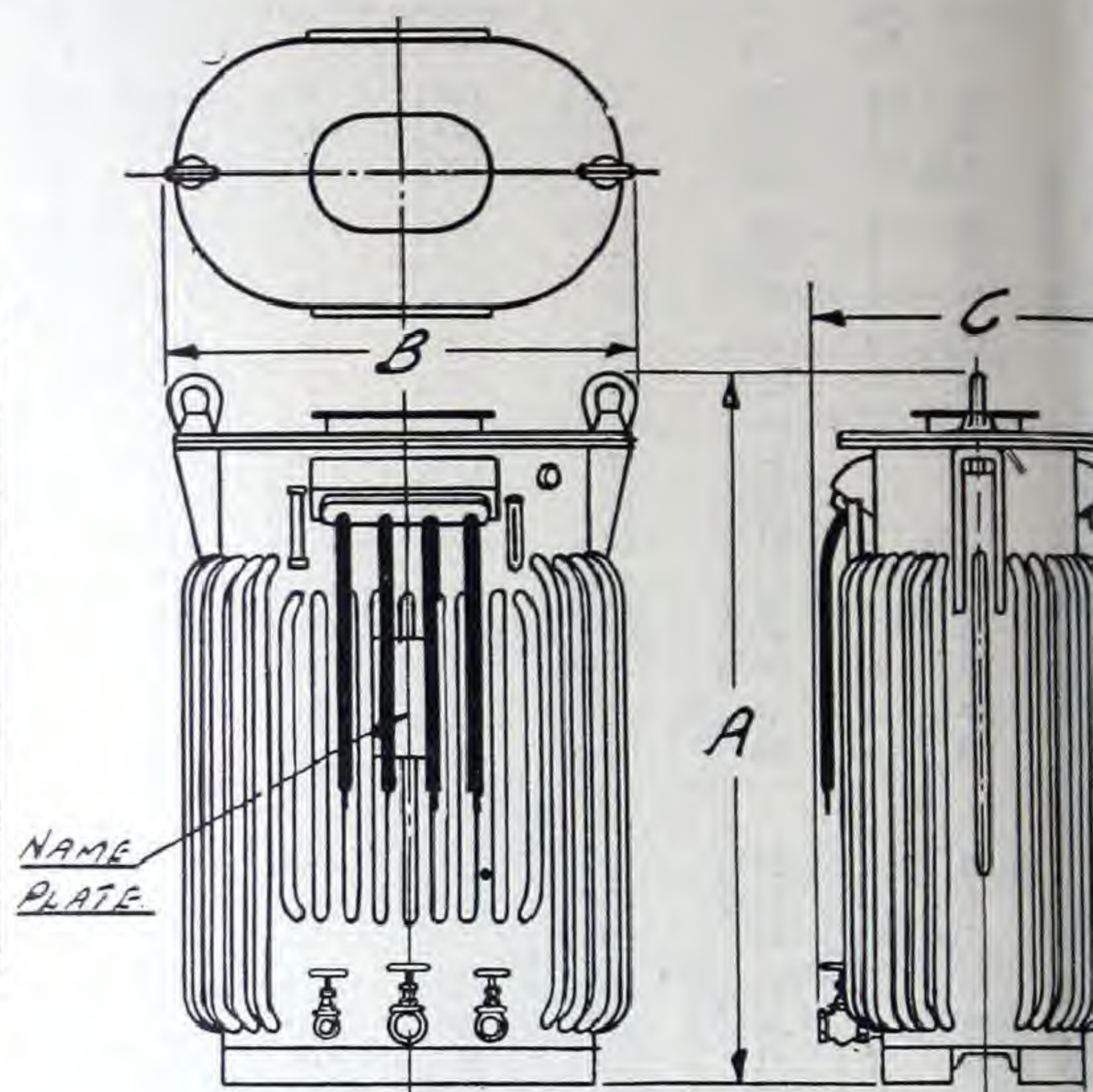


Figure 2.

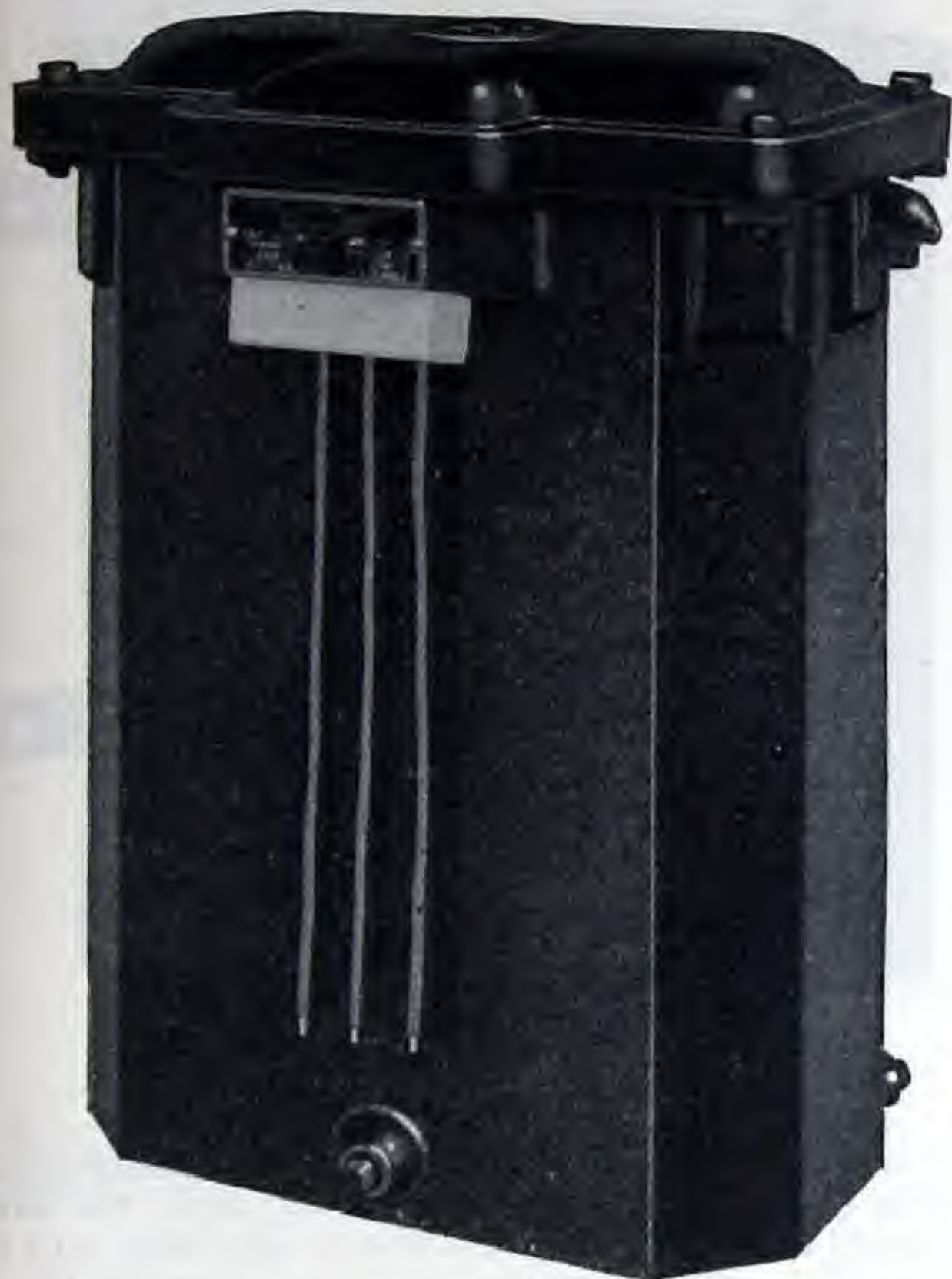
2200, 2300, 2400 Volt Transformers

Cycles	KV-a.	Figure Number	Dimensions in Inches			Gallons Oil	Wgt. of Oil (in lbs.)	Tot. Wgt. (in lbs.)
			A	B	Tank C			
60	75	1	59	29½	21	50	445	1675
60	100	1	61¾	31	24½	65	578	2200
60	150	2	70¾	40	33½	90	800	3190
60	200	2	84¾	40	33½	125	1112	3450
25	75	1	61¾	31	24½	62	552	2240
25	100	1	73¾	35¼	28¼	95	845	3000
25	150	2	79½	46½	37½	136	1210	4700
25	200	2	91½	46½	37½	165	1470	6200
4400, 4600 Volt Transformers								
60	75	1	60¼	29½	20⅞	48	427	1750
60	100	1	63¾	31	24½	63	561	2280
60	150	2	70¾	40	34	87	775	3260
60	200	2	84¾	40	34	123	1095	3550
25	75	1	63¾	31	24½	62	552	2330
25	100	1	73¾	35¼	28¼	95	845	3100
25	150	2	79½	46½	38	136	1210	4800
25	200	2	93½	46½	38	175	1560	6450
6600, 6900 Volt Transformers								
60	75	1	60¼	32	21	48	427	1990
60	100	1	63¾	34	24½	62	552	2600
60	150	2	72¾	40	35	90	800	3500
60	200	2	86¾	40	35	125	1112	3900
11000, 13200, 13800 Volt Transformers								
60	75	1	60¼	32	21	48	427	2100
60	100	1	63¾	34	24½	62	552	2700
60	150	2	74¾	40	35	94	836	3620
60	200	2	88¾	40	35	130	1158	4100
25	75	1	67¾	34	24½	80	712	2690
25	100	1	77¾	35½	28¼	105	934	3450
25	150	2	83½	46½	39	145	1290	4960
25	200	2	93½	46½	39	175	1560	6700

Dimensions and weights are approximate—not to be worked to.
Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Three-Phase Type



Ferranti Three-Phase Distribution Transformer for pole-mounting

Three-phase distribution transformers are supplied in standard capacities from 5 to 200 kv-a. Hangers are regularly supplied in capacities up to and including 50 kv-a. in the 75, 2300 and 4600 volt ranges, but only up to and including 5 kv-a. in the higher voltages.

Two 5% reduced capacity taps in the high voltage winding are standard, and one secondary voltage only is supplied at the standard price. Three-phase transformers may also be supplied as dry type, although the illustrations and dimensions given here cover oil-insulated transformers.

The general construction of Ferranti three-phase distribution transformers is the same as the single-phase transformer, but a three-legged core is used with each phase on a separate leg. This is vastly superior to the construction of some manufacturers using two single-phase transformers in open delta, as the three-legged core type gives a better current balance and therefore much better regulation.

There have been misunderstandings from time to time in connection with secondary voltages for three-phase transformers. It becomes a habit to expect 110/220 volts in connection with single-phase transformers and very often the series-multiple connection is specified on three-phase transformers where it is not actually required, and this makes a very costly and complicated arrangement.

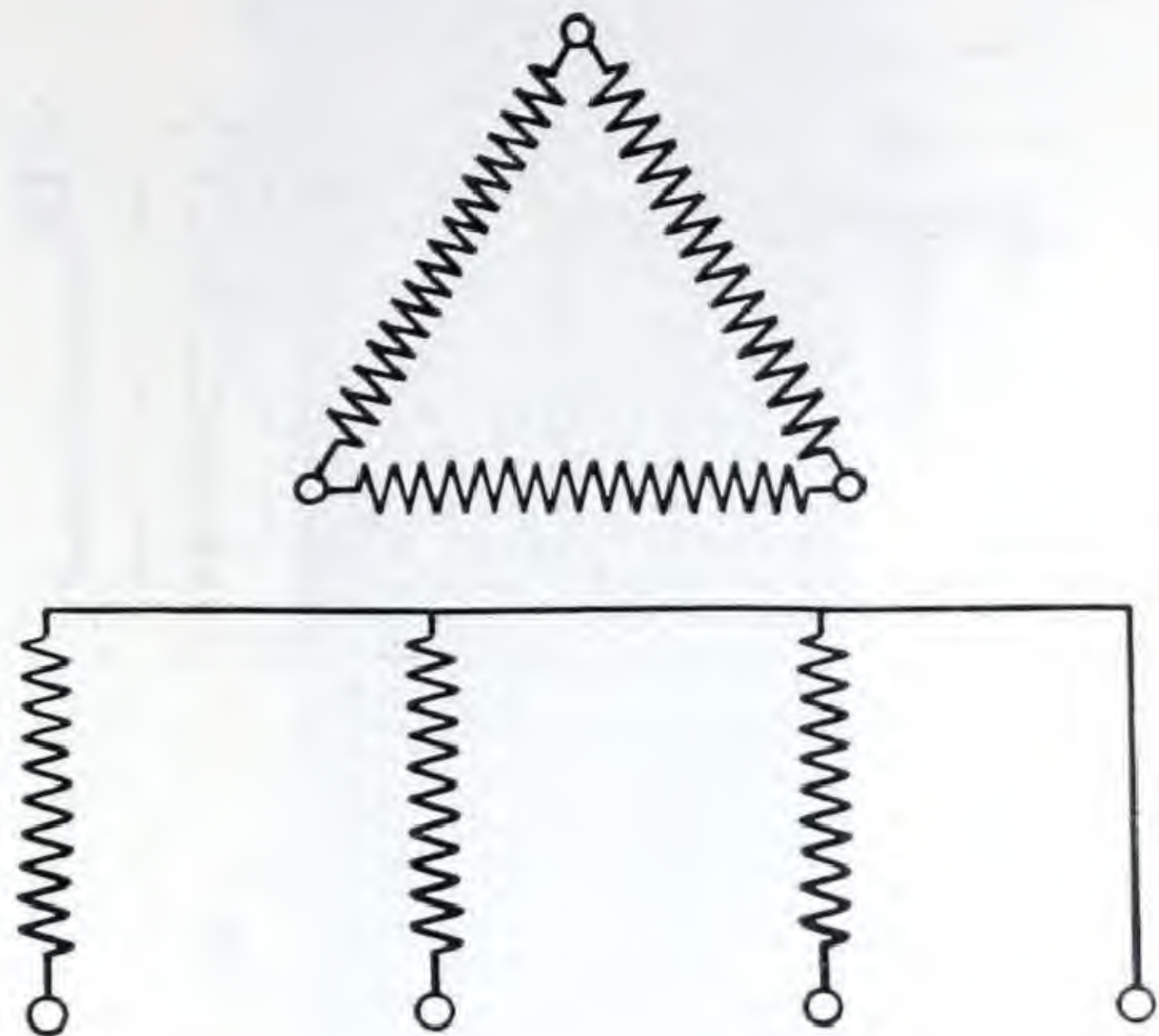
The standard price covers either 220 or 110 volt secondary but not both; in other words the standard price covers two different transformers, one rated 550-110 volts and the other 50-220 volts, or whatever other primary voltages are used.

Wherever possible simply order the standard three-phase transformer, specifying one secondary voltage only. If special arrangements are essential, they can be supplied at an increased price.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Three-Phase Type



The upper diagram shows the standard three-phase transformer with the windings connected in delta.

The lower diagram shows a star-connected transformer without taps, but with the neutral point extended. The neutral point can be grounded and this transformer will give 220 volts between phases and 127 volts from each phase terminal to neutral. With the neutral grounded, each circuit can be used for lighting, using the 125 volt lamp. This connection gives lighting and 220 volt power at the same time, but does not provide for three-wire service. This arrangement involves bringing the neutral out of the transformer case, which makes it a little more expensive than the standard.

Standard Circuit Voltages	Transformer High Voltage Ratings On Full Winding	Approx. on Taps	Transformer Single Secondary Ratings
500	550	520 495	110
	550	520 495	220
	575	545 518	115
	575	545 518	230
	600	570 540	120
	600	570 540	240
2300	2200	2090 1980	110
	2200	2090 1980	220
3-wire	2200	2090 1980	440
	2200	2090 1980	550
	2300	2180 2070	115
	2300	2180 2070	230
	2300	2180 2070	460
	2300	2180 2070	575
	2400	2280 2160	120
	2400	2280 2160	240
23/4000Y	2400	2280 2160	480
	2400	2280 2160	600
	3810	3610 3430	110
	3810	3610 3430	220
4-wire	3810	3610 3430	440
	3810	3610 3430	550
	4000	3800 3600	115
	4000	3800 3600	230
	4000	3800 3600	660
	4000	3800 3600	575
	4160	3940 3240	120
	4160	3940 3240	240
	4160	3940 3240	480
	4160	3940 3240	600

Prices on application.

FERRANTI TRANSFORMERS

Three Phase Type

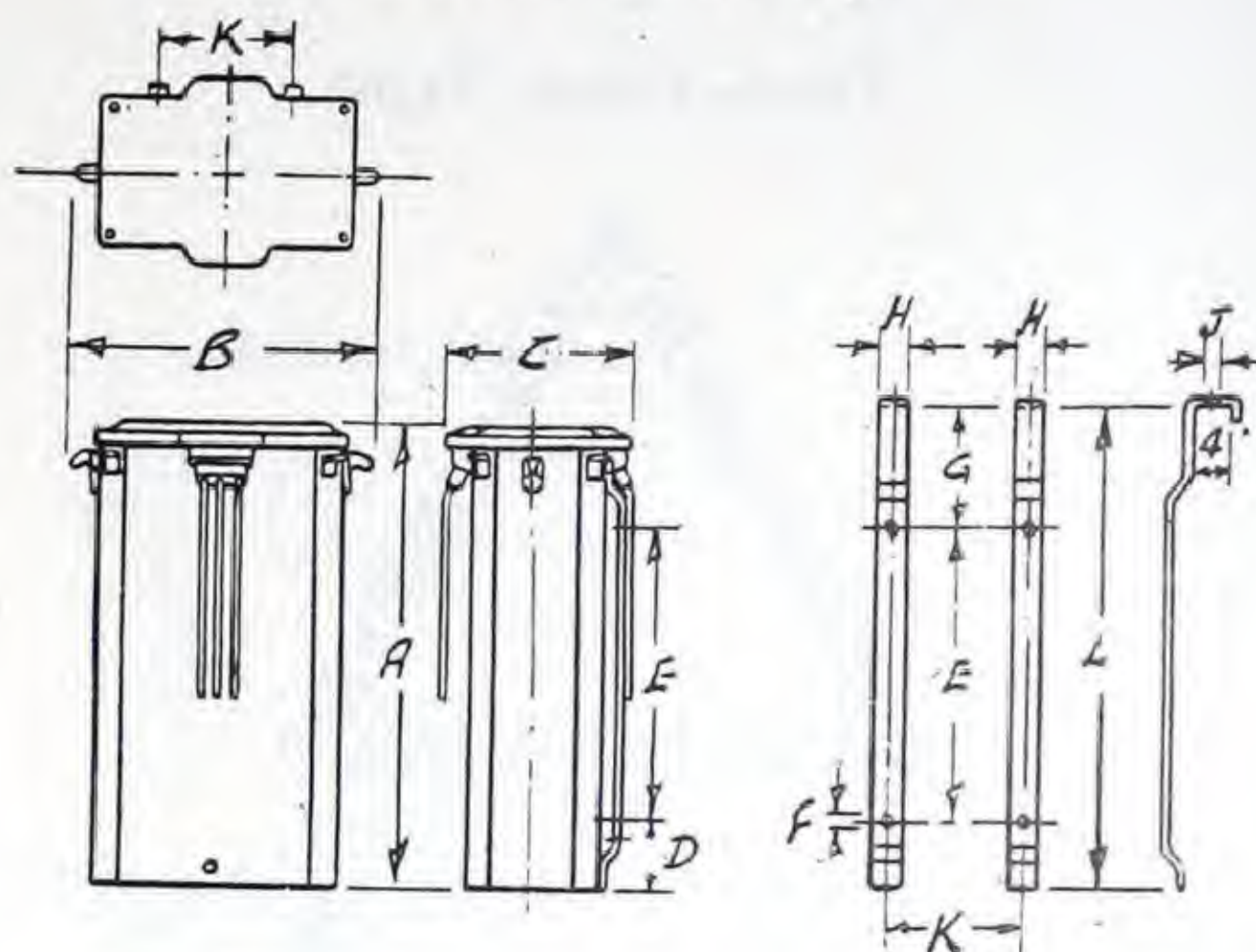


Figure 1

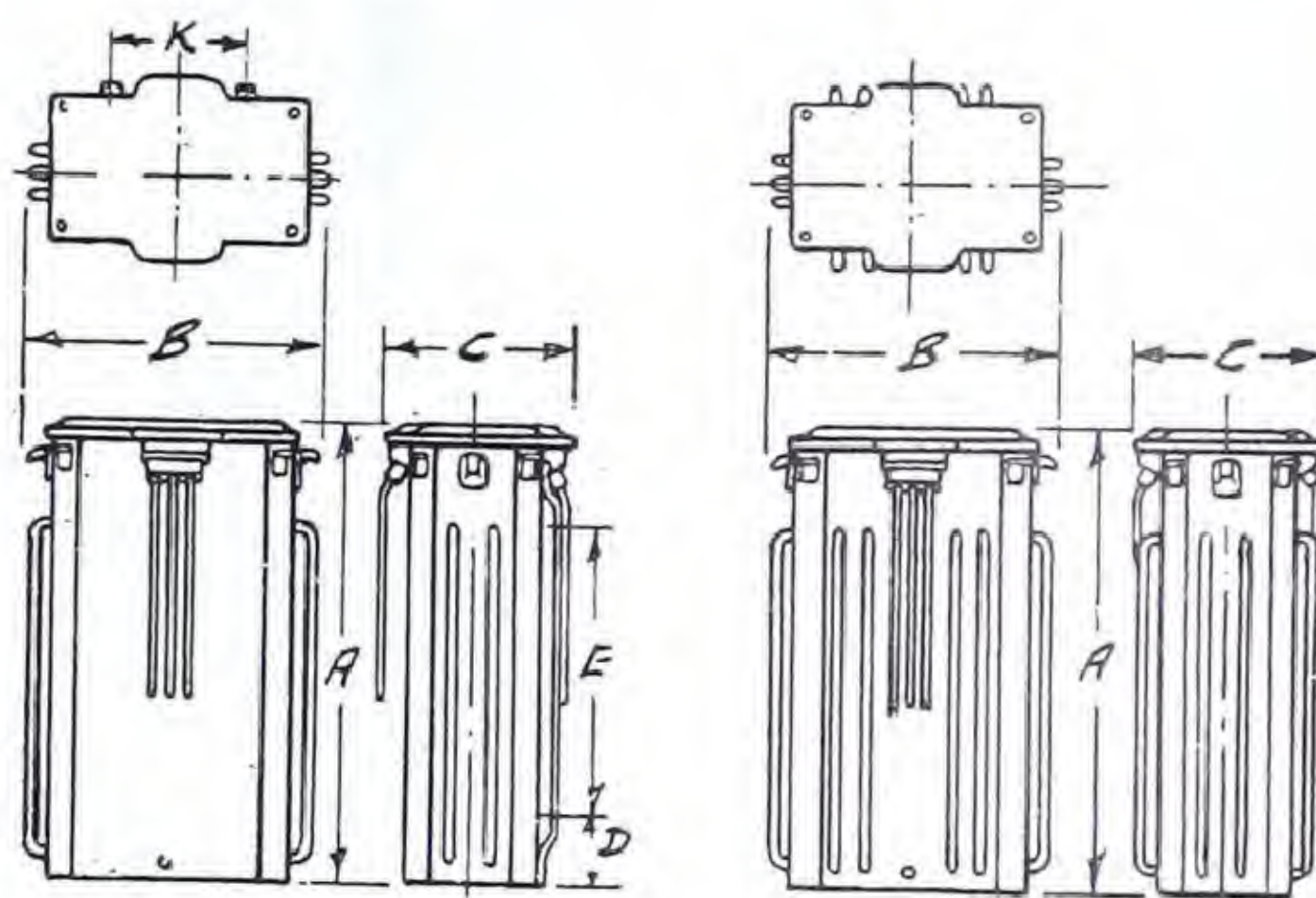


Figure 2

Figure 3

DIMENSIONS

60 Cycle Three-phase Transformers

KV-a.	Fig. No.	Dimensions in Inches				
		Transformer Tank				
		A	B	C	D	E
5	1	26 $\frac{1}{2}$	20 $\frac{1}{2}$	14 $\frac{3}{4}$	6 $\frac{1}{2}$	13
7 $\frac{1}{2}$	1	25 $\frac{1}{4}$	22 $\frac{1}{2}$	15 $\frac{3}{4}$	5 $\frac{7}{8}$	11 $\frac{3}{4}$
10	1	26 $\frac{1}{4}$	22 $\frac{1}{2}$	15 $\frac{3}{4}$	5 $\frac{7}{8}$	12 $\frac{3}{4}$
15	1	28 $\frac{1}{2}$	25	17 $\frac{1}{4}$	5 $\frac{5}{8}$	14 $\frac{3}{4}$
25	1	37 $\frac{1}{4}$	32 $\frac{1}{2}$	21 $\frac{3}{4}$	6	23
37 $\frac{1}{2}$	2	45 $\frac{1}{4}$	32 $\frac{1}{2}$	21 $\frac{3}{4}$	6	31
50	3	45 $\frac{1}{4}$	32 $\frac{1}{2}$	21 $\frac{3}{4}$	6	31

KV-a.	Fig. No.	Hangers				
		F	G	H	J	K
5	1	$\frac{9}{16}$	10	2	$\frac{9}{16}$	9 $\frac{1}{4}$
7 $\frac{1}{2}$	1	$\frac{11}{16}$	10 $\frac{7}{8}$	2	$\frac{9}{16}$	10 $\frac{5}{8}$
10	1	$\frac{11}{16}$	10 $\frac{7}{8}$	2	$\frac{9}{16}$	10 $\frac{5}{8}$
15	1	$\frac{11}{16}$	11 $\frac{3}{8}$	2 $\frac{1}{2}$	$\frac{9}{16}$	12
25	1	$\frac{13}{16}$	12	3	$\frac{9}{16}$	15
37 $\frac{1}{2}$	2	$\frac{13}{16}$	12	3	$\frac{9}{16}$	15
50	3	$\frac{13}{16}$	12	3	$\frac{9}{16}$	15

No hangers supplied

KV-a.	Fig. No.	Gals. Wgt. Approx.		
		of Oil	of Oil	Total Wgt.
5	1	6 $\frac{1}{2}$	58	340
7 $\frac{1}{2}$	1	9	80	390
10	1	8 $\frac{1}{2}$	75 $\frac{1}{2}$	420
15	1	12	107	560
25	1	32	285	970
37 $\frac{1}{2}$	2	43	383	1250
50	3	45	400	1400

Dimensions and weights are approximate—not to be worked to.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Dry Type



The smaller transformers up to 50 kv-a. capacity, can be furnished either as oil-insulated, or as dry type; the latter often called air-cooled, although strictly speaking, both types are air-cooled. The Canadian Electrical Code and the rule of the Hydro-Electric Power Commission of Ontario permit the use of dry type transformers inside a building without fire-proof compartment, if the voltage does not exceed 60 volts. For higher voltages, oil-insulated transformers must be used and they must be installed in a fireproof compartment or else out-of-doors.

Dry type distribution transformers are also used underground by many mining companies where explosive gases are not present. The amount of inflammable material is greatly reduced, and owing to the absence of oil, the amount of gas and smoke generated would be much less. The doors of the ventilating ports which are held open by cords with fusible links in the circuit, should close before any great amount of smoke would get through the mine and there would be no explosive mixture to force open the door. Dry type transformers for this purpose may be supplied up to 2400 volt maximum and 2400 volt dry type transformers are slightly more expensive than 600 volt dry type transformers.

The dry type transformer requires more material and greater ducting of the coils than an oil-insulated transformer of the same capacity. Ferranti dry type transformers are very liberally ducted and the ducts are of greater radial depth than usual. This gives them very low gradients with resulting high overload capacity.

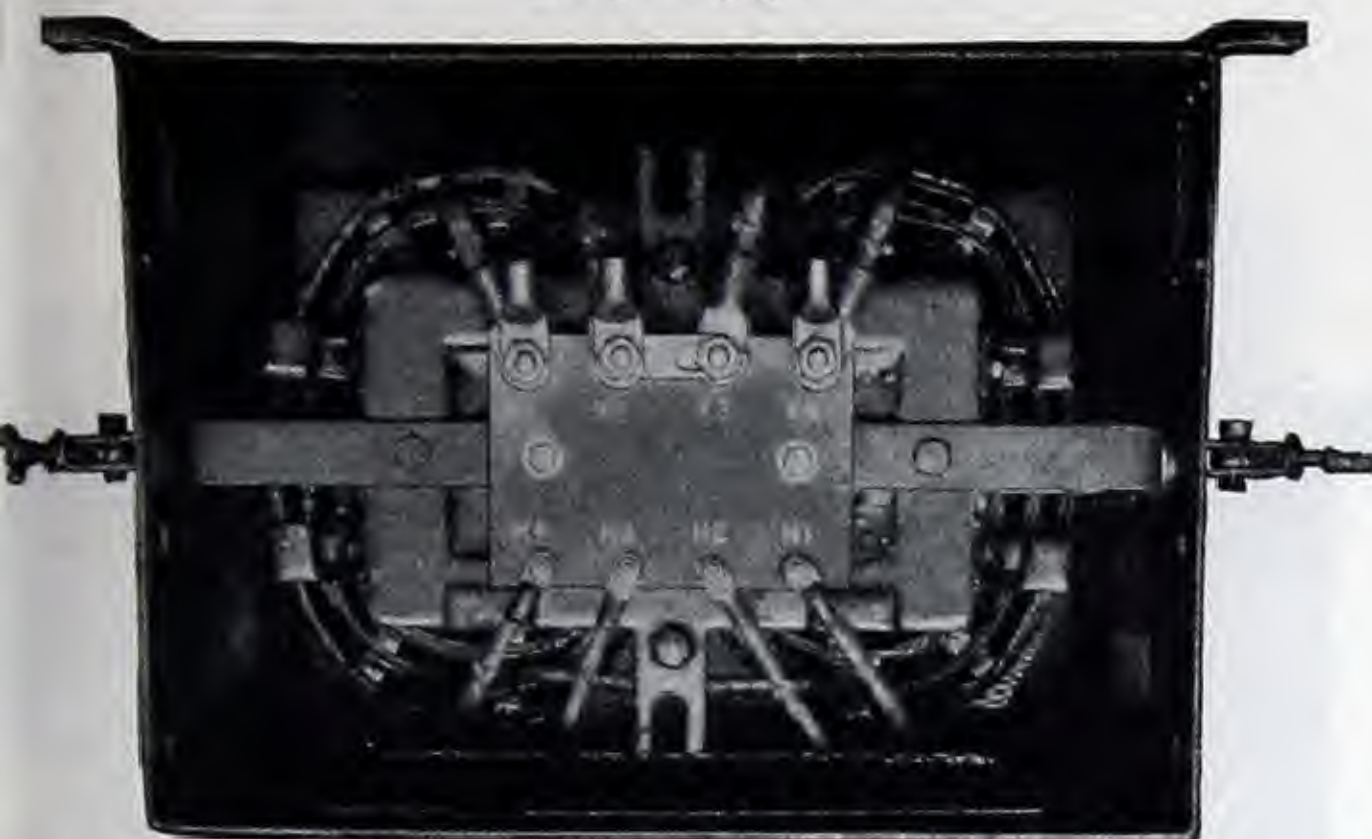
Ferranti Dry Type Transformers are usually supplied with knockout holes for conduit entrance. The terminals within the case are provided with companion lugs. The secondary are wound for either two-wire or three-wire operation, link being provided for making the changes in the winding. Outgoing leads can be supplied instead of knockout holes specified on the order.

Dry type transformers cost 10% more than the corresponding oil-insulated transformers of the same rating. Hangers are regularly supplied for mounting the transformer on the wall but if the transformer is to be installed on a platform, the hangers may be omitted with a slight reduction in price. Proper ventilation of the coils is provided by holes in the case, which are covered with screens for protection from live parts.

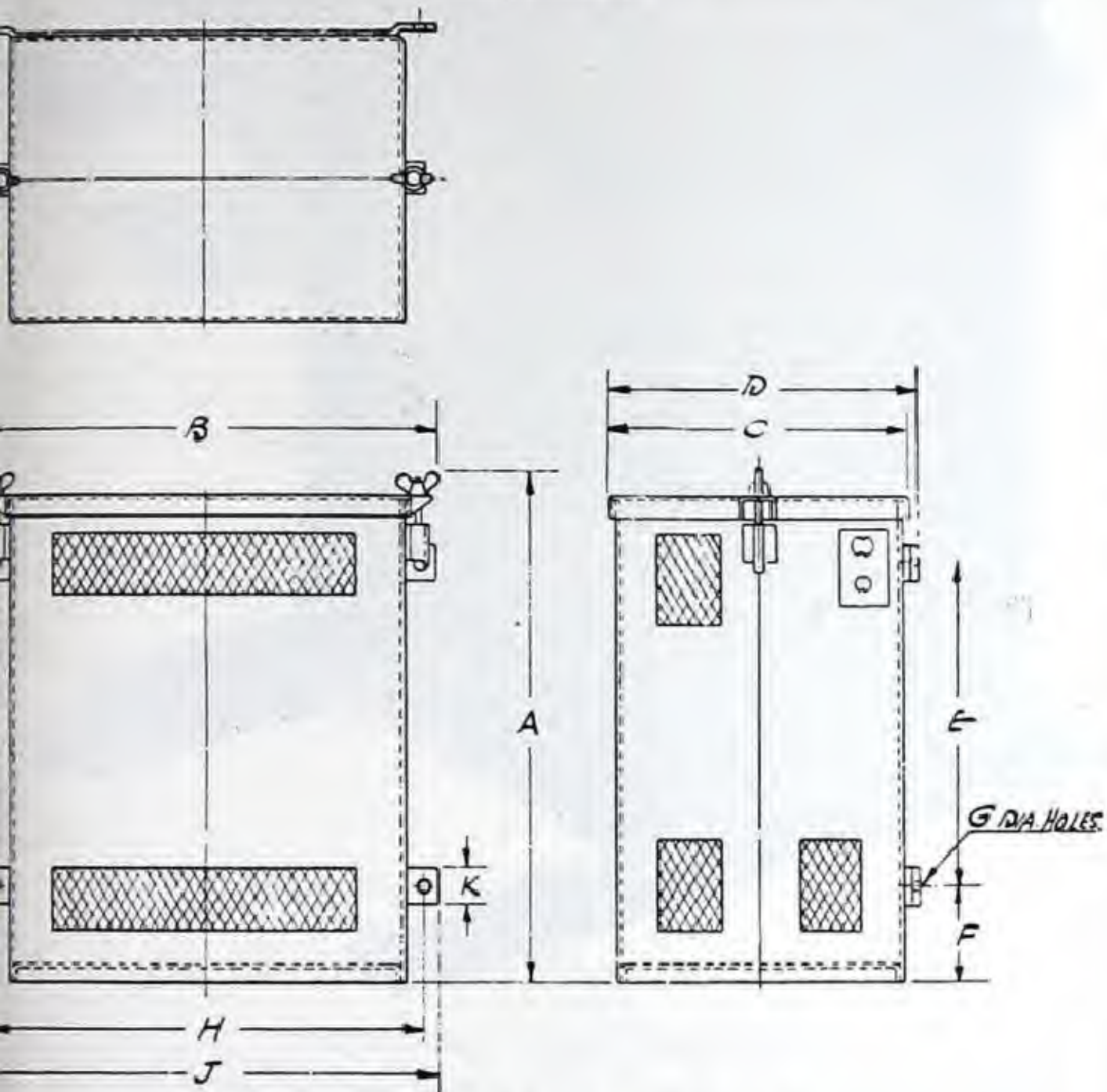
Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Dry Type



Interior of a Ferranti Dry Type Transformer showing the liberal ducting of the coils and the convenient mechanical arrangements



DIMENSIONS IN INCHES

KV-a.		Transformer Tank			Approx.	Wgt.
60 Cycles	25 Cycles	A	B	C	60 Cycles	25 Cycles
2	...	18	15	9 ³ / ₄	...	...
3	...	18	15	9 ³ / ₄	140	...
...	2	22	18	11 ³ / ₄	...	...
5	3	22	18	11 ³ / ₄	200	250
7 ¹ / ₂	5	23	20	12 ¹ / ₂	265	300
10	7 ¹ / ₂	25	21	13	340	400
15	10	26 ¹ / ₂	22 ³ / ₄	13 ³ / ₄	405	510
25	15	29	25 ¹ / ₄	15 ¹ / ₂	575	635
37 ¹ / ₂	25	32	27 ³ / ₄	18	750	910
50	37 ¹ / ₂	34 ¹ / ₂	29 ³ / ₄	19 ¹ / ₂	965	1135
...	50	40 ¹ / ₂	31 ³ / ₄	23 ¹ / ₄	...	1360

KV-a.		Hangers (if required)							
60 Cycles	25 Cycles	D	E	F	G	H	J	K	
2	...	10	9 ¹ / ₂	4 ¹ / ₄	9 ⁹ / ₁₆	14 ¹ / ₄	15 ¹ / ₂	1 ¹ / ₄	
3	...	10	9 ¹ / ₂	4 ¹ / ₄	9 ⁹ / ₁₆	14 ¹ / ₄	15 ¹ / ₂	1 ¹ / ₄	
...	2	12 ¹ / ₄	13 ¹ / ₂	4 ¹ / ₄	9 ⁹ / ₁₆	17 ¹ / ₄	18 ³ / ₄	1 ¹ / ₂	
5	3	12 ¹ / ₄	13 ¹ / ₂	4 ¹ / ₄	9 ⁹ / ₁₆	17 ¹ / ₄	18 ³ / ₄	1 ¹ / ₂	
7 ¹ / ₂	5	13	14 ¹ / ₂	4 ¹ / ₄	9 ⁹ / ₁₆	19 ¹ / ₄	30 ³ / ₄	1 ¹ / ₂	
10	7 ¹ / ₂	13 ¹ / ₂	16	4 ¹ / ₂	11 ¹ / ₁₆	20 ¹ / ₂	22 ¹ / ₄	2	
15	10	14 ¹ / ₂	17	5	11 ¹ / ₁₆	21 ¹ / ₂	23 ¹ / ₄	2	
25	15	16 ¹ / ₄	18 ¹ / ₂	5	13 ¹ / ₁₆	24 ¹ / ₄	26 ¹ / ₄	2 ¹ / ₂	
37 ¹ / ₂	25	18 ³ / ₄	20	6 ¹ / ₂	13 ¹ / ₁₆	26 ³ / ₄	28 ³ / ₄	2 ¹ / ₂	
50	37 ¹ / ₂	20 ¹ / ₄	21 ¹ / ₂	7 ⁵ / ₈	13 ¹ / ₁₆	28 ³ / ₄	30 ³ / ₄	2 ¹ / ₂	

No hangers supplied.

Dimensions and weights are approximate—not to be marked to.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Subway Type



Ferranti Subway Transformers are of the same high standard of design and workmanship found in the standard pole type transformers, with special features which make it distinctly successful and economical in underground installations.

In construction, this subway type transformer is practically identical with the standard service transformers in welded, copper-bearing steel tanks. The only change has been to supply a special cover and suitable terminal arrangements. The transformers are supplied in cylindrical steel cases with machined flange, to which is bolted a machined cast iron cover. For terminal connections, special water-tight screwed unions with tapered wiping sleeves on the end of same are provided. The hole in the sleeve becomes larger on the inside which means that on cutting off at the right point, a hole exactly the diameter of the lead cable can be obtained which greatly facilitates the making of a wiped joint. The transformer terminal leads are brought to connection boards inside the transformer and supplied with special lugs which are small enough to be pulled through the union and wiping sleeves.

In installing the transformers the supply cables are pulled through the wiping sleeves and unions, and are soldered to the lugs on the terminal board, after which the cable joint is wiped where the lead sheath of the cable passes through the wiping sleeves. With this arrangement in case it should be necessary to change or remove the transformer, it is not necessary to break the cable joint, as the transformers can be disconnected by disconnecting the terminal lugs inside, unscrewing the unions outside and pulling the whole lead cable and joint with half the unions attached, away from the transformers. This is a feature which will be appreciated by Power Companies where transformers are changed from time to time.

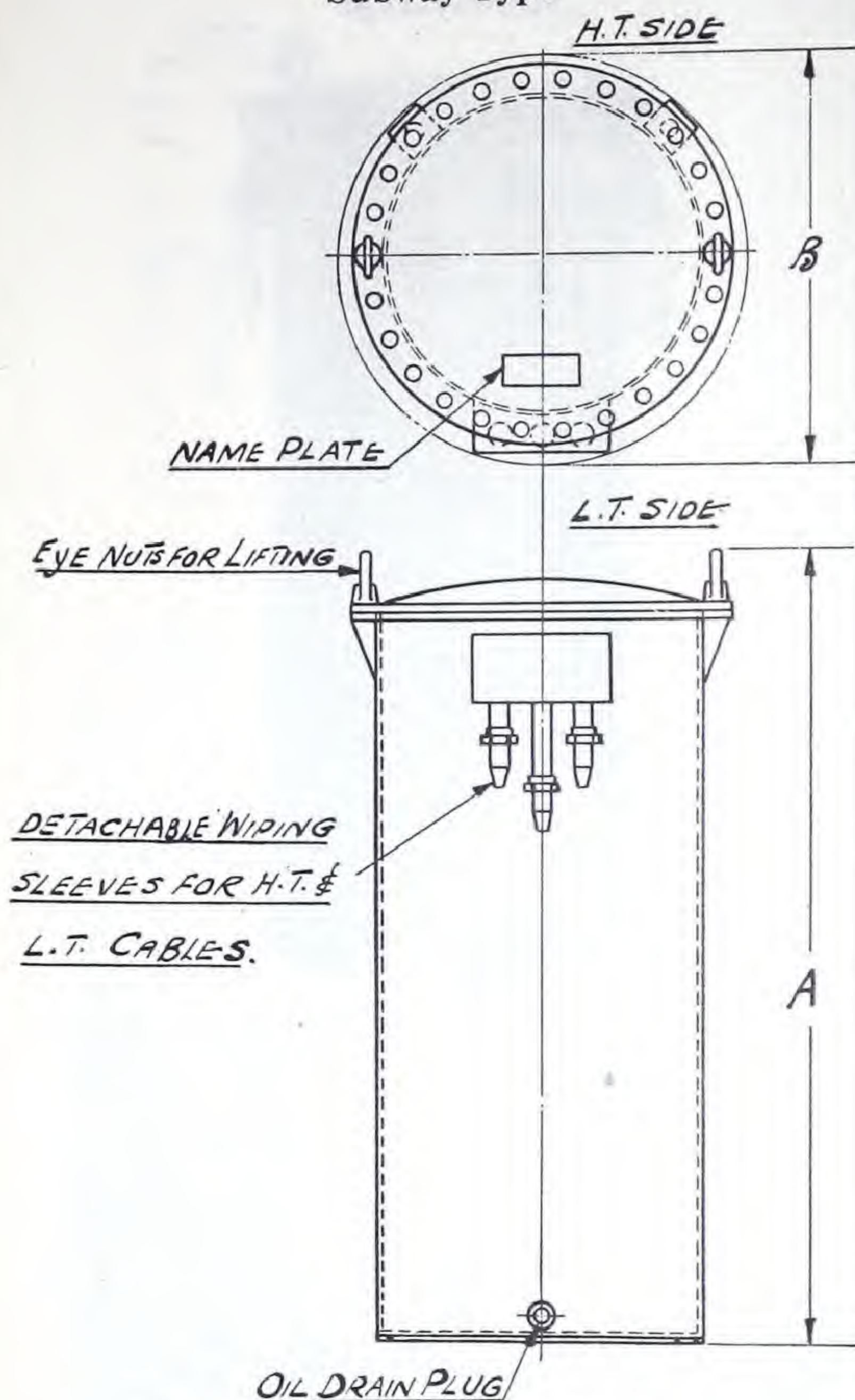
Subway type transformers are standard in sizes from 5 to 200 kv-a. and for voltages up to 2400 both 25 and 60 cycles.

An unusually slender type of Subway Transformer in the 100 kv-a. size has been specially developed and the illustration above shows the 100 kv-a. size in this type rated 2300-115/230 volts. This transformer is from 3 to 6 inches smaller in diameter than older designs and will pass through a 29 inch manhole.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Subway Type



KV-a.	Dimensions		60 Cycles		
60	in Inches		Gals.	Wgt.	Total
Cycles	A	B	of Oil	of Oil	Wgt.
5	30	20	6	53½	280
7½	33	22	7	62½	340
10	33	22	8½	75½	390
15	39	24½	14	125	530
25	40½	25½	25	223	810
37½	45	25½	30	267	1000
50	53	27½	44	392	1420
KV-a.	Dimensions		25 Cycles		
25	in Inches		Gals.	Wgt.	Total
Cycles	A	B	of Oil	of Oil	Wgt.
3	30	20	6½	58	350
5	33	22	6	53½	420
7½	33	22	8	71½	490
10	34	23	13½	120	580
15	39	24½	22	196	850
25	40½	25½	29	258	1100
37½	45	25½	42	374	1600

Dimensions and weights are approximate—not to be worked to. Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Mining Type Transformers

(FLAME-PROOF)



Mining Type Transformer

Every precaution must be taken against the risk of fire or smoke underground as the oil in transformers may become a hazard in case of fire. In coal mines and other mines where explosive gases may be present, great care must be taken that no arcing takes place in connection with the electrical equipment. Cables are used so that the transformers must be suitable for cable entrance. Also, oil switches are essential as cutouts cannot be used.

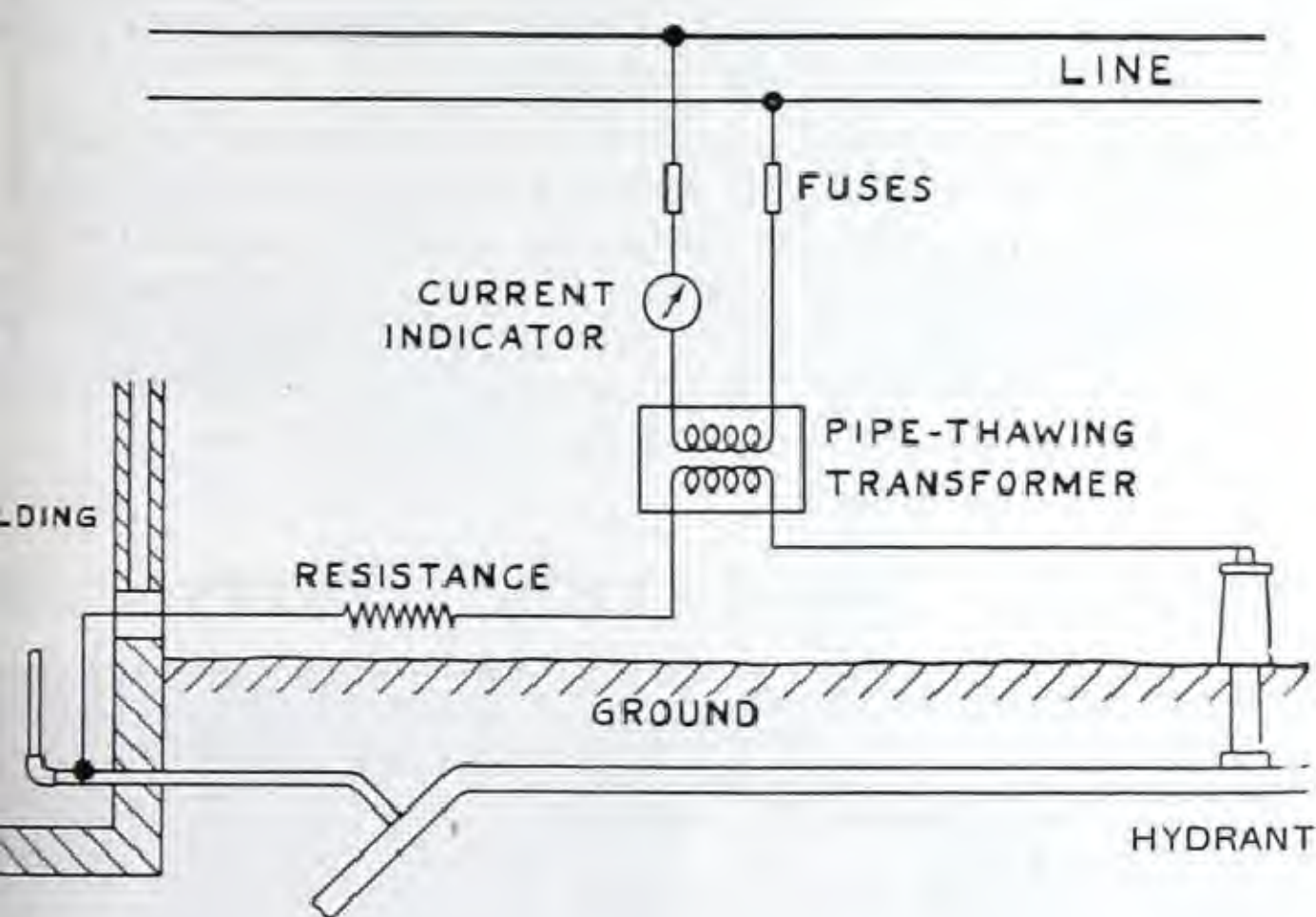
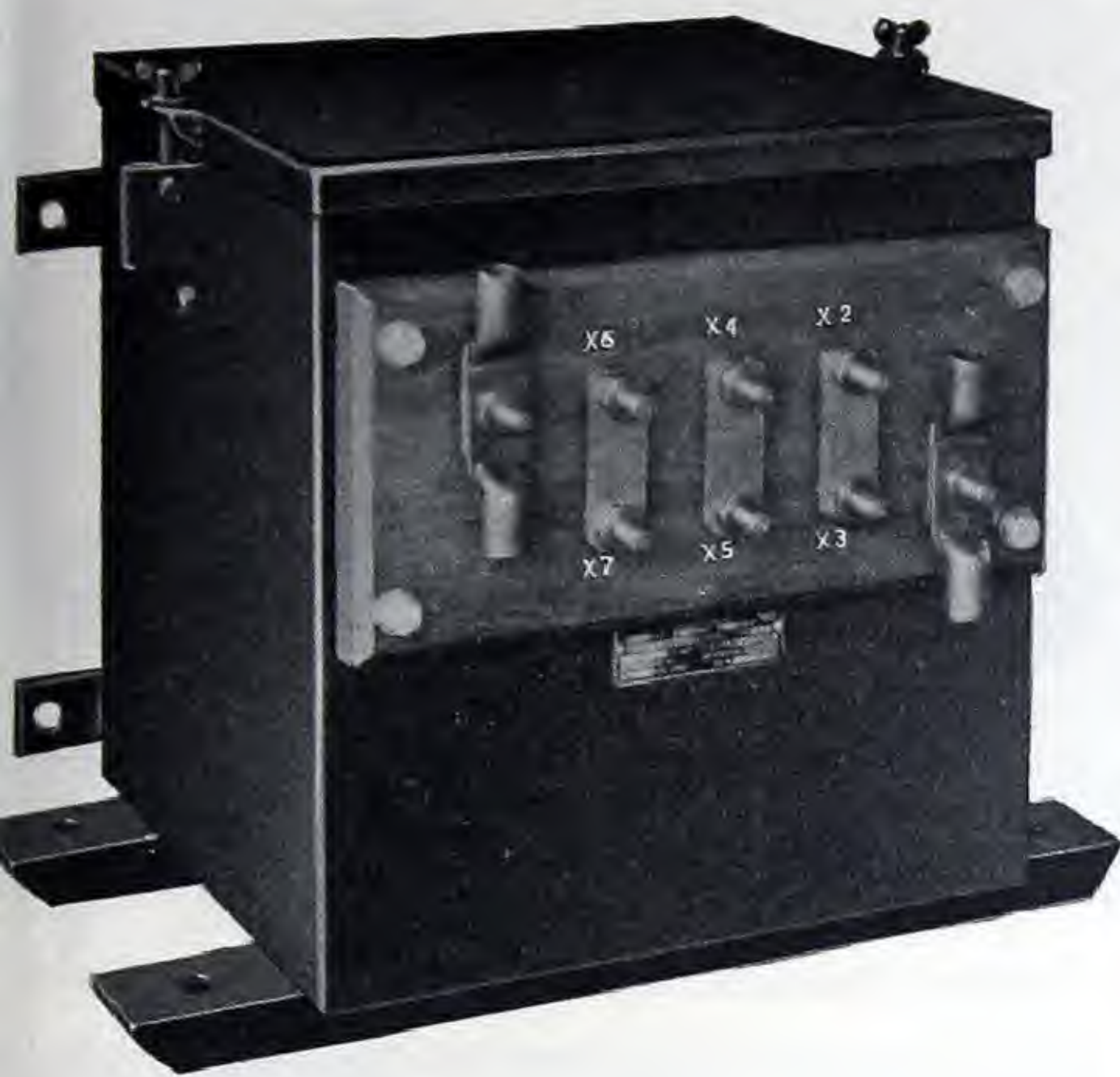
The illustration shows the type of transformer complete with switch which has been developed by Ferranti engineers for this purpose and which conforms with the regulations governing mining type transformers established by the British Engineering Standards Association.

The transformer itself is of the standard construction and it is mounted in a flame-proof tank made of copper bearing sheet steel to resist corrosion. The switch is of the oil-immersed type and is supported on a cast iron casing bolted to the transformer tank. The operating mechanism is supported from this casing, and is easily accessible for inspection when the oil tank is removed. The switch is of the two-pole type with two breaks per pole, and it is so arranged that the break occurs under a large head of oil. The sheet steel flame-proof oil tank is securely bolted to the top casing. A substantial wood lining with barriers between poles has been provided.

The switch contacts are of the laminated brush type made from high conductivity copper and designed to combine resilience with ample strength. The moving contacts are fitted with renewable sparking pieces.

Large bushings of porcelain carry the fixed contacts which are made of copper, of ample size and thoroughly insulated. Prices on application.

FERRANTI PIPE-THAWING TRANSFORMERS



The Ferranti Standard Pipe-thawing Equipment consists of single-phase 2200-110/55/27½ volt dry type transformer mounted in a weatherproof sheet steel case on channel irons. The transformer is dry type to avoid the necessity of handling extra weight if oil were used, and to avoid splashing the oil when moving the transformer from place to place. The taps are brought out to studs on the outside of the case and full voltage can be obtained on all three voltages. If specified, the primary voltage may be supplied as 550 volts or 220 volts instead of 2200 volts.

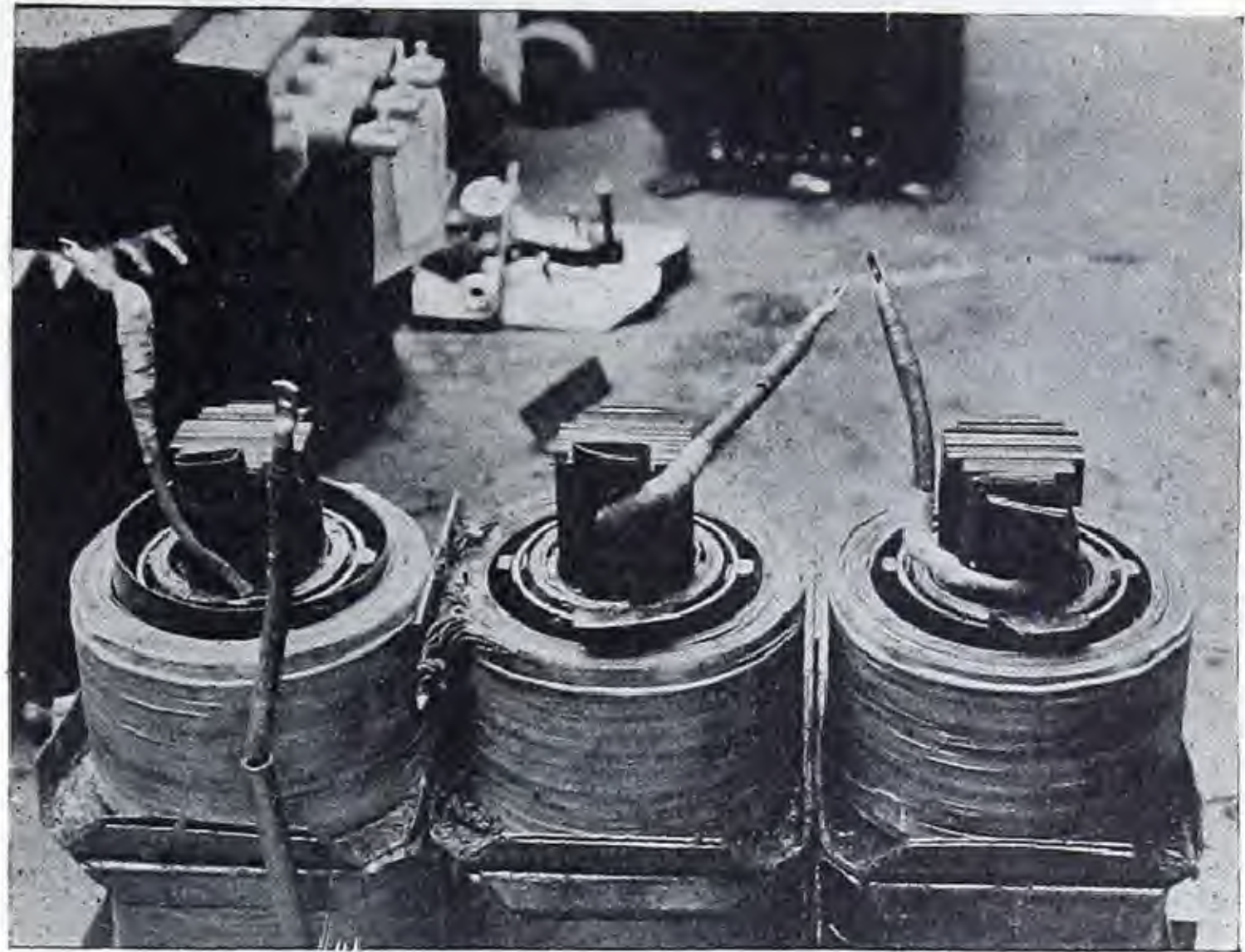
KV-a.	25	Dimensions in inches			Net Weight	
		Transformer	Tank		60	25
	Cycles	H	W	D	Cycles	Cycles
	3	22¾	19	15¾	210	260
½	5	23¾	21	16½	270	310
	7½	25½	22	17	340	410
	10	27	25	19¾	400	520
	15	29½	27½	21½	610	650
½	25	32½	30	24½	760	910
	37½	35	32	28½	980	1150

Prices on application.

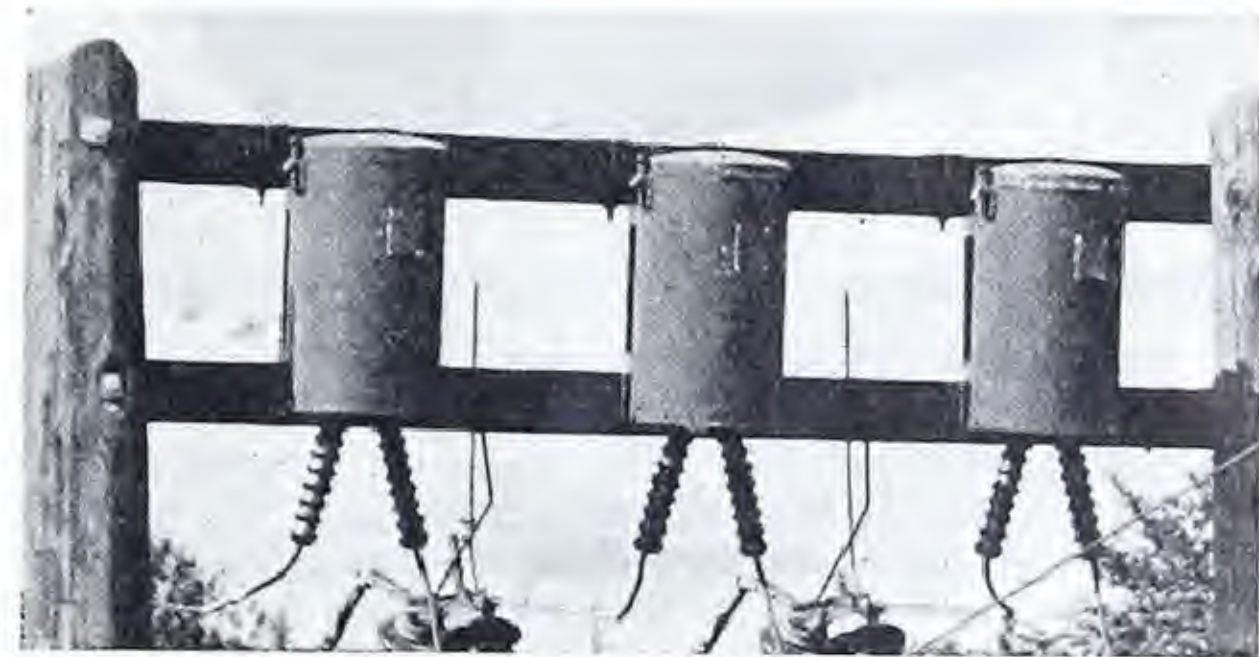
FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers

Operating experience has shown that Ferranti Surge-Proof Transformers are immune from break-down due to lightning. Also fuse blowing is practically eliminated.



View of transformer windings after the surge tests, showing the damage done to the unprotected phase



Ferranti Surge Absorbers installed at National Quarries, Montreal.

Ferranti Surge Absorbers have proved particularly effective where it is difficult or impossible to get a low ground resistance, such as on rural lines. With the proper co-ordination of insulation as developed in Ferranti Surge-Proof Distribution Transformers using Ferranti Surge Absorbers installed inside the tank, it is possible not only to eliminate transformer break-down, but also to practically do away with fuse-blowing from lightning. This has been proved in operation over extended areas after three years service under severe lightning conditions.

CONSTRUCTION OF THE SURGE ABSORBER

All surge absorber coils are made of round or rectangular paper-insulated magnet wire and are vacuum-varnished impregnated. Large insulators are used to bring the leads out of the tank and to eliminate the danger of flashover from the terminals to the case which is at ground potential.

TYPE "M" (COMPOUND FILLED)

The Type "M" Surge Absorber is used for the protection of meters and transformer windings up to 600 volts. The coil is cylindrical and is mounted in a round case filled with compound. The bushings and leads are brought out at the bottom of the tank. The dissipators are cylindrical in form and there will be one or more, according to the application; they are insulated from the coils with mica-paper barrels.

Prices on application.

FERRANTI ADJUSTABLE-RATIO TRANSFORMER For Relay Testing



Adjustable-Ratio Transformer for Relay Testing

An adjustable-ratio transformer for loading relays in testing. This method is much more economical than resistance-type loading devices and enables the use of an ordinary 120 volt outlet with the usual branch-circuit fusing. It is arranged for 115/230 volt 60 cycle service with terminals and switch for 110 volt cycle counter. The secondary is wound for 40 volts 20 amperes continuous rating. One half of this winding is tapped in 2 volt steps so that any voltage may be obtained between 2 and 40. Two 75 watt Allen-Bradley carbon resistances are connected in parallel and in the lead from the centre of the rotary switch to give fine adjustment voltage.

Price on application.

FERRANTI PIPE THAWING TRANSFORMER

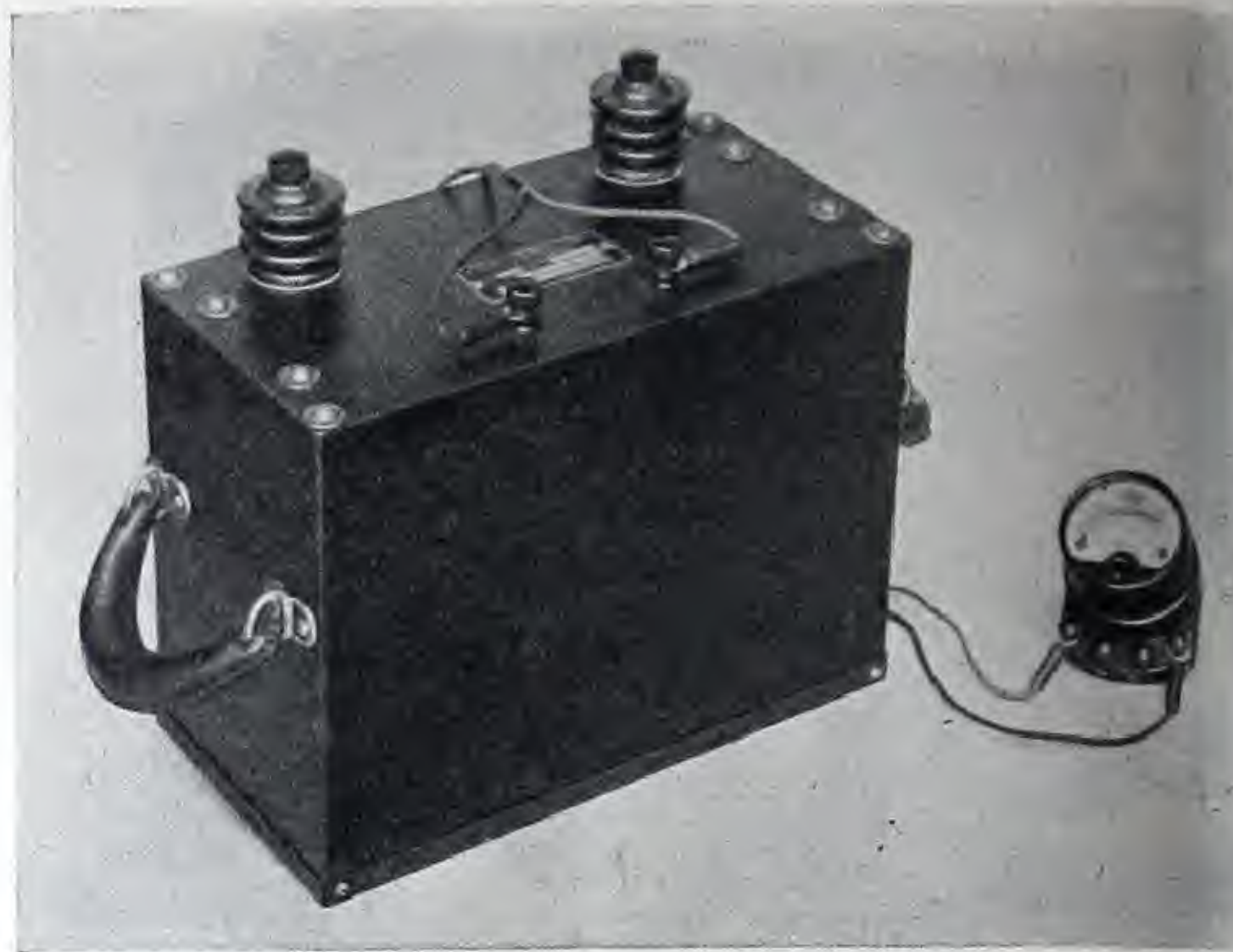


No. 149-1

For thawing frozen pipes. Full instructions with each outfit.

Price on application.

FERRANTI POTENTIAL TRANSFORMER For Neon Sign Service



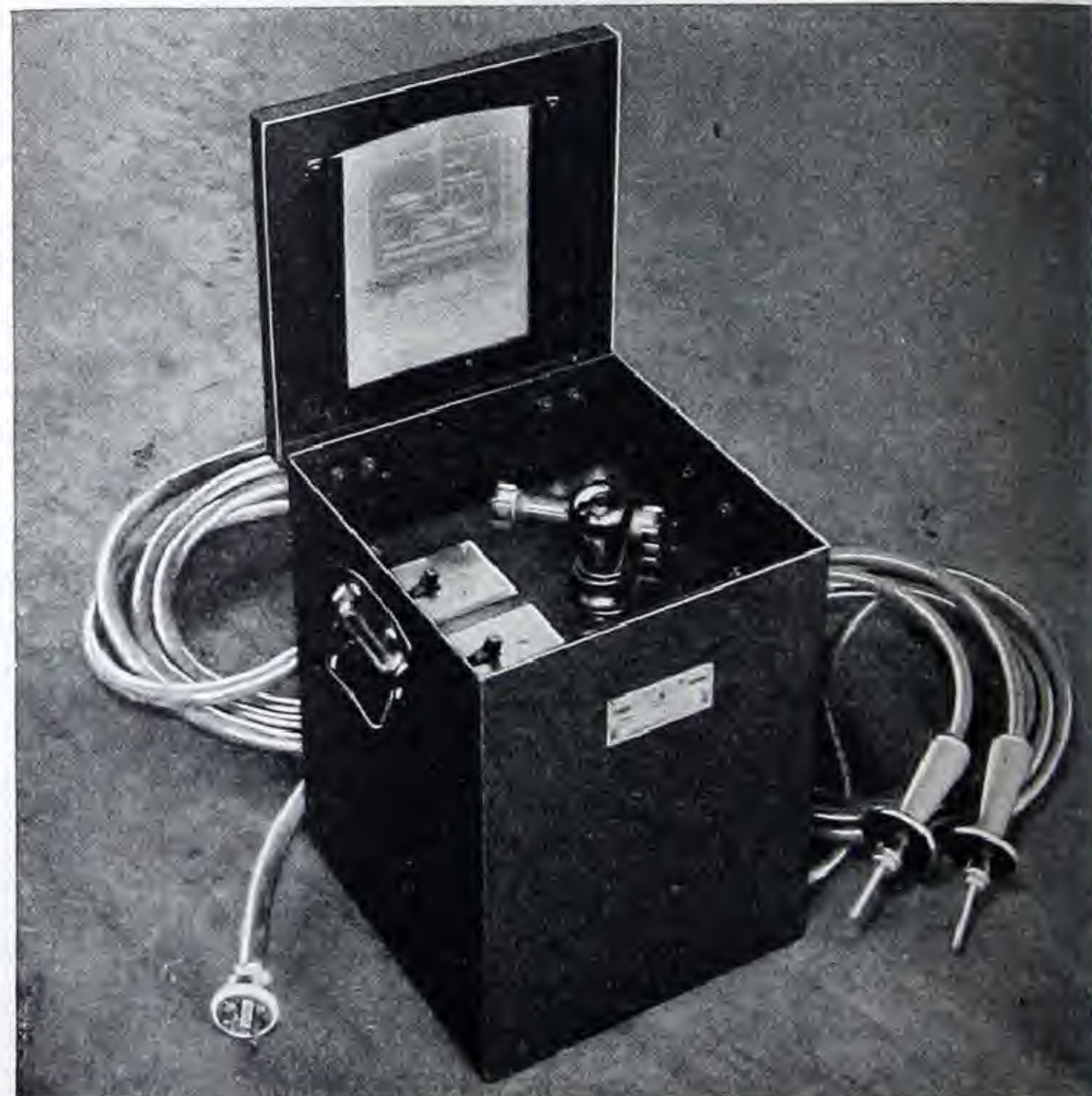
Ferranti Potential Transformer for Neon Sign Service

This special potential transformer has been developed for testing the voltage of gaseous tube transformers. An ordinary potential transformer can not be used, as it draws so much current that the voltage of the high reactance gaseous tube transformer under test, would be reduced to one-half or three quarters of the open circuit voltage.

This special potential transformer is wound for voltages up to 20,000 and with a ratio of 100 to 1. It is compensated for the burden of the moving iron voltmeter which is supplied with it. The total error of the complete equipment, including the meter, will not be over 2%, and probably about 1%. The transformer is mounted in a portable metal case and filled with compound to protect the windings from moisture.

Price on application.

FERRANTI INSULATION TESTING SET



Ferranti portable insulation testing set.

This insulation testing set has a capacity of 500 volt-amperes and is suitable for connection on 110 volts, either 25 or 60 cycles. Testing voltages of 900, 1,100, 1,500 volts are available.

Prices on application.



Type CC

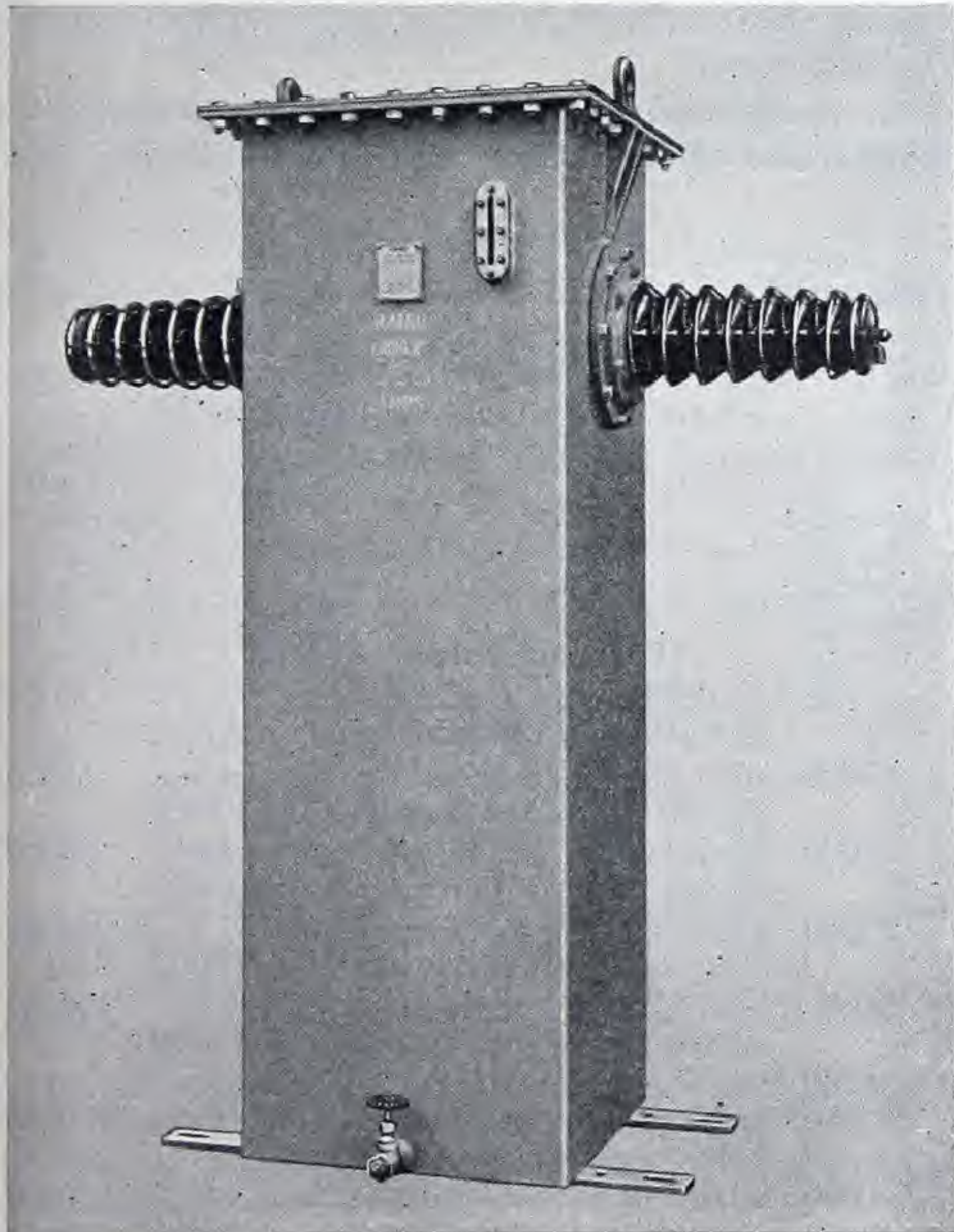
FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers

TYPE "CC" (COUNPOUND- FILLED)

The Type "CC" Surge Absorber is somewhat similar in construction to the Type "M." There may be one or more cylindrical coils mounted in a round case filled with compound. The dissipators are cylindrical and well insulated from the coils. The bushings and leads are brought out at the bottom of the tank. It is arranged for cross-arm mounting.

The Type "CC" Surge Absorber is built in capacities from 5 to 50 amperes, and in voltages up to and including 12,000.



Standard Type "CO" oil-filled Ferranti Surge Absorber supplied for 46,000 volt circuits up to 300 amperes.

TYPE "CO" (OIL-FILLED)

The Type "CO" Surge Absorber is built of one or more cylindrical coils and is similar in design to the Type "CC" except for the tank. This type also, is oil-insulated. The bushings and leads are brought out at the sides of the tank. The mounting arrangements permit this type to be installed either on a platform or on two cross-arms on one pole.

The Type "CO" is built in capacities from 5 to 50 amperes or 15000 volts, from 10 to 25 amperes for 25000 and 35000 volts, from 10 to 50 amperes for 46000 volts (140 KV dry flashover) and 25 to 300 amperes for 46000 volts (190 KV dry flashover).

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers

Standard Type "DO" oil - filled Ferranti Surge Absorber, supplied in capacities above 50 amperes for 8,000 and 15,000 volt circuits.

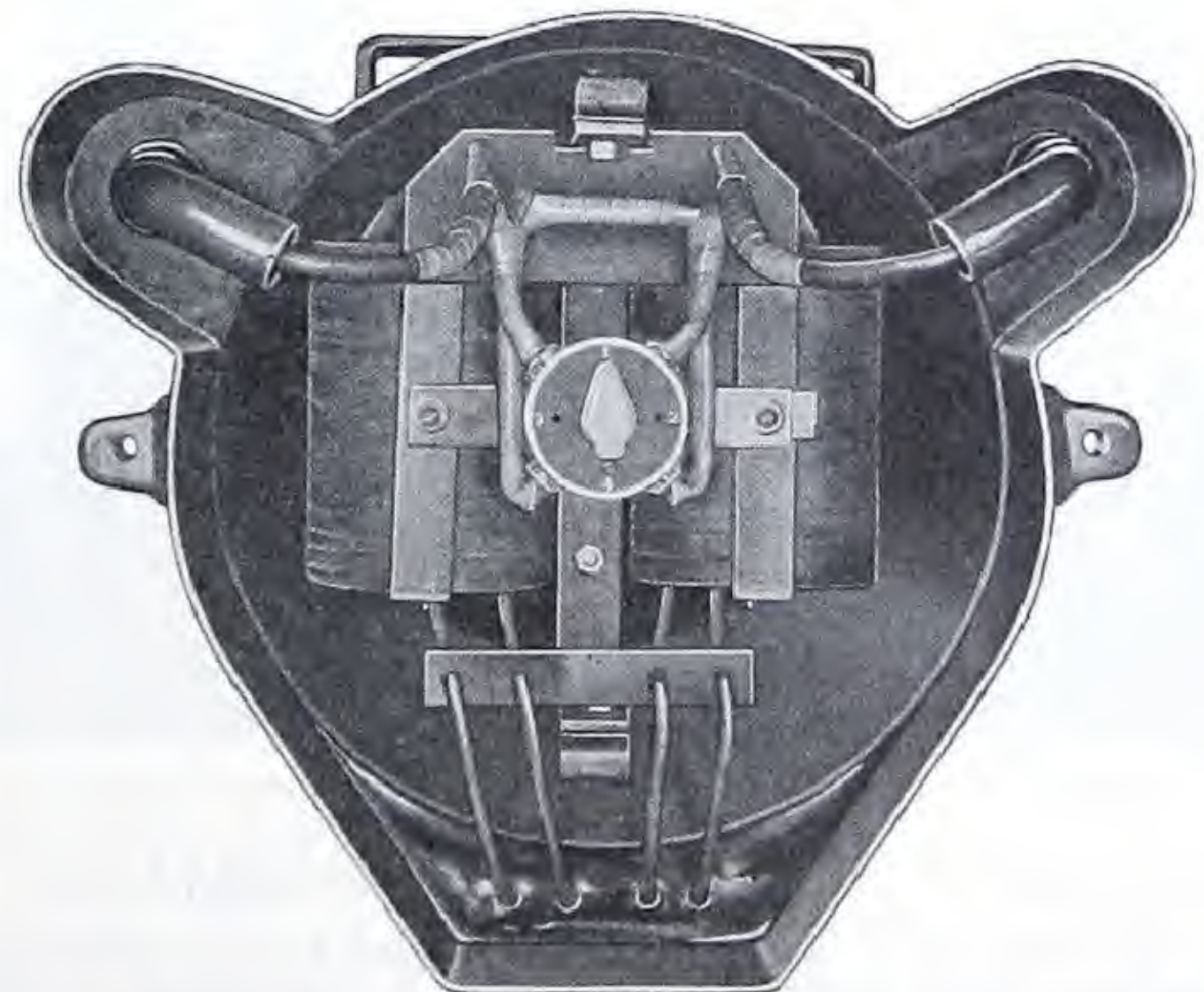
For voltages of 25000 and 33000, this type is supplied in capacities above 25 amperes and it is similar to the illustration except for higher voltage bushings.



TYPE "DO" (OIL-FILLED)

Disc coils are used and the coil stack is mounted in a round or oval case filled with oil. The bushings are brought through the cover. The dissipators are circular in shape and are placed between each pair of coil sections. In the higher voltage absorbers, the dissipators are fitted with piped edges to eliminate the danger of corona. The dissipators are insulated from the coils with paper and pressboard washers.

The Type "DO" Surge Absorber is supplied in all current ratings above 50 amperes in the 8000 and 15000 volt classes and in all current ratings above 25 amperes in the 25000 and 35000 volt classes.

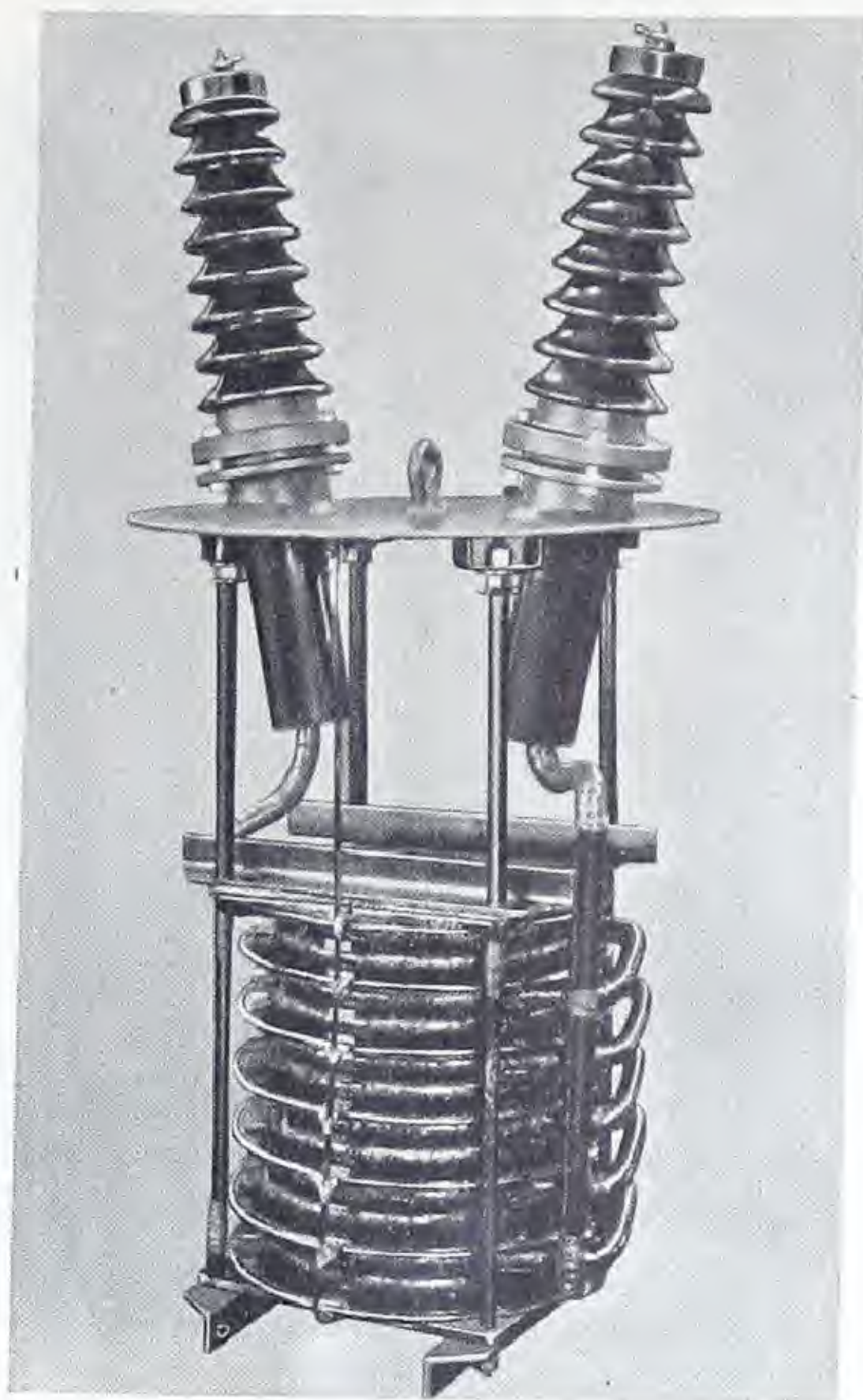


Ferranti Surge-Proof Distribution Transformer with Two Surge Absorbers Built In, for Use on Delta Lines

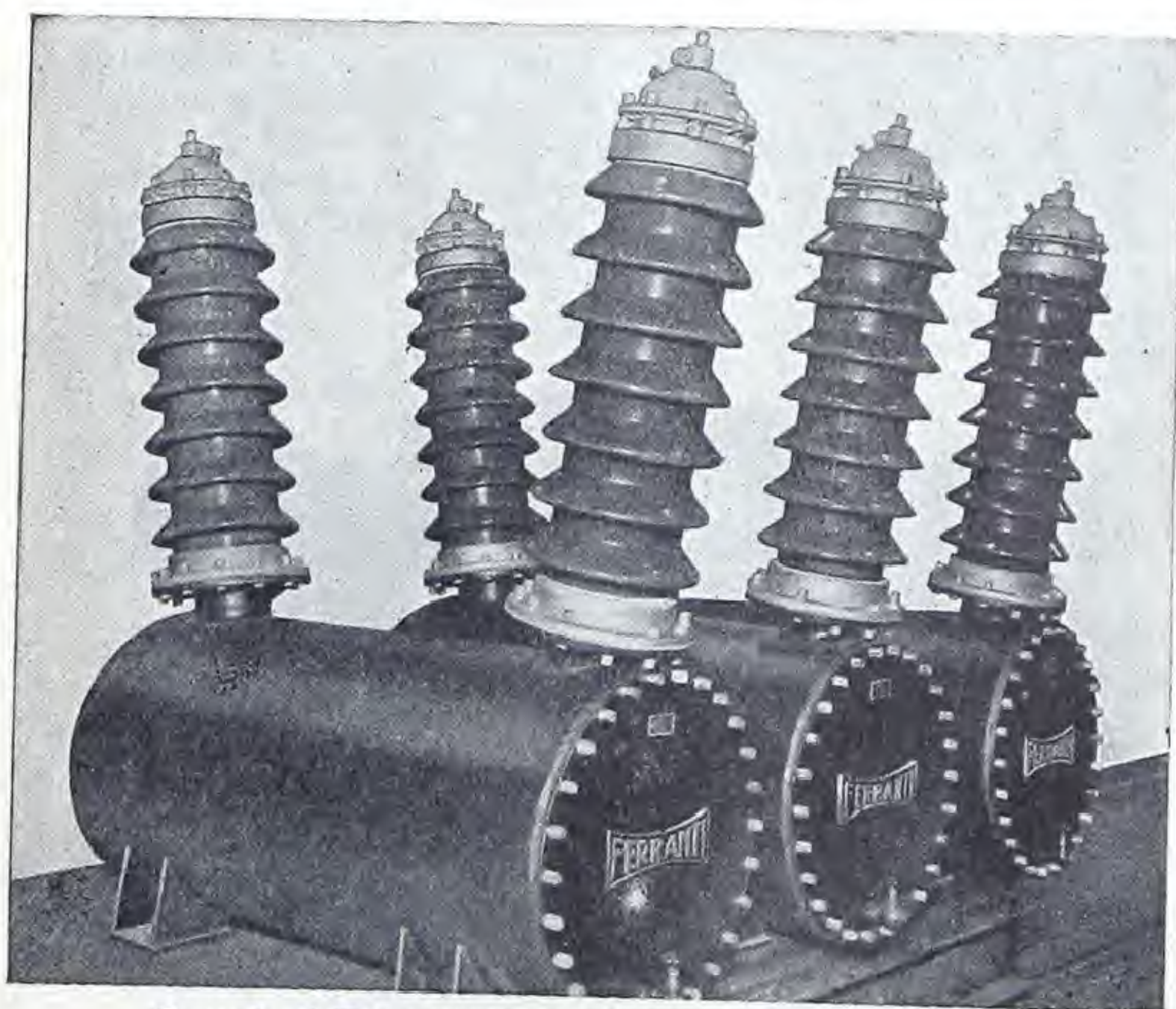
Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers



Windings of a standard Type "DO" Ferranti Surge Absorber with disc coils, and dissipator plates interleaved between the coils from which they are well insulated.



Standard Type "H" oil-filled Ferranti Surge Absorber

TYPE "H" (OIL-FILLED WITH CONSERVATOR)

The Type "H" Surge Absorber is used for all currents in voltages 66000 and up. The coils are cylindrical or disc-shaped, and the coil stack is mounted in a round tank filled with oil. Due to the high voltage stress, the coil stack is insulated from the dissipators with micarta cylinders; collars and washers are used on the ends to give the regular creepage distance to ground. The dissipators are cylindrical in form.

FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers

Ferranti Surge Absorbers are supplied as separate units for pole mounting in the smaller capacities and for platform mounting in the higher ratings. Where Surge Absorbers are being ordered in conjunction with new transformers which they are to protect, considerable saving may be made in some cases by having the Surge Absorbers installed inside the transformer tank. The Absorbers, of course, are connected in series with the high voltage leads, and, as no discharge to ground occurs, there is no objection to placing these inside the case. Ferranti Surge-Proof Transformers are regularly provided with over-size, high-voltage bushings.

For Y-connected lines with the neutral grounded, only one Surge Absorber is required per transformer. Where only one Surge Absorber is installed in the transformer, the corresponding high tension bushing is identified on the outside by a plate welded to the bushing pocket; this plate is marked "Line." Another plate on the other high tension pocket is marked "Neutral." Thus, they can be easily identified when erecting the transformer, and this eliminates the necessity of raising the cover.

On delta-connected lines for single-phase service, two Surge Absorbers are mounted inside the transformer case.

Information Required to Determine the Full Rating of the Surge Absorber for any Installation

STANDARD VOLTAGE RATINGS

Standard Surge Absorber Voltage Rating	For Line Voltage Rating	Where line insulator 60 cycle dry flashover voltage | does not exceed
600	all voltages up to 600	10000
8000	2300/4000Y grounded or ungrounded, all delta lines between 2500 and 8000	55000
12000	6600/11400Y grounded or ungrounded, all delta lines between 8000 and 12000	70000
15000	13200/22000Y solidly grounded, all delta lines between 12000 and 15000	90000
25000	13200/22000Y ungrounded, all delta lines between 15000 and 25000	120000
35000	all delta lines between 25000 and 35000 and Y-connected lines with circuit voltage between 25000 and 35000.	150000
46000	all delta lines between 33000 and 46000	140000
46000	all delta lines between 33000 and 46000	190000
66000	all delta lines between 46000 and 66000	260000
88000	all delta lines between 66000 and 88000	330000
110000	all delta lines between 88000 and 110000	400000
132000	all delta lines between 110000 and 132000	475000

Having determined the proper voltage rating of the surge absorber it is necessary to know the normal line current of the apparatus to be protected and to keep in mind what increase may be expected in this line current in the near future. The surge absorber must carry this line current continuously and from this the proper rating is determined.

Prices on application.

FERRANTI DISTRIBUTION TRANSFORMERS

Surge Absorbers

In general, a given surge absorber, unless specially designed to do so, should not be used to protect apparatus whose normal rating is less than 60% of the rating of the surge absorber. That is, 100 ampere, 33,000 volt absorbers can be used to protect a 60 ampere, 33,000 volt transformer, but not a 50 ampere 33,000 volt transformer. The protection given the transformer of the lower current rating is not sufficient for the factors of safety normally used in transformer design. The only exception is the 10 ampere absorber designed for voltages greater than 15,000 volts. As this is the smallest standard current rating in these voltages, these 10 ampere absorbers are specially designed to protect transformers of lower current ratings. Similarly, the 5 ampere absorber in the lower voltages is designed with extra inductance to protect transformers as small as 3 kv-a. where the current rating may be less than 1 ampere. The 100 ampere 33,000 volt surge absorber will, however, effectively protect a 200 ampere 33,000 volt transformer. It is not, however, designed to carry double load continuously, so that this is an incorrect application except where the transformer is at present under-loaded. Thus, in making for quotations the rating of the apparatus to be protected must also be given.

Ferranti Surge Absorbers are built in the standard voltage ratings in capacities as follows:

Voltage Rating	Standard Current Ratings
8000	5, 10, 15, 25, 35, 50, 75, 100, 150, 200, 250 and 300 amperes.
12000	5, 10, 15, 25, 35 and 50 amperes.
15000	5, 10, 15, 25, 35, 50, 75, 100, 150, 200, 250 and 300 amperes.
25000	10, 15, 25, 35, 50, 75, 100, 150, 200, 250 and 300 amperes.
35000	10, 15, 25, 35, 50, 75, 100, 150, 200, 250 and 300 amperes.
46000	10, 15, 25, 35 and 50 amperes (low flashover).
46000	25, 50, 100, 150, 200 and 300 amperes (high flashover).
66000	50, 100, 150, 200 and 300 amperes.
88000	50, 100, 150, 200 and 300 amperes.
100000	50, 100, 150, 200 and 300 amperes.
132000	50, 100, 150, 200 and 300 amperes.

Summarizing the above, the following essential information required for quoting on Surge Absorbers:

1. 60 cycle dry flashover of transmission line insulators or manufacturer's number of insulator.
2. Rated voltage of the line, and if star-connected give the circuit voltage and state whether grounded or ungrounded.
3. Wood pole or steel tower construction. If wooden poles, are insulator pins steel or wood?
4. The normal line current of apparatus to be protected stating what increases may be expected in this line current in the near future.
5. The type of apparatus (that is, generator, transformer, etc.) and the rating of the apparatus to be protected.
6. Frequency.
7. Line short circuit current.

The following information should be provided if possible:

8. Surge impedance of the line.
9. Operating history, that is whether conditions are severe, etc.

Prices on application.

LIGHTNING ARRESTER GROUND FITTINGS

GARTON-DANIELS TYPES



Malleable Iron
Ground Point
External Type



Malleable Iron
Ground Point
Internal Type



Ground Wire
Disconnecter

BRASS CAPS For 3/4-Inch Pipe

List No.	Description	Std. Pkg.	List Price Each
50079	For No. 4 or 6 wire.....	48	\$0.45
50428	For No. 0 wire or cable.....	48	.45
50429	For 1/4-inch cable.....	48	.45
For 1-Inch Pipe			
50432	For No. 4 or 6 wire.....	48	.55
50433	For No. 0 wire or cable.....	48	.55
50434	For 1/4-inch cable.....	48	.55

BRASS COUPLINGS For 3/4-Inch Pipe

50080	For No. 4 or 6 wire.....	12	.40
50430	For No. 0 wire or cable.....	12	.40
For 1-Inch Pipe			
50435	For No. 4 or 6 wire.....	12	.50
50436	For No. 0 wire or cable.....	12	.50

MALLEABLE GROUND POINTS For 3/4-Inch Pipe

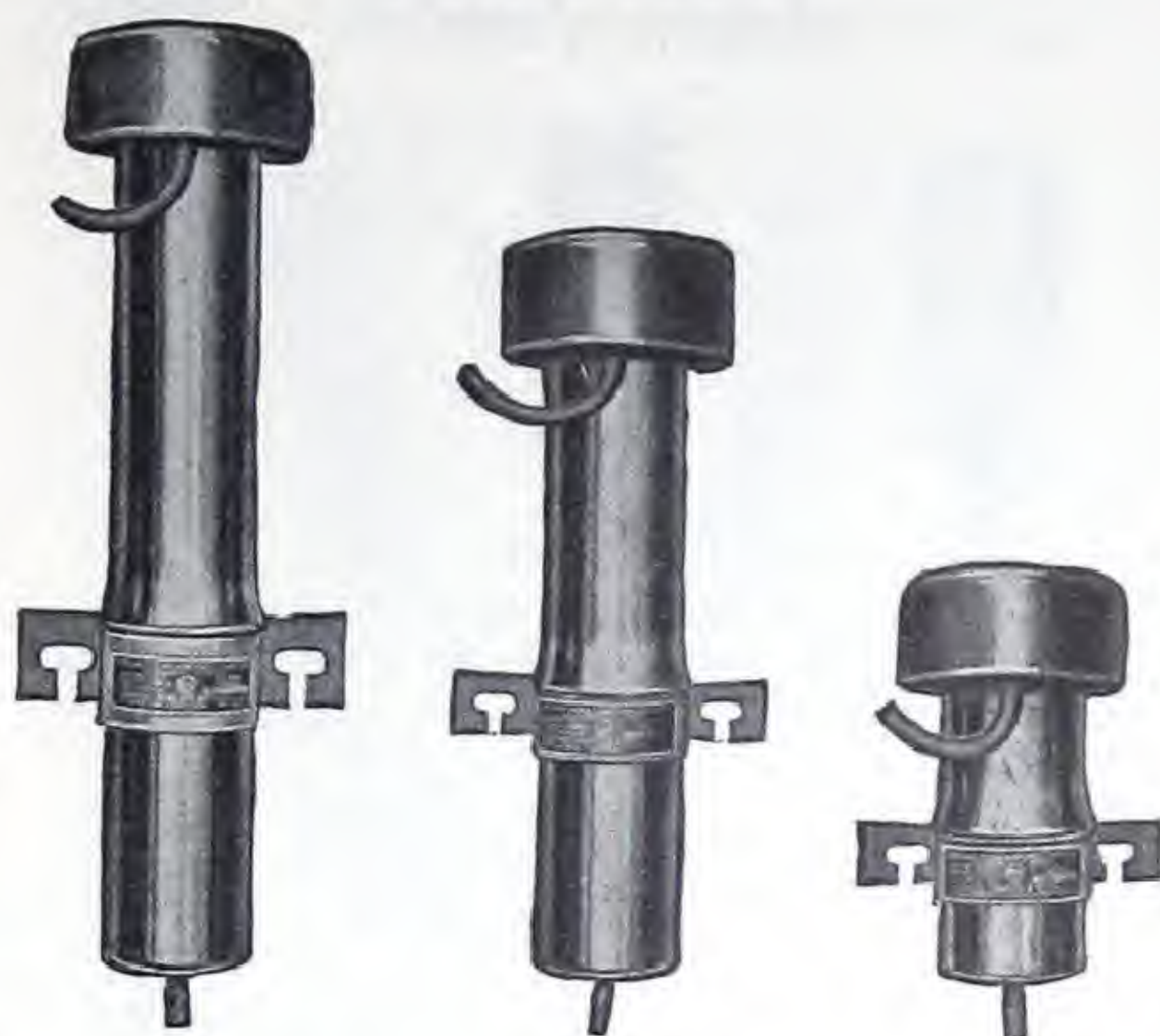
50081	External Type.....	48	.45
50431	Internal Type.....	48	.40
For 1-Inch Pipe			
50437	External Type.....	48	.55
50438	Internal Type.....	48	.50

MISCELLANEOUS

50082	Iron ground plate tapped for 3/4-inch pipe.....	12	1.20
50444	Ground wire disconnecter for No. 4 or 6 B. & S. solid.....	12	1.25
50936	Steel driving cap for 3/4-inch pipe...	12	1.20
50937	Steel driving cap for 1-inch pipe.....	12	1.40

CRYSTAL VALVE LIGHTNING ARRESTERS

350-15000 Volts A.C.



Crystal Valve Lightning Arresters represent an outstanding development in the design of highly efficient lightning protective apparatus and are the result of some highly successful researches in the rectifying properties and valve characteristics of refractory conducting crystals. They are characterized by the following important advantages:

- Low initial or relief voltage for lightning disturbances.
- High discharge rate due to extremely low internal impedance.
- They are of the true valve type with all its attendant advantages.
- They suffer no measurable deterioration in service.
- Cathode Ray Oscillograph tests show that their speed of operation is exceedingly high.
- Cathode Ray tests show time or speed characteristics are little affected by the steepness of the wave points.
- Do not cause radio interference.
- Bodies and caps are made from the highest grade of wet process porcelain.
- Their operating characteristics permit of their handling rapidly recurring discharges over long periods of time without danger of self-destruction.
- Their impedance decreases as the severity of the discharge increases.
- They require no inspection other than a visual inspection.
- They are small in size and of low first cost, permitting them to be installed directly on the transformer pole and used to protect small transformers as well as large.
- Due to their operating characteristics they have an extremely long life.

Crystal Valve Arresters are regularly provided with line and ground leads of No. 6 B & S gauge stranded cable, 18 inches long and with hot galvanized strap hangers.

Voltage Ratings

All voltages specified are maximum phase-phase voltages. For straight single phase circuits use arresters recommended in Table 1.

Treat single phase circuits split from two phase, and single and two phase circuits split from three phase circuits in accordance with the recommendations covering the particular type of circuit from which they are split.

For two phase four wire ungrounded circuits use arresters recommended in Table 1. For two phase three wire circuits

CRYSTAL VALVE LIGHTNING ARRESTER

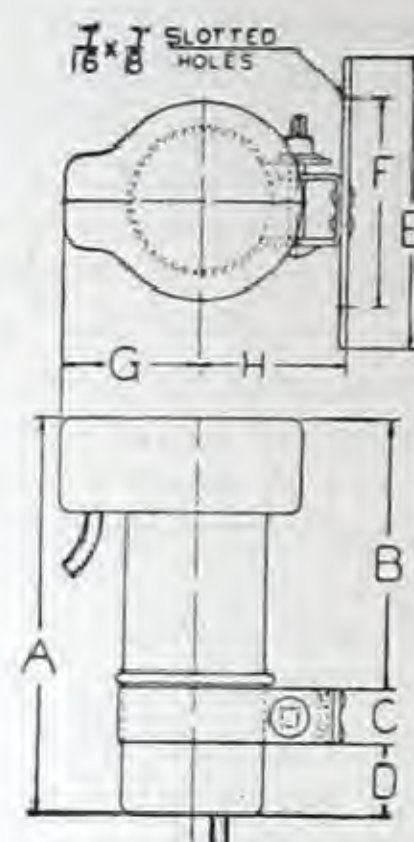


Fig. 1—Nos. 50935, 50927, 50931, with type "CA" Mounting Bracket

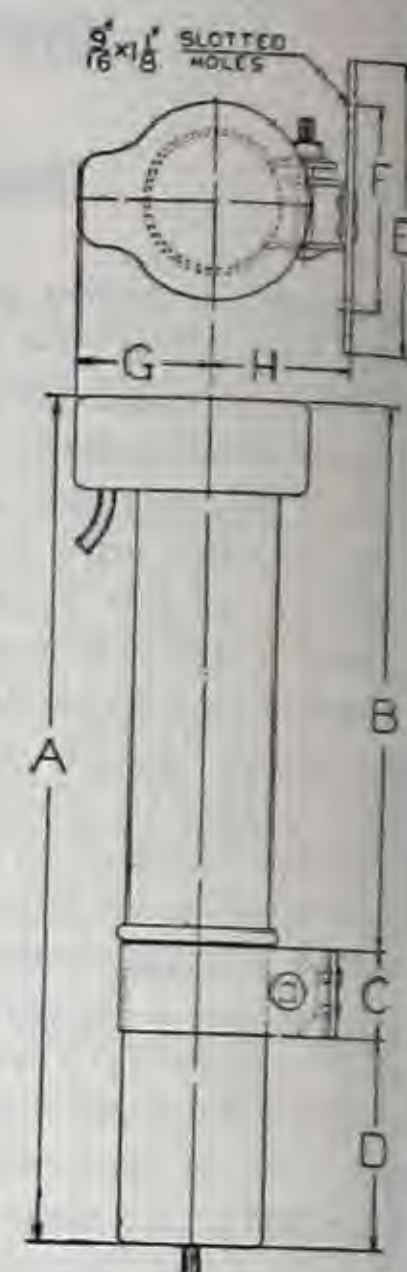


Fig. 2—Nos. 50932, 50933, and 50934, with type "DA" Mounting Bracket

with ungrounded neutral use arresters recommended in Table 1 for the phase wires; for the neutral wire use arresters rated at 71 per cent of the phase-phase voltage.

For the neutral wire of three phase four wire ungrounded Y circuits use arresters rated at 58 per cent of the phase-phase voltage.

For neutral protection on either two or three phase circuit where the neutral is solidly grounded, use Types T-300, R, 1 or NS arresters. If, due to unbalancing, the voltage between neutral and ground is between 350 and 750 volts, use type CV form D arrester, listed below.

C. V. Arresters fitted with stud terminals, also various designs of mounting brackets, are listed hereinafter.

List No.	Type	Table 1 For Delta or Ungrounded Y Three Phase Systems Volts	Table 2 For Three Phase Systems with Solidly Grounded Neutral Volts
		Volts	Volts
50935	CV Form D.....	350- 1000	
50927	CV Form 3.....	1000- 3000	3000- 5000
50931	CV Form 7.....	3000- 6000	5000- 9000
50932	CV Form 8.....	6000- 9000	9000-12800
50933	CV Form 9.....	9000-12000	12800-15000
50934	CV Form 10.....	12000-15000	15000-18000

Dimensions for CV Arresters

List No.	Type	(With Line and Ground Leads) Dimensions in Inches						
		A	B	C	D	E	F	G
50935	CV- D.....	6 1/8	4 7/8	1 1/4	1 1/8	6 5/8	4 3/4	2 11/8
50927	CV- 3.....	9 1/8	6 1/8	1 1/4	1 1/8	6 5/8	4 3/4	2 11/8
50931	CV- 7.....	16 1/8	10 7/8	1 1/4	1 1/8	6 5/8	4 3/4	2 11/8
50932	CV- 8.....	20 1/8	13 3/8	2	5 3/8	6 3/4	4 3/4	2 11/8
50933	CV- 9.....	26 1/8	17 1/8	2	7 3/8	6 3/4	4 3/4	2 11/8
50934	CV-10.....	31 1/8	20 1/8	2	9 3/8	6 3/4	4 3/4	2 11/8

List No.	Type	Std. Pkg.	List Price Each
50935	Type CV Form D Arrester.....	12	\$6.00
50927	Type CV Form 3 Arrester.....	12	7.00
50931	Type CV Form 7 Arrester.....	12	13.00
50932	Type CV Form 8 Arrester.....	6	17.00
50933	Type CV Form 9 Arrester.....	6	23.00
50934	Type CV Form 10 Arrester.....	6	30.00

*Voltage ratings given apply only for installations at altitudes up to 4000 feet. For altitudes above 4000 feet special recommendations will be made.

CRYSTAL VALVE LIGHTNING ARRESTERS

Stud Terminal Types

Crystal Valve arresters listed below differ from the standard type arresters listed heretofore only in that stud terminals are supplied in place of wire leads. Voltage ratings for corresponding types are the same as given for standard types on preceding page. Dimensions are practically the same as standard types excepting in the over-all length, each stud terminal adding approximately 1½ inches.

GROUND STUD TERMINAL TYPE

			List
		Std. Pkg.	Price Each
27	Type CV form 3 arrester	12	7.00
31	Type CV form 7 arrester	12	13.00
32	Type CV form 8 arrester	6	17.00
33	Type CV form 9 arrester	6	23.00
34	Type CV form 10 arrester	6	30.00

LINE STUD TERMINAL TYPE

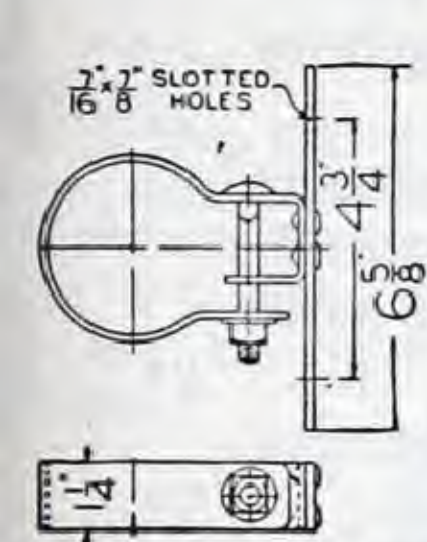
27	Type CV form 3 arrester	12	8.50
31	Type CV form 7 arrester	12	14.50
32	Type CV form 8 arrester	6	17.00
33	Type CV form 9 arrester	6	23.00
34	Type CV form 10 arrester	6	30.00

LINE AND GROUND STUD TERMINAL TYPE

27	Type CV form 3 arrester	12	8.50
31	Type CV form 7 arrester	12	14.50
32	Type CV form 8 arrester	6	17.00
33	Type CV form 9 arrester	6	23.00
34	Type CV form 10 arrester	6	30.00

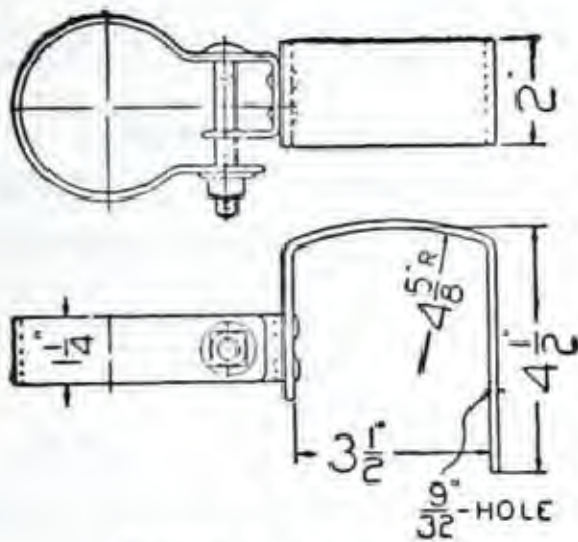
MOUNTING BRACKETS

350-6000 volts

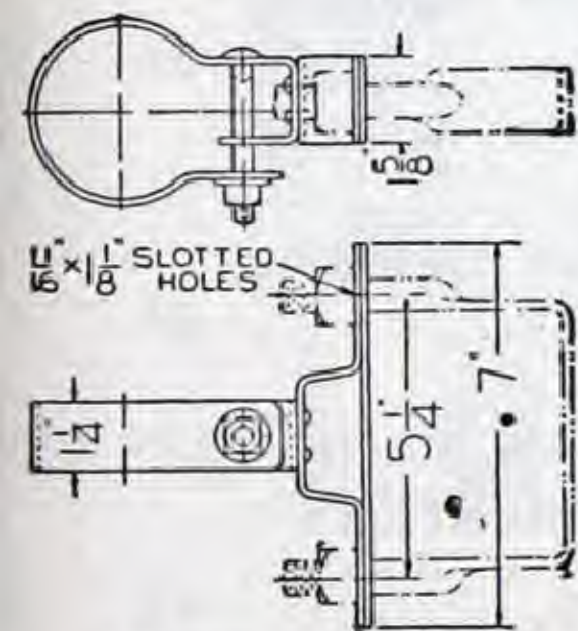


Types CA and DA Standard Equipment unless otherwise specified

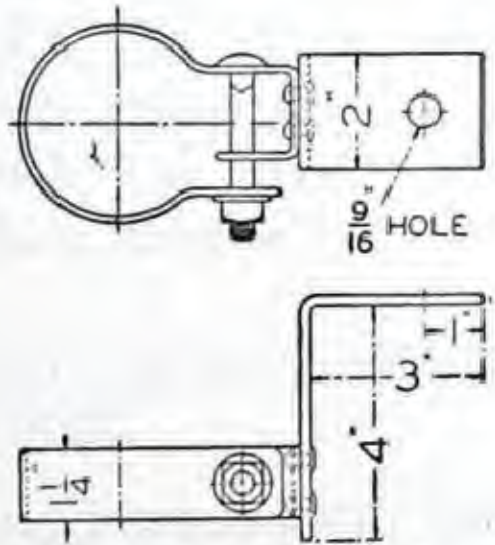
Types CA and CB have 1¼" strap as illustrated above. Types DA and DB differ only in that a 2" strap is supplied.



Types CB and DB



Types CD and DD



Types CEA and DE

Types CD and CEA have 1¼" strap as illustrated above. Types DD and DE differ only in that a 2" strap is supplied.

Types CA, CB, CD and CEA brackets are for use on Crystal Valve arresters Nos. 50935, 25, 27, 31, Nos. 60925, 27, 31, Nos. 70925, 27, 31, Nos. 80925, 27, 31. Type CA bracket is supplied unless other types are specified on order. Choice of above mounting brackets may be had without additional cost.

Types DA, DB, DD and DE brackets are for use on Crystal Valve arresters Nos. 50932, 33, 34, Nos. 60932, 33, 34, Nos. 70932, 33, 34, Nos. 80932, 33, 34. Type DA bracket is supplied unless other types are specified on order. Choice of above mounting brackets may be had without additional cost.

The Types CA and DA brackets are designed for cross arm or flat face mounting and are the type generally preferred by the user. The Types CB and DB are saddle type brackets for the standard 3½ x 4½ inch cross arms. The Types CD and DD are clamp type brackets designed

CRYSTAL VALVE LIGHTNING ARRESTERS

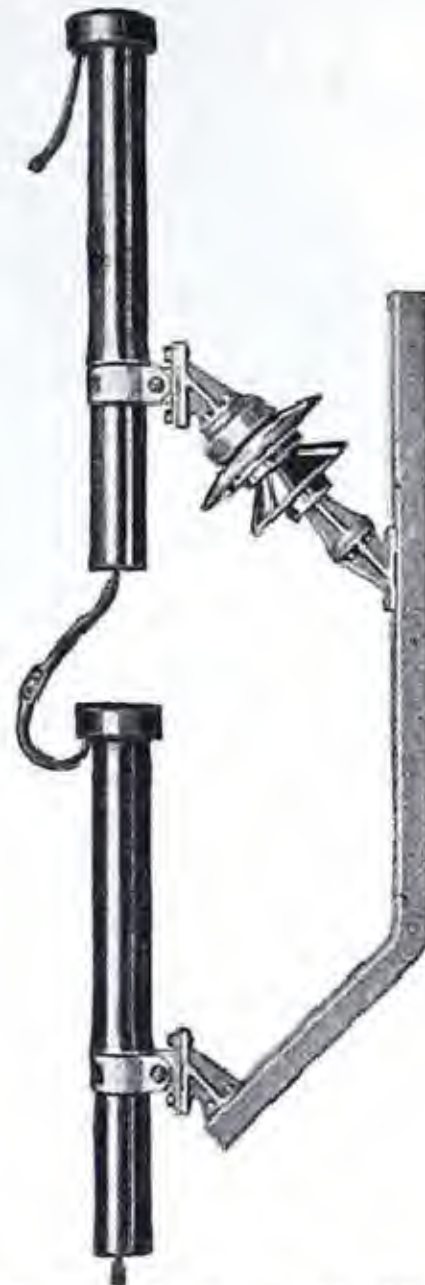
for use with standard Pierce cross arm straps and may be used with either the No. 1001-2-3-4 or 2001-2-3 or 4 Pierce straps; the Pierce straps are not included as a part of the bracket. The Types CE and DE are semi-saddle type brackets bolting to the top of the arm and may be used with any standard arm.

All brackets are made from heavy steel stock, hot galvanized; are riveted and spot welded and the entire assemblies are of great strength and durability and easy to install.

15000-25000 VOLTS A. C.



Type CV form 12, No. 56787, 15,000 to 20,000 Volts, A. C.



Type CV form 11, No. 51001, 20,000 to 25,000 Volts, A. C.

The type CV form 12 Crystal Valve arresters are rated for use on systems operating at from 15,000 to 20,000 volts, and type CV form 11 are rated for use on systems operating at from 20,000 to 25,000 volts. Both types operate on principles identical with those inherent to the lower voltage Crystal Valve arresters, and consequently possess the same features of high efficiency, reliability and freedom from deterioration.

Arresters are shipped in knockdown form and are accompanied with prints showing clearly the method of reassembling for service.

Voltage Rating

The type CV form 12 Crystal Valve arrester is designed for application to Delta or ungrounded Y systems having phase to phase voltages of from 15,000 to 20,000. It is designed for use on solidly grounded Y system having phase to phase voltages of 18,000 to 25,000. On a four-wire non-grounded Y system, the type CV form 12 arrester should be used on the phase wires, while the type CV form 9 arrester should be used on the neutral. On four-wire Y systems with solidly grounded neutral for neutral protection use standard Crystal Valve arresters of a rating commensurate with the maximum voltage existing between neutral and ground.

The type CV form 11 Crystal Valve arrester is designed for application to Delta or ungrounded Y systems having phase to phase voltages of from 20,000 to 25,000. It is designed for use on dead grounded Y systems having phase to phase voltage of from 25,000 to 30,000 volts. On a four-wire non-grounded Y system, the type CV form 11 arrester should be used on the phase wires while the type CV form 10 arrester should be used on the neutral. On four-wire Y systems with solidly grounded neutral, for neutral protection use standard Crystal Valve arresters of a rating commensurate with the maximum voltage existing between neutral and ground.

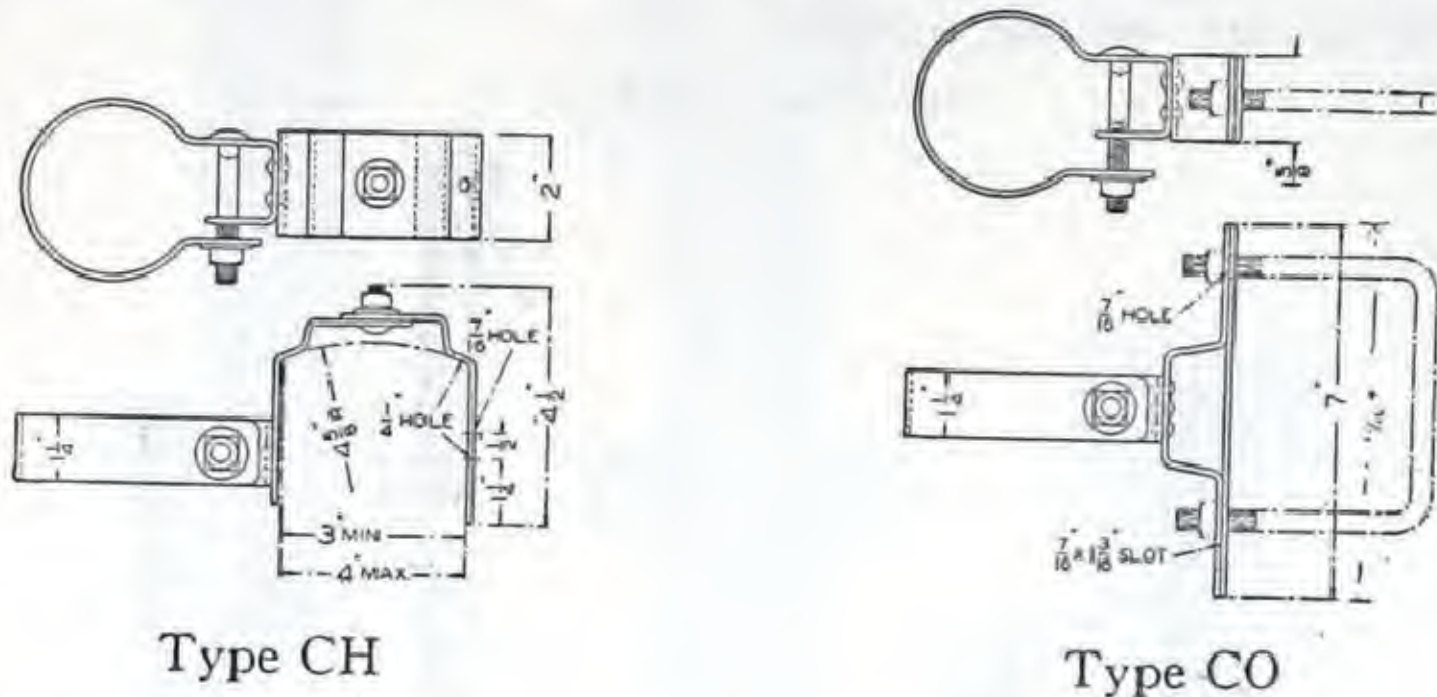
The above ratings apply only for installations at altitudes up to 6,000 feet. For altitudes above 6,000 feet special voltage ratings will be given upon request.

List No.		Approx. Height	Std. Pkg.	List Price Each
56787	Type CV form 12 arrester . . .	52½"	3	\$54.00
51001	Type CV form 11 arrester . . .	70½"	1	84.00

CRYSTAL VALVE LIGHTNING ARRESTERS

Mounting Brackets

350-6000 Volts



Type CH

Type CO

The type CH is an adjustable saddle type bracket and will fit any standard cross arm from the $3\frac{1}{4} \times 4\frac{1}{4}$ to the 4×5 inch, inclusive.

The type CO is a bracket generally similar to the type CH, but is designed for use with Slater or similar U-bolts made from $\frac{3}{8}$ " diameter stock. U-bolts are not included as a part of the bracket, but will be supplied with same at an extra cost. For convenience in ordering, the four standard sizes are listed below.

6000—15000 Volts A.C.

The type DA bracket is designed for cross arm or flat surface mounting and is the type generally preferred by the user.

The type DB is a saddle type bracket for the standard $3\frac{1}{2} \times 4\frac{1}{2}$ inch cross arm and is made only in the size shown.

The type DD is a clamp type bracket designed for use with standard Slater or similar cross arm straps, being used generally with the standard $\frac{5}{8}$ inch straps, though the standard $\frac{1}{2}$ inch is also frequently used as well. Cross arm straps are not included as a part of the bracket, but will be supplied with same at an extra cost. For convenience in ordering, the four standard sizes are listed below.

The type DE is a semi-saddle type bracket bolting to the top of the arm and may be used with any standard arm.

The type DH is an adjustable saddle type bracket and will fit any standard cross arm from the $3\frac{1}{4} \times 4\frac{1}{4}$ to the 4×5 inch, inclusive.

All brackets are made from heavy steel stock, hot galvanized; bolts, nuts and washers are likewise hot galvanized; mounting members are attached to the arrester clamping member both by riveting and spot welding and the entire assemblies are such that brackets of great strength, durability and ease of application are provided. All galvanizing will meet the National Electric Light Association specifications.

When crystal valve arresters are ordered by the list number and/or type only as given in the several listings appearing herein, the type DA mounting bracket will be supplied. Where another type of bracket is desired instead of the type DA it is necessary to specify on order both the list number or type of arrester desired and the type number of the bracket.

Arresters are supplied with any of these five types of mounting bracket at no increase in price.

CROSS-ARM STRAPS

List No.	Size Arm Inches	Size Strap Inches		List Price Each
		Flat Section	Round Section	
59806	$3\frac{1}{4} \times 4\frac{1}{4}$	$\frac{1}{4} \times 1\frac{3}{8}$	$\frac{5}{8}$	On Request
59807	$3\frac{1}{2} \times 4\frac{1}{2}$	$\frac{1}{4} \times 1\frac{3}{8}$	$\frac{5}{8}$	" "
59808	$3\frac{3}{4} \times 4\frac{3}{4}$	$\frac{1}{4} \times 1\frac{3}{8}$	$\frac{5}{8}$	" "
59809	4×5	$\frac{1}{4} \times 1\frac{3}{8}$	$\frac{5}{8}$	" "

CENTRAL VALVE LIGHTNING ARRESTERS

TRANSFORMER TANK TYPE (CLASS A)

Crystal Valve Tank Type lightning arresters are made in one size only and are rated at 1000 to 3000 volts for delta ungrounded Y services, or at 3000 to 5000 volts where used on a Y service with solidly grounded neutral. They are designed especially for inside tank mounting, with transformer of any KVA capacity.

List No.	Description	Std. Pkg.	Li Pri Ea
53437	Crystal Valve transformer type lightning arrester.....	12	\$7 0
56420	Tank Type.....	12	7 0
53438	Tank grounding gap	12	7 0

CLASS B—SECONDARY CIRCUIT ARRESTERS

50960	Type S.....	12	3 0
50000	Type T-300.....	24	3 0
51082	Type LB Crystal Valve lightning arrester, single pole type. Line lead 36 inches; ground lead 18 inches.....	24	3 0
51081	Type LC Crystal Valve lightning arrester, double pole type. Line leads 36 inches; ground lead 18 inches.....	12	6 0

CLASS C—LOW VOLTAGE SIGNAL ARRESTERS

51056	Type LA Crystal Valve lightning arrester, cartridge only.....	24	1 0
50949	Type LA Crystal Valve lightning arrester, cartridge mounted on A. R. A. terminal block, including wood screws.....	24	1 0
53171	Type LI Crystal Valve lightning arrester, cartridge only.....	24	1 5
53287	Type LI Crystal Valve lightning arrester, cartridge mounted on A. R. A. terminal block, including wood screws.....	24	1 5
51389	Type LD Crystal Valve lightning arrester, cartridge only.....	24	1 5
51390	Type LE Crystal Valve lightning arrester, cartridge only.....	24	1 5
51391	Type LF Crystal Valve lightning arrester, cartridge only.....	24	1 5

CLASS D—PROTECTIVE GAPS, TANK GAPS AND NEUTRAL ARRESTERS

53438	Transformer grounding gap.....	12	2 0
50642	Type N Neutral Arrester.....	24	1 5
50643	Type NS Neutral Arrester.....	24	1 5

TYPE G PROTECTIVE GAP

List No.	Size Leads	Type Bracket	Std. Pkg.	Li Pri Ea
54275	Type G Gap..... No. 10 B. & S.	A	12	\$2 5
54505	" " " No. 10 B. & S.	B	12	2 5
54506	" " " No. 10 B. & S.	C	12	2 5
59775	" " " No. 10 B. & S.	N	12	2 5
53960	" " " No. 6 B. & S.	A	12	2 5
54507	" " " No. 6 B. & S.	B	12	2 5
54508	" " " No. 6 B. & S.	C	12	2 5
59774	" " " No. 6 B. & S.	N	12	2 5

DOMINION OIL FUSE CUTOUTS



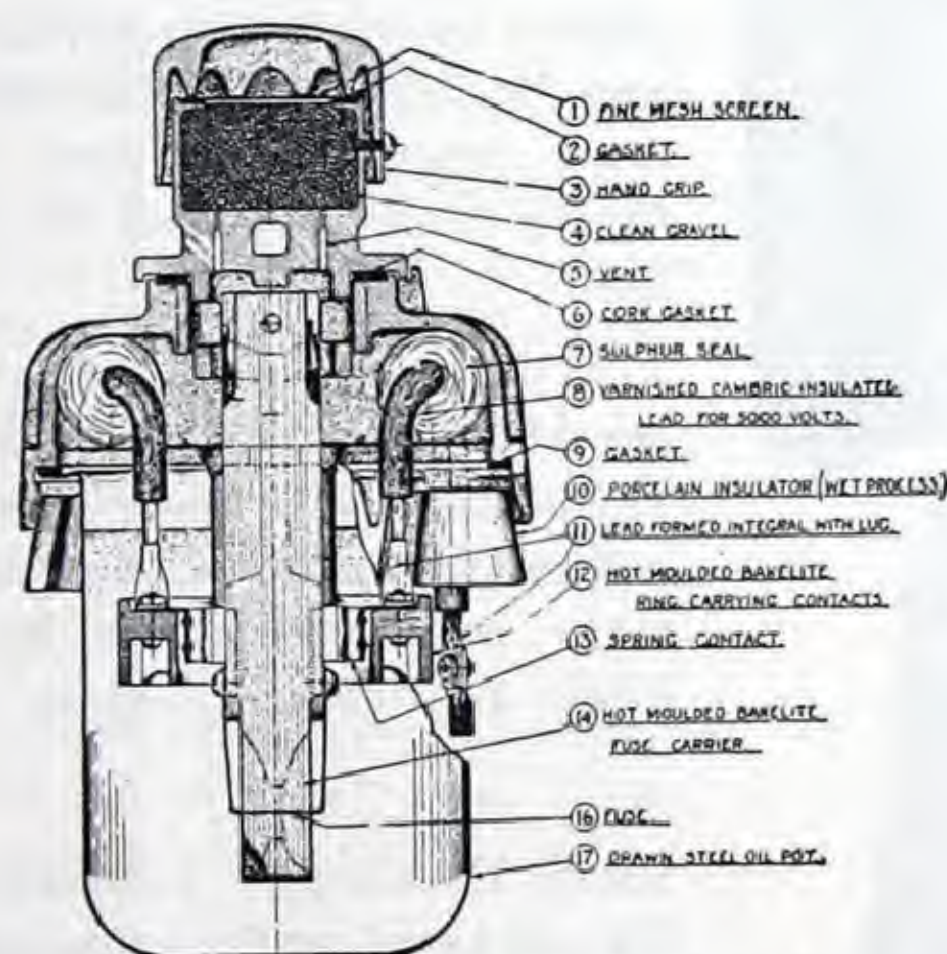
No. D-25-H2 Pole Type Oil Fuse Cutout

DOMINION OIL FUSE CUTOUTS

Oil Fuse Cutouts possess many of the advantages of the oil switch and have greater speed in opening the circuit. Their general applications are for Transformer Fusing, up to 200 k.v., Pole type or Station type, 2500/4000 volts, and for sectionalizing Branch Feeder Circuits.

They are particularly advantageous for the following applications.—

1. For Indoor Service—Industrial Plants, Commercial Buildings, Apartment Houses, Etc.
2. In applications where a limited amount of operation as switch under load is required.
3. Indoor service where the flame from an expulsion cutout would be objectionable and where quiet operation is required.
4. Where the open or exposed contacts of an expulsion cutout would be subject to corrosion by gas, sea air, etc.
5. Where the possibility of accidental contact with live parts is a source of danger.
6. For underground or subway installations, subject to flooding.



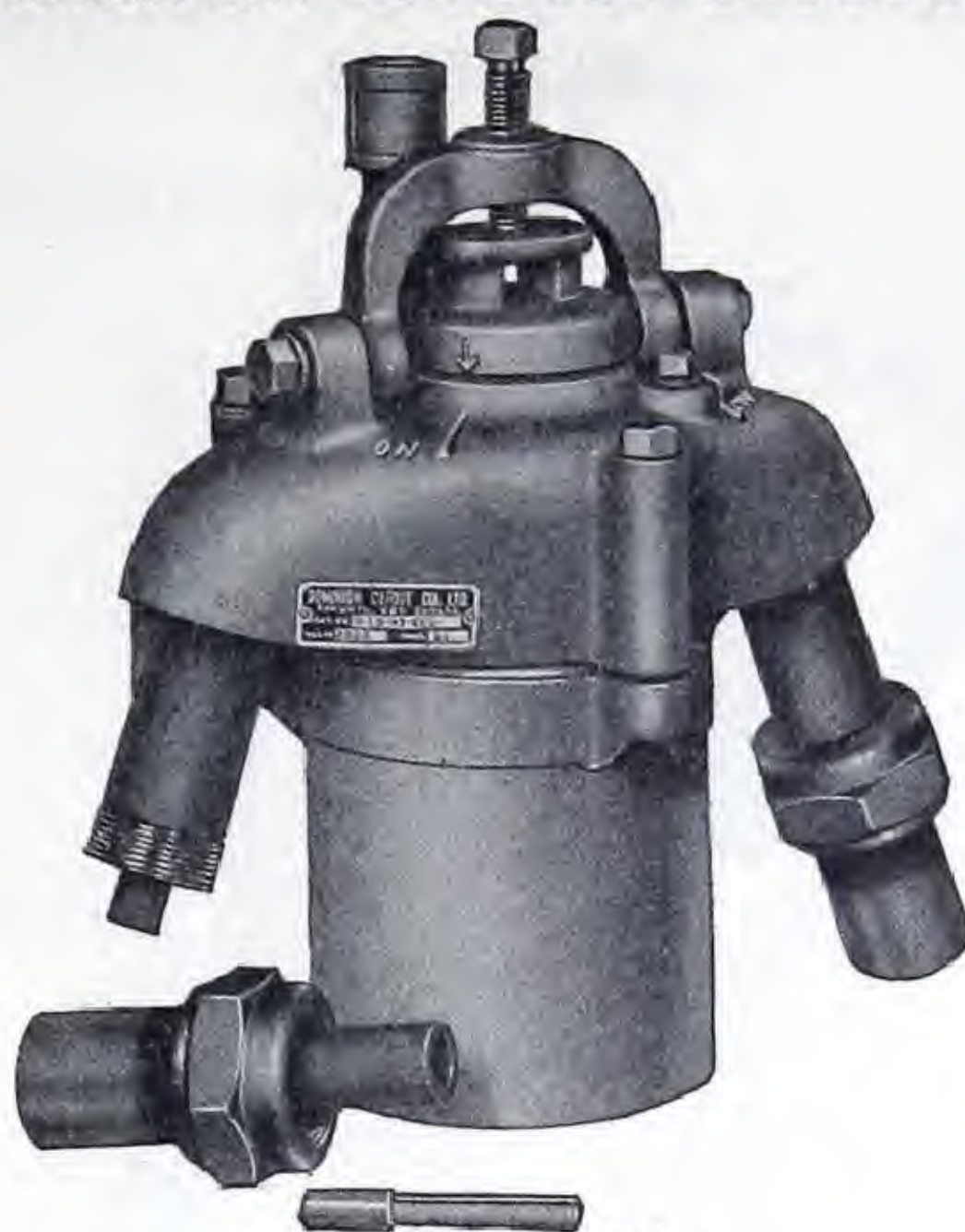
Section Type No. D-25-H2

Dominion Oil Fuse Cutouts serve a field of application midway between the oil switch with trip out coils, and the porcelain type expulsion cutout. They cost much less than oil switches, but have many of their properties and provide services impossible for the expulsion cutout.

The well known principle of breaking an arc under oil is utilized in the design of these oil fuse cutouts. The fuse link which is completely submerged in oil consists of two pieces of special spring metal connected by the fusible element. When the fuse blows, the circuit is quickly opened and the gap increased by the spring action of the metal strips.

When a heavy short circuit blows the fuse, the resulting gas with particles of oil is dissipated through vent holes in the moveable casting. It then passes through baffles which catch or hold the oil, the gas passing on under the cap to the outer air and the oil returning to the pot.

DOMINION OIL FUSE CUTOUTS



No. D-50-H3 Sub.

Subway Type Oil Fuse Cutout

The fuse carrier is positively locked into the cutout when in the "on" position and cannot be removed for re-fusing until it has been turned through 90 degrees to the "off" position.

It is highly desirable to use the correct type of oil to obtain satisfactory service. It should have a low freezing point. The exact amount of the correct grade is shipped, in a convenient container, with each cutout. The oil should be inspected from time to time to see that it is clean and at the proper level, and should be renewed if the cutout has been subjected to severe short circuits.

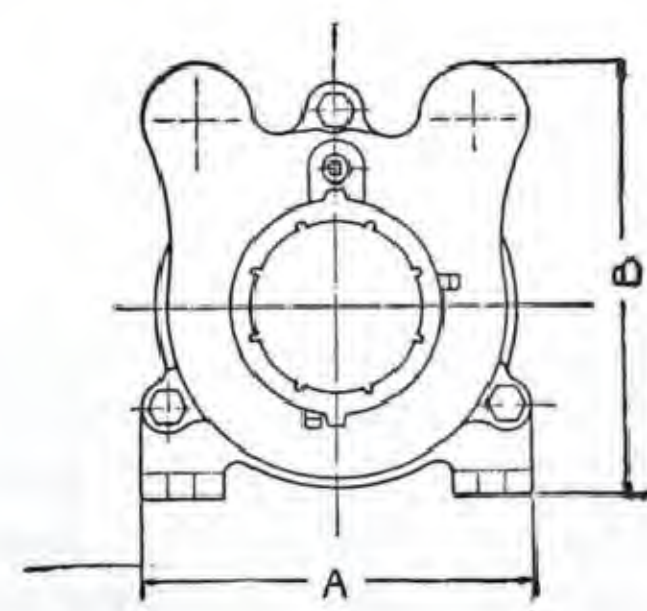
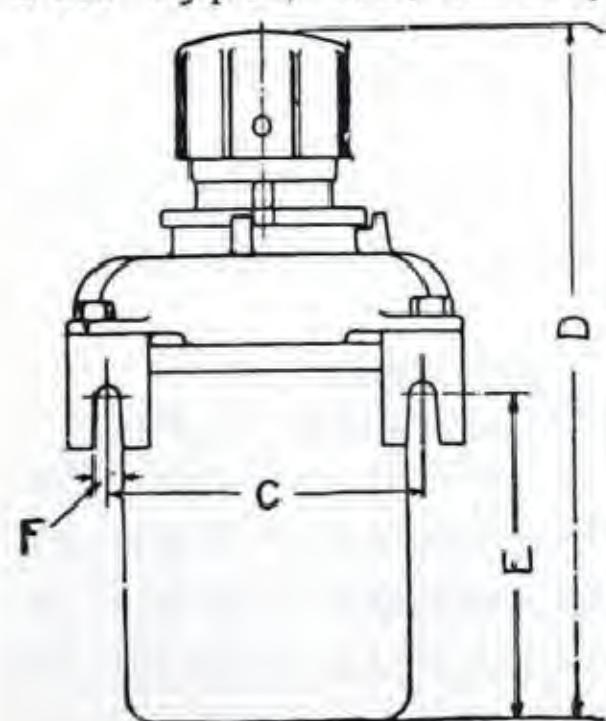
It is essential that only Dominion Fuse Links be used in these oil cutouts. Fuse wire must not be used as the rating of fuse wire in air is increased three or four times when submerged in oil.

Dominion Oil Fuse Cutouts are manufactured in both Pole and Subway types in various ratings. The Subway types have specially designed joints with copper-asbestos gaskets that make them absolutely watertight and are equipped with detachable leads for connection to lead-covered cable. Provision is made for venting through a pipe connection at the back of the cutout.

Pole Type Oil Fuse Cutouts 2500 volt (4000 volt grounded neutral)

Rating	Type	List Price Each
25 amperes	D- 25-H2	\$23.20
50 amperes	D- 50-H2	29.25
100 amperes	D-100-H2	41.50
200 amperes	D-200-H2	59.30

Prices on Fuse Links, Subway Types, 5000 and 7500 volt Pole Types, etc., on request.

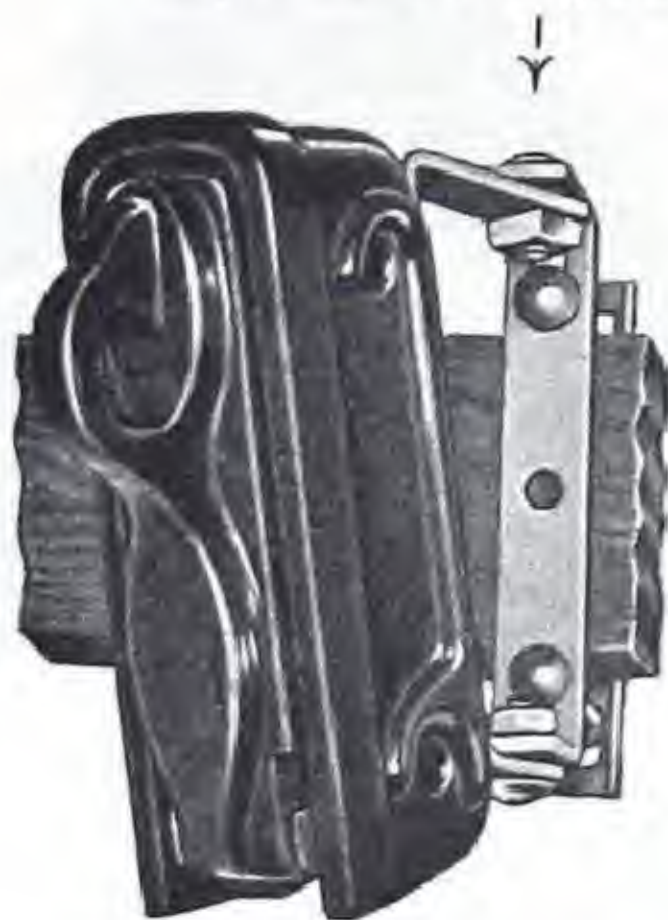


Overall Dimensions in Inches

Type	Rating Amp.	A	B	C	D	E	F
D- 25-H2	25	7 1/2"	8 3/8"	6"	13 1/4"	6 1/8"	1 1/2"
D- 50-H2	50	11 3/4"	6 3/8"	6"	14 1/16"	6"	1 1/2"
D-100-H2	100	13 1/2"	7 3/4"	6 1/4"	16 1/4"	6 1/2"	1 1/2"
D-200-H2	200	15 1/2"	8"	8"	19 3/4"	8 3/4"	9/16"

SLATER-MATTHEWS PRIMARY FUSE CUTOUTS

Adjustment of angle at this point.



Slater-Matthews 60 Amp. 5000 Volt Cutout (No. 650).

Showing detachable wet process porcelain door. Adjustable cross arm hanger is shown with cutout tilted forward and turned in toward the pole.

The expulsion fuse has so far proven to be the best and most inexpensive means for the isolation of secondary short circuits. From a protection standpoint, transformer cutouts not only prevent damage to apparatus from heating, but they block abnormally large currents which would cause damaging strains on transformer and motor windings.

The choice of a cutout from among those at present being offered and advertised requires a good deal of care and thought. The Slater-Matthews cutouts illustrated in this publication are all designed to give maximum short circuit protection. In addition, the use of wet process porcelain boxes of liberal dimensions, a removable porcelain door on the popular 5 KV size, and other features are very apparent on examination or comparison.

When a short circuit or overload occurs, the cutout becomes a current-breaking device and as such, the speed at which this is accomplished depends upon:

1. The liberal design of the fuse tube.
2. The careful design of the Fuse Link (which is the heart of the cutout).
3. Liberal flashover and creepage distances to prevent leakage after the circuit has been opened.

Every consideration has been given to all of these factors in the manufacture of Slater-Matthews expulsion cutouts.

List No.	Rating Amps.	Rating Volts	Rating as a Disconnecting Switch	Shpg. Weight
550	30	2500	40 amperes	6 lbs. ea.
650	60	5000	75 amperes	10 lbs. ea.
850	60	7500/12,500	75 amperes	12 lbs. ea.
950	150	5000	200 amperes	24 lbs. ea.

Interrupting Capacity— 30 Amp. Cutout— 600 Amperes
60 Amp. Cutout—1200 Amperes
150 Amp. Cutout—3000 Amperes

Price on application.

SLATER-MATTHEWS PRIMARY FUSE CUTOUTS



Slater-Matthews 60 Amp., 7500/12500 Ground Y. volts, Cut-out (No. 850) showing skirted housing design to give extra creepage and flashover distance to ground.

NO RADIO INTERFERENCE

Radio interference is caused by static arcing, loose contact parts, loose lead-in wires, and similar causes, and has been the subject of much study by the Canadian Engineering Standards Association and all large power companies. However, by adherence to time-proven practices in cutout design, Slater-Matthews cutouts do not allow radio interference. Heavy, jig-cemented stationary contacts and leakage clips combine to prevent radio interference up to voltages of 6 to 7 times the service voltage.



Dropout Cutouts

The dropout feature is available in the porcelain housed cutout in two voltage ratings, i.e., 5000 and 7500/12500 Ground Y volts.

These cutouts retain all the well-known values of the popular No. 650 and No. 850 Slater-Matthews cutouts. Same ratings, same sizes, same rupturing capacities, uses the same fuse link.

A very important safety feature is the wide separation of the "dead" door hinge from the lower contacts—2½ inches. A further safety feature is the extra porcelain barrier between the hinge and these contacts.

Slater-Matthews Dropout Cutout No. 65 rated at 60 amperes and 5000 volts. No. 85 rated at 60 amperes and 7500/12500 ground Y volts.

List No.	Item	Max. Amp. Rating	Maximum Voltage Rating	Shipp. Wt., Lbs. Each
65	No. 65 Cutouts Complete	60	5000	10
56	Fuse Cartridge.....	60	5000	1
66	Door Assembly — No Cartridge.....	..	5000	1
85	No. 85 Cutouts Complete	60	7500/12500	13
58	Fuse Cartridge.....	60	7500/12500	1
86	Door Assembly — No Cartridge.....	..	7500/12500	1

Type 60-B Slater-Matthews Fuse Links should always be used with Slater-Matthews Dropout Cutouts.

Prices on application.

SLATER-MATTHEWS OPEN-TYPE FUSWITCHES



Slater-Matthews No. 1401 Open Type Fuswitch—
rating 60 Amps., 7500 volts.

These fuswitches were designed by former distribution engineers and are the outgrowth of 22 years' experience in the manufacture of fuswitches. The extraordinarily high wet flashover values are made possible by the unique one-piece wet porcelain insulator (special patented design), exceeding the A.I.E.E. flashover test requirements by a large margin.

A clamp type cross arm hanger is furnished, so designed that the Fuswitch can be turned toward the pole, facilitating the opening and closing by a lineman at the pole.

The entire design is very compact and light in weight without any sacrifice of mechanical strength. No attempt has been made to reduce costs by using a cheap substitute for any part in these fuswitches.

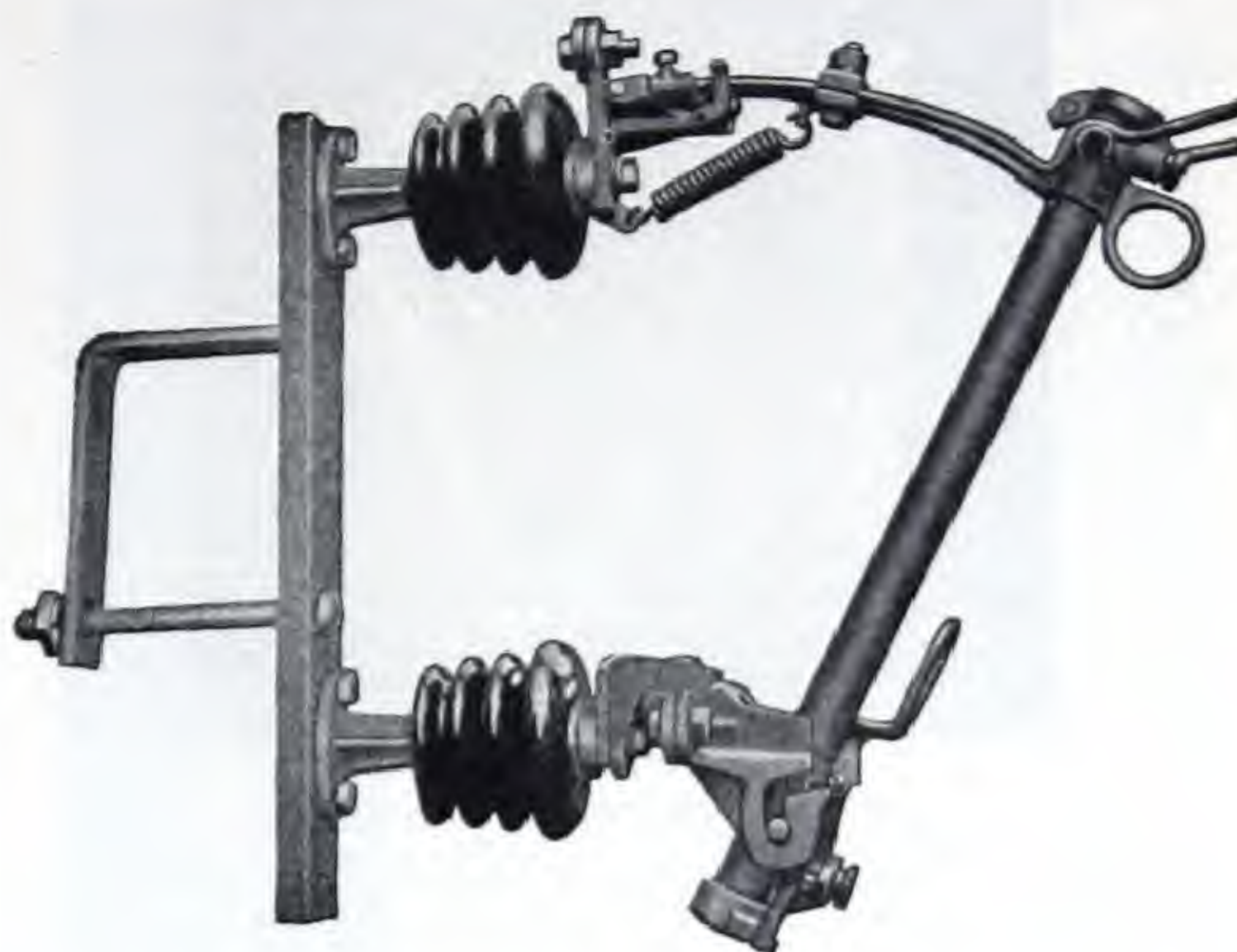
There are, by actual count, about 1/3 fewer parts in these fuswitches than in most other types. And this simplicity of design means more efficient performance at lower cost.

For dependable performance on low overloads or heavy short circuits, we believe that a Series 1400 Fuswitch equipped with a Pullink and Slater-Matthews Bimetallic Fuse Link cannot be excelled.

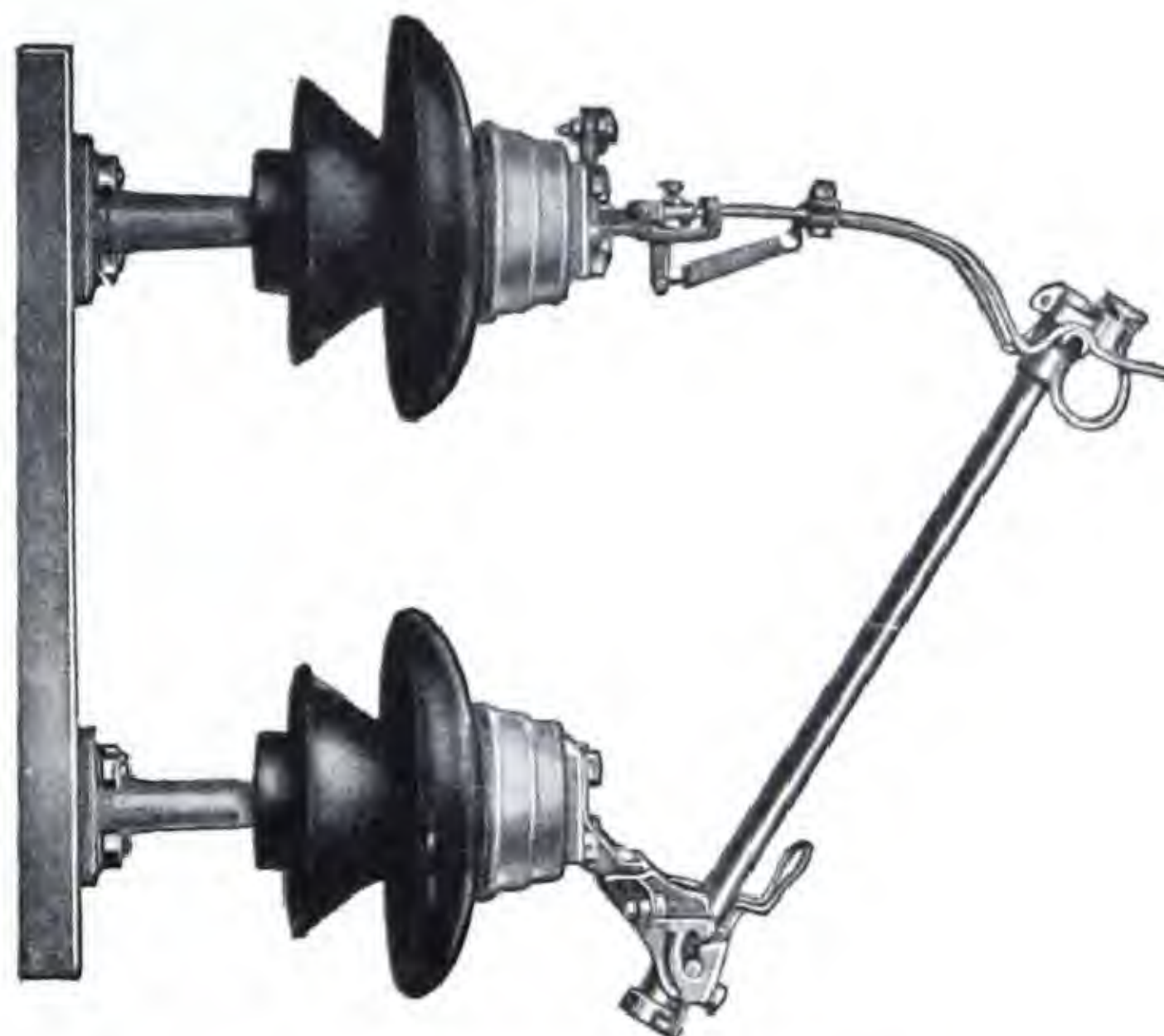
List No.	Voltage Rating	Ampere Rating		Shipping Weight (lbs.)
		As Fuswitch	As Disc. Switch	
1401	7500	60	75	12
1403	7500/12500	60	75	14
1407	15000	60	75	18

Prices on application.

SLATER MATTHEWS DROPOUT FUSWITCHES



No. 1352 Slater-Matthews Fuswitch—Two Insulator Type
Rating—100 Amps.
7.5/12.5 Ground Y Kv.

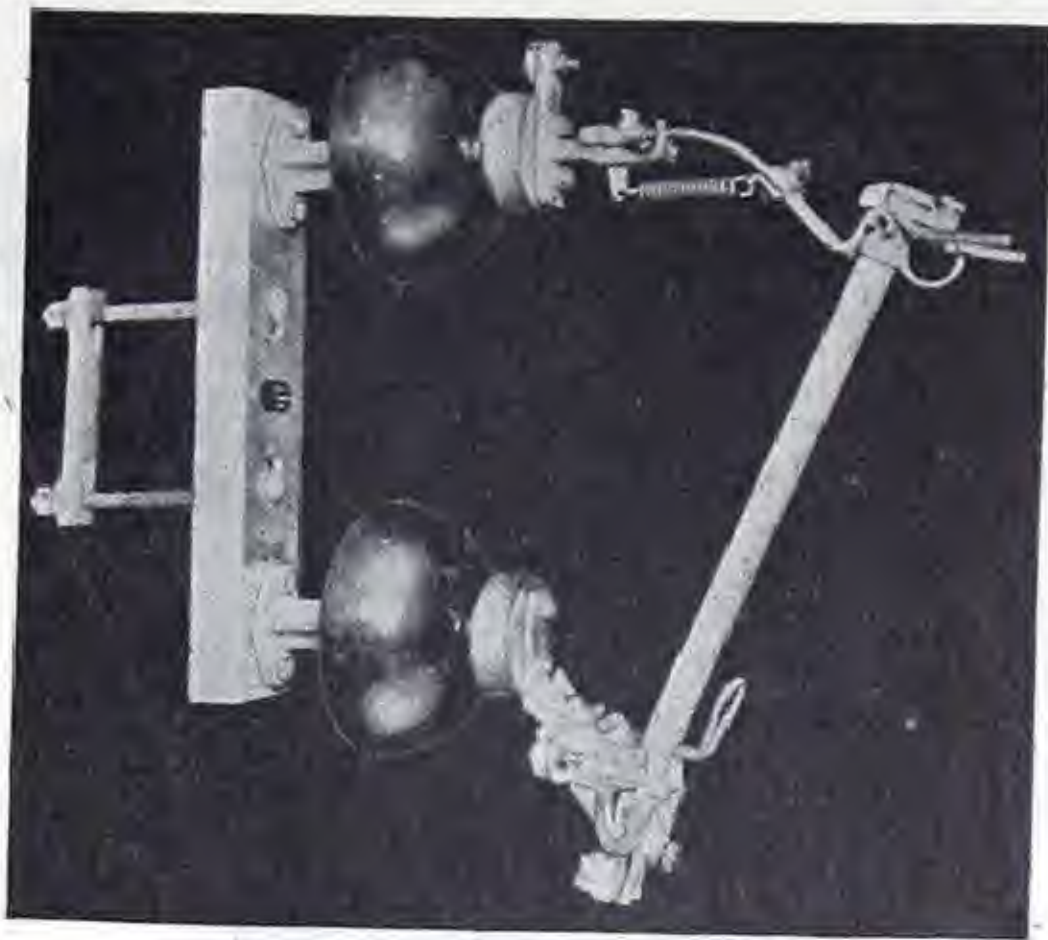


Slater-Matthews Dropout Fuswitch
Rating 100 Amps.
34.5 Kv.

In order to have insulators which will be interchangeable with other equipment such as disconnecting switches and bus supports, Dropout Fuswitches can be furnished with standard N.E.M.A. insulator units (having 3 inch bolt circle) at a slight increase in price. In certain cases, over-insulation is desirable on account of local conditions. The substitution of the expulsion dropout fuse for the older types of liquid fuse or non-dropout fuse can easily be effected without delay. These applications, with complete information, should be referred to the company.

Prices on application.

SLATER-MATTHEWS OPEN TYPE AND DROPOUT FUSWITCHES



Shows Fuse Holder in fused position.

All Slater-Matthews Dropout Fuswitches are designed so that the tension on the fuse link will not exceed one and a half pounds when the fuse link is pulled tight and clamped by the lower contact plug. The stress on the link will not exceed three pounds when the fuse tube is pushed under the upper contact arm before it is seated.

The patented upper contact arm includes a phosphor bronze coil spring which exerts a constant tension on the fuse link, preventing overstraining and subsequent premature and unnecessary outages.

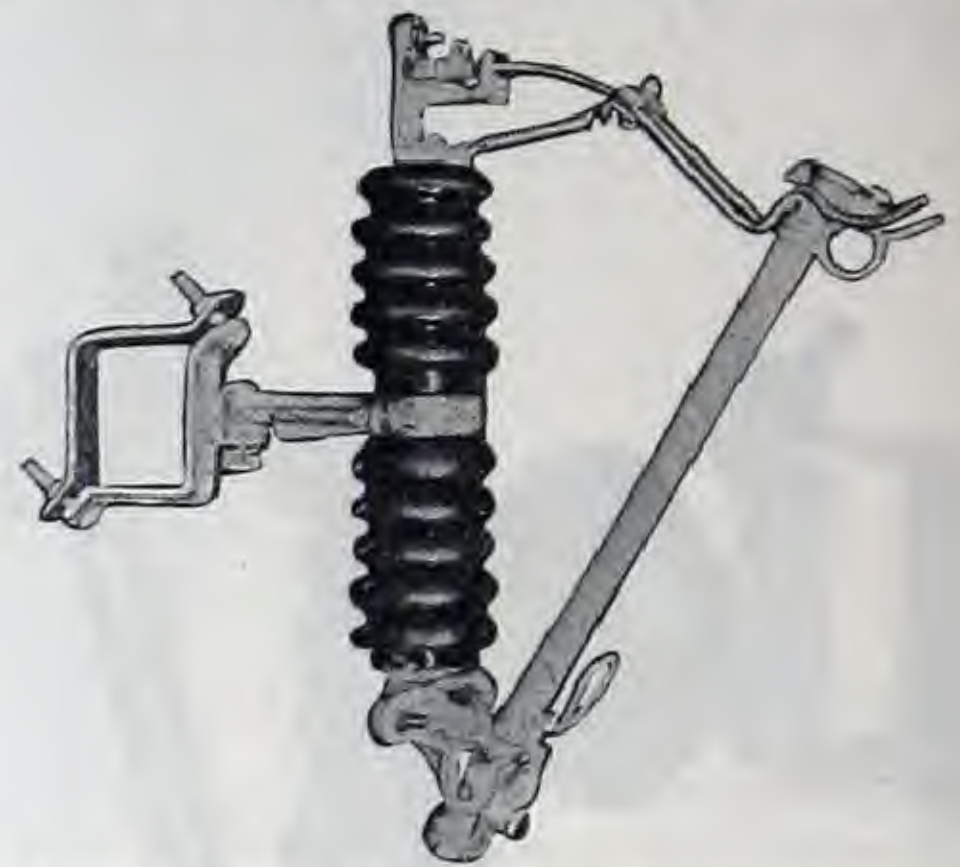
This exclusive feature of all Slater-Matthews Dropout Fuswitches will save many unnecessary outages caused by too much tension on the Fuse Links—especially on links of less than 15 amperes. In addition, this feature assures the proper contact pressure. The lineman cannot distort the wires of the contact arm by slamming the fuse holder, as the coil spring cushions the blow. Dependence on the spring of the copper contact wires is thus avoided.

The two insulator Dropout Fuswitch is made in four voltage ratings, as shown in the table below. All units are fusible from 1 to 100 amperes inclusive, and have a guaranteed interrupting capacity of 2000 amperes.

Rating	Wet Flashover to Ground
5 Kv.	20 Kv.
7.5/12.5 Grd. Y Kv.	35 Kv.
15 Kv.	50 Kv.
23 Kv.	70 Kv.

List Nos.	Description	Voltage Rating	Amp. Rating	Ship. Wt. Lbs.
1342	Two Insulator Fuswitch Complete.....	5 KV	100	11
1442	Single Insulator Fuswitch Complete.....	5 KV	100	9
1343	Fuse Holder for 1342 and 1442 Fuswitches.....	5 KV	100	1 1/4
2342	Two Insulator Fuswitch Complete.....	7.5 KV	100	12
2442	Single Insulator Fuswitch Complete.....	7.5 KV	100	10
1352	Two Insulator Fuswitch Complete.....	7.5/12.5 KV	100	14
1452	Single Insulator Fuswitch Complete.....	7.5/12.5 KV	100	12
1353	Fuse Holder for 1352 and 1452 Fuswitches.....	7.5/12.5 KV	100	1 1/2
1358	Two Insulator Fuswitch Complete.....	15 KV	100	28
1458	Single Insulator Fuswitch Complete.....	15 KV	100	22
1359	Fuse Holder for 1358 and 1458 Fuswitches.....	15 KV	100	1 3/4
1368	Two Insulator Fuswitch Complete.....	23 KV	100	36
1369	Fuse Holder for 1368 Fuswitch.....	23 KV	100	2

SLATER-MATTHEWS OPEN TYPE AND DROPOUT FUSWITCHES



Shows Fuse Holder in fused position ready to drop out when the fuse link melts or blows. Rating 100 Amperes, 15 Kv. No. 1458.

The unique one-piece insulator which has proved so successful is found in the Dropout type, with the addition of on rating, namely 5 Kv. The Dropout type is also available however, in the conventional two insulator style with maximum voltage rating of 23 Kv.

The dropout type Fuswitch has a higher current rating than the series 1400, being rated at 100 amperes, suitable for use with 75 and 100 ampere Slater Bimetallic fuse links. The fuse tube is made of seasoned horn fibre with a wrapped bakelite cover for weather protection.

The explosive force of a heavy short circuit is vented to the open air at both ends of the tube as the upper end of the fuse tube is equipped with a hinged cap which swings open with a slight pressure, and recloses as soon as explosion is past. The main purpose of this cap is to prevent the undue accumulation of moisture or precipitation in the tube, and yet provide gas pressure relief.



Showing Switch with Pullink in closed position.



Showing action of Pullink as Fuse Link melts or blows. Fuse Link is thrown clear of cartridge.

SLATER PULLINKS

The Pullink is a bronze spring device which can be applied to any make of open Fuswitch. The Pullink holds the fuse link under tension and when the fuse link melts, the tension of the spring is instantly released. By this action, the unburned portion of the fuse link is rapidly whipped out of the cartridge and thrown to the ground.

It has been shown that over 90% of all cartridge failures are due to "slow-burning" of the fuse link under low overload conditions. In this condition, the fuse link parts very slowly causing carbonization and eventual re-establishment of the arc. The Pullink gives the required clearing of the cartridge on slight overloads and does not impair the short circuit performance of the fuswitch or cutout.

Over 30,000 Pullinks are in use in the United States and Canada on all makes of open type fuswitches; the pullink is also used as the actuating mechanism of the Instantaneous Reclosing Fuswitch.

SLATER-MATTHEWS FUSE LINKS

AND THEIR APPLICATION

Development in the Primary Distribution Cutout field in the past few years has led to the manufacture of a great many types of Cutouts and has complicated the problem of producing a satisfactory fuse link that will fit two or more types and still give satisfactory electrical performance. To solve this problem for you we have developed a complete line of up-to-date and better Matthews Fuse Links as follows:

SERIES 100-H

If you happen to be using both Open and Housed types of cutouts in both the dropout or non-dropout styles, you have had difficulty in finding a fuse link that is mechanically adaptable to all of them, yet one that will perform equally as well under high tension in a dropout style Cutout as it does with no tension in a non-dropout style Cutout. Series 100-H Matthews Fuse Links do this. They should also be used where you are using only the open type dropout style Cutout. They can be furnished with the patented 100-B Head, if you prefer them.

SERIES 60-H

Maybe you are using only 50 ampere or 60 ampere Porcelain Housed Dropout or Non-Dropout Cutouts. Series 60-H Matthews Fuse Links fit all makes of this style. Series 60-H are identical to Series 100-H except for the fact that the $\frac{3}{4}$ -inch washer is omitted from the head assembly, and the copper tail is shorter. These two modifications make the Series 60-H easily adaptable to all 50-ampere or 60-ampere Cutouts.

SERIES 60-B AND SERIES 150-B

If you are using only 50-ampere or 60-ampere Porcelain Housed Non-Dropout Type Cutout, the Improved Series 60-B Matthews Fuse Links are adaptable to all makes. For 100-ampere or 150-ampere Porcelain Housed Non-Dropout Types of Cutouts, the Series 150-B Matthews Fuse Links should be used. No tension is ever applied to these Fuse Links and they have proved highly satisfactory for many years for use with non-dropout porcelain housed Cutouts.

SPECIALS

Many operating companies have special needs for fuse links and may be using certain types of Cutouts exclusively, that do not require universal types of Fuse Links. Matthews engineers can handle your special problem for you as they have for dozens of others in past years.

We can furnish any of our standard series of Fuse Links without button heads for use in fuse holders requiring side contact connection only. We can furnish special lengths to our own specifications. We can furnish special varieties of Spring Type Links to fit your peculiar conditions.

No matter what your special needs may be, just tell us, and our engineers will submit samples and data for your consideration.

ECONOMY

Economy in a fuse link is not a matter of first cost. You may buy cheaper links, or use "homemade" wire links, and save a few cents on initial cost, but bear in mind that proper fuse links are scientifically developed and have required years of research and testing by our engineers, who are trying to give you Better Fusing Protection. Matthews have had twenty-seven years' experience in designing and making Cutouts and Fuse Links—the first fast blowing, scientifically designed Fuse Links, the first Universal Fuse Links and the first 100 per cent rated Fuse Links were Matthews Fuse Links. Now Matthews offers you more than ever in fuse link performance at a reasonable cost.



Matthews Fuse Links are packed in a strong paper tube with rating stamped on the head. 25 are packed in a strong fibre can with screw cap.

SLATER-MATTHEWS FUSE LINKS

Series 60-B and 150-B

BIMETALLIC UNIVERSAL TYPE

For All Makes of Non-Dropout Porcelain Housed Cutouts

These Fuse Links are made in two series, the Series 60-B for Porcelain Housed Cutouts having a maximum rating of 60 amperes, 7500/12500 Grd. Y Volts and the Series 150-B for Cutouts having a maximum rating of 150 amperes and 7500/12500 Grd. Y Volts. These Matthews Fuse Links will fit Non-Dropout Matthews Fuswitches and Cutouts and all similarly rated cutouts of other manufacturers.

The fusible portion of these Fuse Links is a low melting alloy, one end of which is attached by soldering to a copper strip that has been pressed into the copper button head; the other end is soldered to a strip of flexible tinned copper braid. In the smaller sizes there is also a high strength nichrome wire across the fusing section to strengthen it.

By using the low melting alloy the maximum temperature which can be attained is limited to a temperature below that which will be injurious to the horn fibre tube. These Fuse Links have been calibrated to 100% rating and, in addition, are so designed that the temperature attained by the upper contact will never exceed 30 degrees C. over 40 degrees C. ambient.

The tinned copper braid, in addition to providing a low heating material, assists in the rapid clearing of the tube when the fuse blows. The developed gas pressure within the cartridge tends to blow the heavy section of the fuse link out of the tube and hence as the copper braid is flexible, this is accomplished easier than if a solid link were used. This will expedite the clearing and at least a portion of the Fuse Link will be ejected from the cartridge and protrude below the Fuswitch or cutout and the fact that the fuse has blown will be visible.

The action of Bimetallic Universal Matthews Fuse Links and their time current characteristics are such that with proper size of fuse link and relay setting the fuse will clear the circuit before the relay operates. See Time Current Curves.

Ampere Ratings and List Numbers

Amp. Rating	Type 60 To Fit All Housed Cutouts Having Maximum Rating of 60 Amperes	Type 150 To Fit All Housed Cutouts Having Maximum Rating of 150 Amperes
	List No.	List No.
1	1AU60-B	1AU150-B
2	2AU60-B	2AU150-B
3	3AU60-B	3AU150-B
5	5AU60-B	5AU150-B
7	7AU60-B	7AU150-B
10	10AU60-B	10AU150-B
15	15AU60-B	15AU150-B
20	20AU60-B	20AU150-B
25	25AU60-B	25AU150-B
30	30AU60-B	30AU150-B
40	40AU60-B	40AU150-B
50	50AU60-B	50AU150-B
60	60AU60-B	60AU150-B
75		75AU150-B
100		100AU150-B
125		125AU150-B
150		150AU150-B

Prices on application.



SLATER-MATTHEWS FUSE LINKS

Series 100-H

HIGH-TENSION UNIVERSAL TYPE



Modern Primary Distribution Cutouts of all makes of the dropout styles, either open or housed types, place variable mechanical strains on the cutout fuse link. To obtain satisfactory fusing protection under these variable mechanical strains, it is necessary to use a fuse link of extremely high mechanical strength, yet one which will have constant time current characteristics for all practical purposes and also one which will fit all Dropout Cutouts.

The new Series 100-H High-Tension Universal Slater Matthews Fuse Links answer this new Dropout problem as follows:

1. Overcoming Effects of Variable Mechanical Strains on Fuse Links:

Under varying mechanical strains imposed by dropout type Cutouts, the smaller sizes of conventional type fuse links, particularly, vary widely in electrical characteristics. To avoid this variation in the Series 100-H Matthews Fuse Links the fusing sections of all sizes from 1 ampere to 20 amperes, inclusive are Spring Type and are calibrated and held under a definite tension of 5 pounds, which is in excess of the strain applied by dropout

type Cutouts. This 5-pound tension assures constant electrical performance in dropout Cutouts. Bear in mind that 5 pounds "tension" is not "tensile strength." Their strength is much greater than 5 pounds (see next paragraph). The Series 100-H Matthews Fuse Links from 20 amperes to 100 amperes are non-spring type with an alloy fusing section carrying the major part of the current and a high strength resistance wire carrying the strain. These larger sizes are practically free from electrical variation under variable tensions, but nevertheless the strain is removed from the fusing section to reduce the variation to the absolute minimum.

2. High Mechanical Strength:

Because of the high strength construction of Series 100-H Matthews Fuse Links, they will not break or give under strain in Dropout Cutouts. All sizes will withstand 10 pounds strain or more, indefinitely. Fibre Tubes over Fusing Sections in 1 to 60-ampere sizes provide greater strength and protection against damage in handling.

SLATER-MATTHEWS FUSE LINKS

Series 100-H

HIGH TENSION UNIVERSAL TYPE

(Continued)

3. Close Calibration and Constant Electrical Characteristics:

Dropout Cutouts place strains of from 2 to 4 pounds on fuse links. Since the Series 100-H Matthews Fuse Links are closely calibrated at 5 pounds and are designed to minimize the variation in electrical characteristics under variable mechanical strains, they will perform with practical constant electrical characteristics in any dropout cutout you may use. Materials used insure fast, low temperature performance. See Time Current Characteristics curves.

4. 100% Rating:

Every size will carry 100 per cent of its rated current continuously without exceeding a temperature rise of 30° above 40° C. ambient.

5. Resistance to Corrosion:

All parts of these Fuse Links are highly corrosion resistant. Copper Tails are tinned.

6. Used with Non-Dropout Cutouts:

When using the Series 100-H Matthews Fuse Links with non-dropout cutouts, the spring type fuse sections of the 1-ampere to 20 ampere sizes cause the necessary separation between the unburned ends of the fuse link when the fuse blows on a low overload meltout, hence creepage within the fuse holder tube and consequent damage to the cutout prevented. Above 20 amperes sufficient gas pressures are developed within the fuse holder tube to cause ample separation, even on low overload meltouts. Series 100-H Matthews Fuse Links can also be used with Matthews Pullinks.

Series 60-H

HIGH-TENSION UNIVERSAL TYPE

Series 60-H Matthews Fuse Links are identical in all respects to the Series 100-H described above, except that the 3/4-inch washer and retaining band are omitted and the copper tail is only 13 inches long. They will fit any make of 50- or 60-ampere Housed type Cutout, so if this is the only size Cutout you may be using, order Series 60-H instead of Series 100-H.

Ampere Ratings and List Numbers
High-Tension
Universal Matthews Fuse Links

Ampere Ratings	List Numbers	
	Series 100-H	Series 60-H
1	1A100-H	1A60-H
2	2A100-H	2A60-H
3	3A100-H	3A60-H
5	5A100-H	5A60-H
7	7A100-H	7A60-H
10	10A100-H	10A60-H
15	15A100-H	15A60-H
20	20A100-H	20A60-H
25	25A100-H	25A60-H
30	30A100-H	30A60-H
40	40A100-H	40A60-H
50	50A100-H	50A60-H
60	60A100-H	60A60-H
75	75A100-H	.....
100	100A100-H	.....

Prices on application.

SLATER MATTHEWS FUSE LINKS

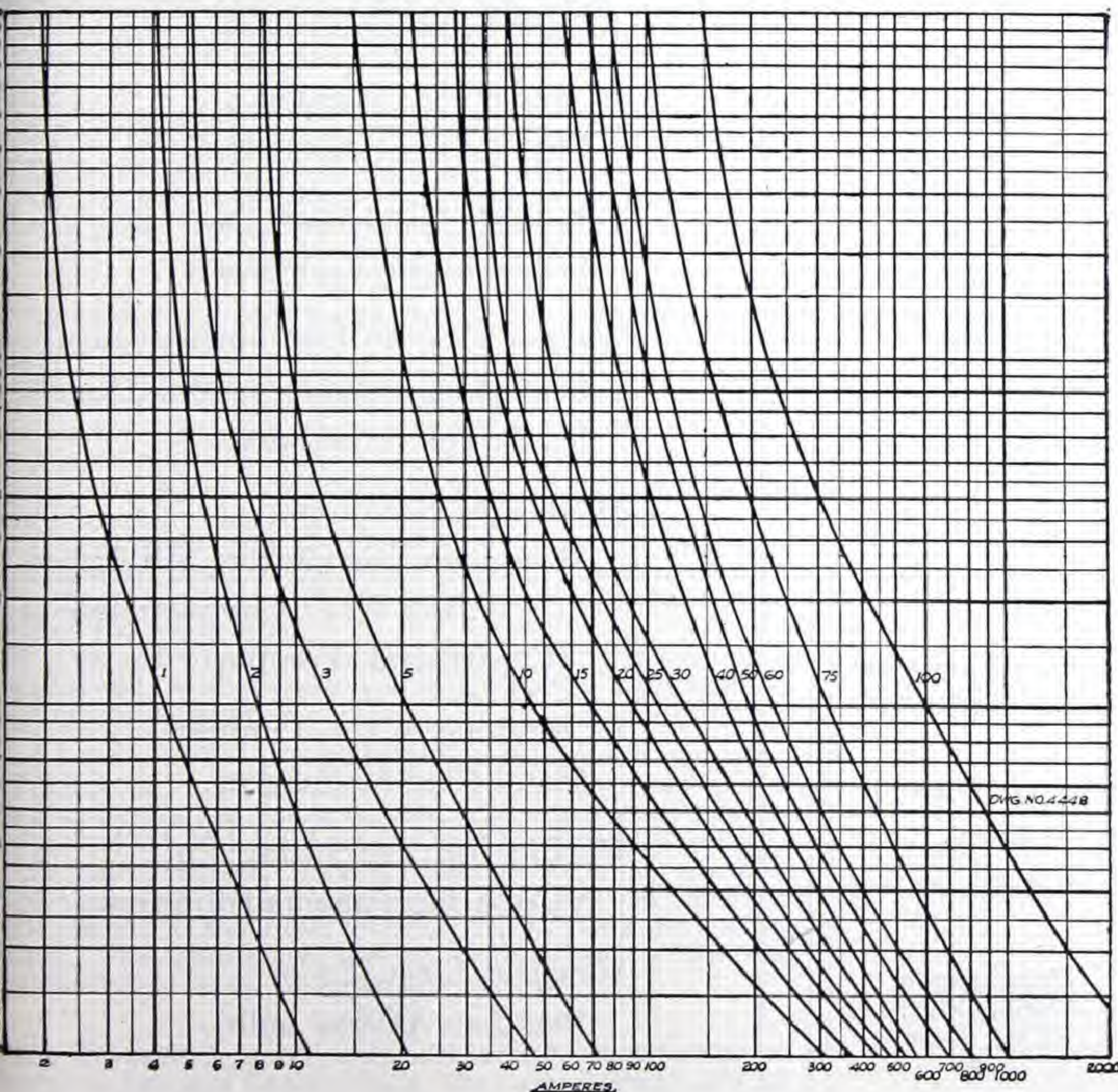
Application

The proper application of the Fuse Link is necessary in order to obtain the degree of protection desired. To properly apply a link to any circuit, the characteristics of the fuse link must be known and also the transient conditions which are likely to exist. When deciding upon the proper fuse link to use at a particular location, the amount of current available under short circuit conditions and the effect of transients must be considered. If the available short circuit current is low, large links must be avoided. A fuse link rating close to load current is also objectionable because the fuse will blow during transient conditions that are not sustained long enough to cause damage, such as starting of induction motors and incandescent lamps, which is usually accompanied by a rush of current several times greater than normal but which only persists for a few cycles and therefore cannot cause any damage.

As all types of Matthews Fuse Links are calibrated to carry 100% of their rated current continuously, the use of fuse links of at least 200% (preferably more) of the normal load current of the apparatus to be protected is recommended.

When fuse links are used in series such as is the case when both the branch line and transformers are fused, it is recommended that the branch line fuse link be at least 50% greater than the transformer fuse link. Caution must also be exercised when using fuse links of different manufacturers in series, and on substations where both the primary and secondary sides are fused as the basis of calibration may be so different that the expected protection will not be obtained.

If you have any Cutout fusing problems, write us full details and our factory engineers will help you.



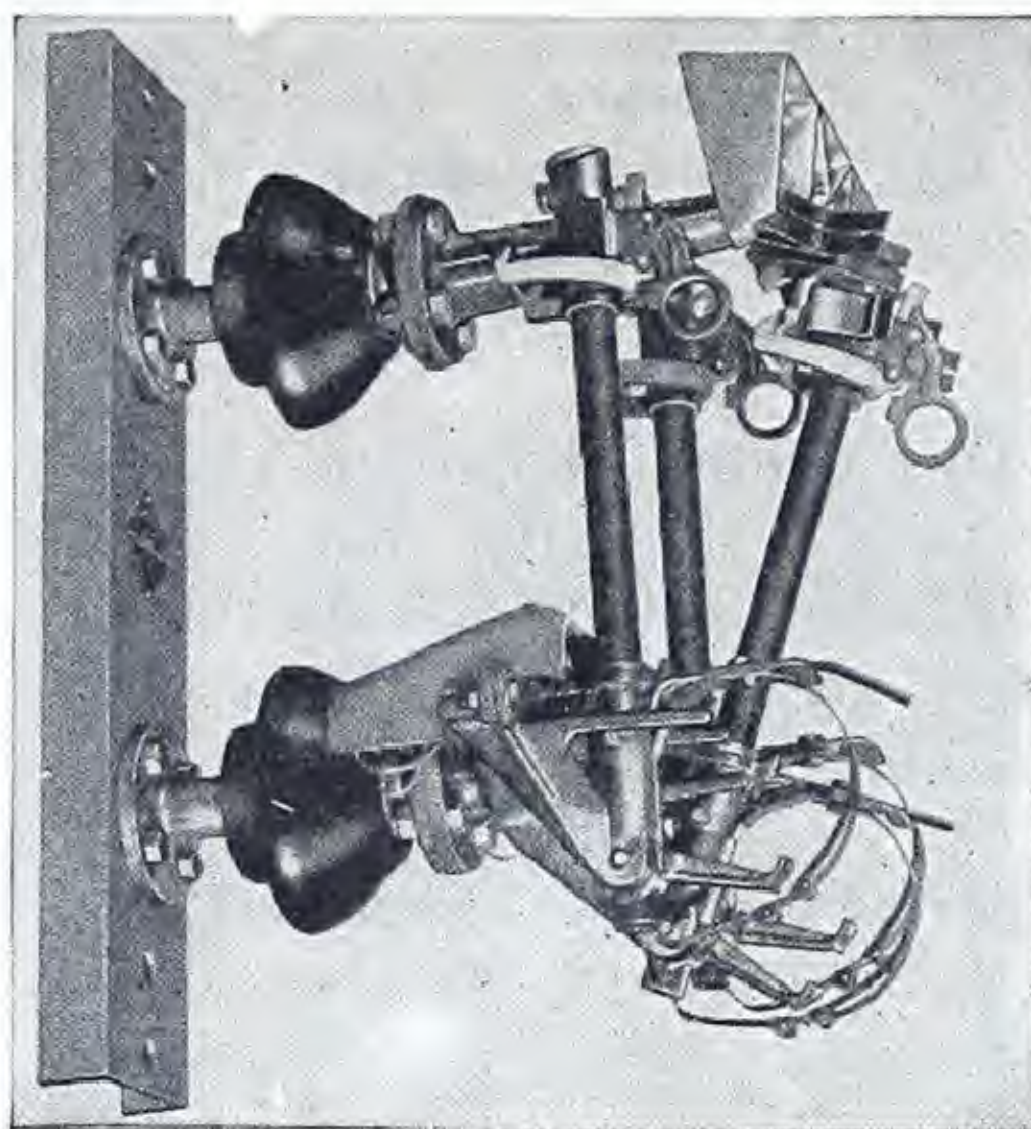
Characteristics shown are for
SERIES 100-H LINKS

Due to the shorter length of the Series 60-H Links their characteristics will vary slightly but will be approximately as shown.

Time Current Characteristics of Series 100-H and Series 60-H High-Tension Universal Matthews Fuse Links—100% Rated R.M.S. Amperes

SLATER-MATTHEWS INSTANTANEOUS RECLOSING FUSWITCH

Careful investigation by many power companies all over the United States and Canada show that a large majority of fuse outages on power circuits are caused by lightning transients. They show rather uniformly that 85% of these outages would not have been noticed by their customers if the circuit had been instantaneously reclosed after the fuse had blown. Also that another 7% would not have been noticed by their customers if there had been a second instantaneous reclosure of the circuit.



Slater-Matthews No. 1700 Reclosing Switch,
rating 100 Amperes, 7500 Volts. Use one
Fuswitch per phase.

Satisfactory Reclosing Oil Circuit Breakers have been available to take care of this situation for some time but not quite as fast. Their cost, however has limited their use to situations where the available revenue would justify it.

There are many places on the systems of almost any power distributor where the engineers would like to have efficient reclosing if the cost could be justified.

Fast Reclosing Matthews Fuswitches are satisfactorily answering this demand all over the country on circuits of from 2300 volts up to and including 33,000 volts.

A large number of Fast Reclosing Matthews Fuswitches have gone through two lightning seasons and one winter with remarkably satisfactory results.

Insulation conforms to N.E.M.A. switchgear ratings.

Guaranteed interrupting capacity—2000 Amperes.

Must be fused with Type 1700-DR Slater-Matthews fuse links.

List No.	Voltage Rating	Ampere Rating	Approximate Ship. Wgt. Lbs., Each
1700	7500	100	90
1725	15000	100	105
1750	23000	100	140
1775	34500	100	160

Prices on application.

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.
Motor Controls.

Condit Electrical Mfg. Corp.
Oil Circuit Breakers.

Ferranti Electric Ltd.
Transformers, Surge Absorbers.

J. P. Tubular Heater Co.
Electric Heating Systems.

Sangamo Electric Limited,
Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,
Cutouts and Disconnects.

Telegraph Condenser Co.
Power Static Condensers.

Weston Electric Instrument Corp.
Indicating Instruments of all kinds.
Radio Test Equipment.

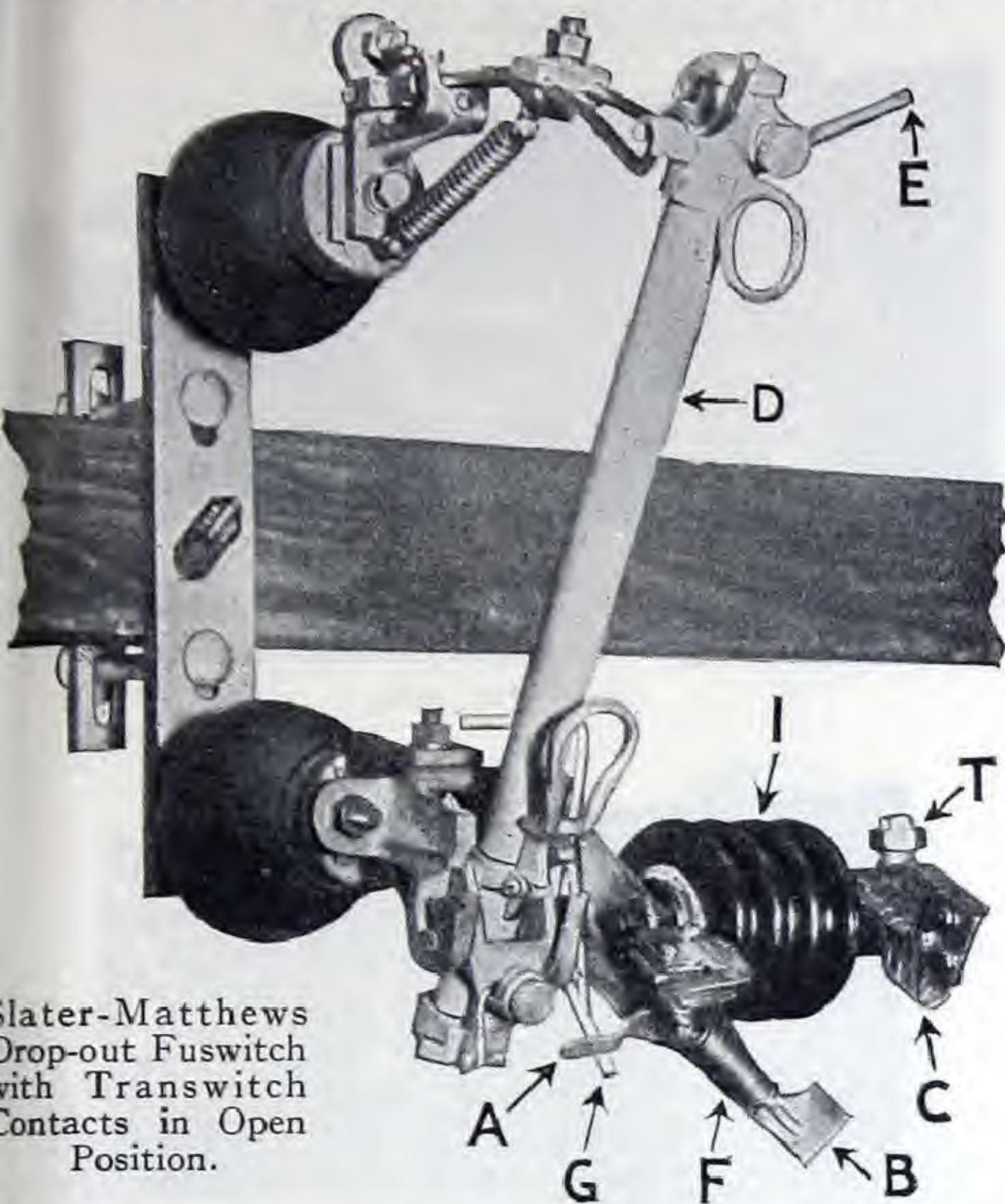
Mather & Platt Ltd.
Motors and Generators, All Types,
A. C. and D. C. Complete line of
Centrifugal Pumps.

A. Reyrolle & Co. Limited.
Metal Clad Switchgear.

Ilg Electric Ventilating Co.
Ventilating Fans and Blowers.

Hewittic Electric Co.
Rectifiers (Glass bulb).

SLATER-MATTHEWS TRANSWITCH



Slater-Matthews Drop-out Fuswitch with Transwitch Contacts in Open Position.

GENERAL DESCRIPTION

The Transwitch is just what the name implies—a transfer switch. It transfers the current from an open type Dropout Slater-Matthews Fuswitch, after it has cleared the circuit, to any make or style of cutout in combination with the transwitch. The transfer of the circuit requires about 30 cycles.

The voltage across the Transwitch is very low. It is therefore made in one size only. This one size fits all voltage ratings of Slater-Matthews Dropout Fuswitches.

The Transwitch is rugged and simple. It contains no delicate parts. No special hot-stick or switching platform is necessary.

Operation

The contact of the Transwitch is of the Quick-Make, Quick-Break type.

When the Fuse Link melts, the fuse holder drops out in a semi-circular downward path. During its travel, the fuse tube strikes the tripping arm of the Slater-Matthews Transwitch and moves it down. This tripping arm releases the contact arm, which is snapped into positive contact with the fixed contact by the force exerted by a bronze spring.

All the above takes place before the fuse tube completes its downward travel. The circuit has been transferred, after 30 cycles interruption, to the Cutout or Fuswitch, at the sight of the Transwitch.

If a second transfer is required, a second Transwitch is installed and the above operation is duplicated. Any number of transfers can be made.

Re-Fusing

The burned Fuse Links can be replaced and the combination reset to its original state, without interrupting the circuit. When the Fuse Link has been replaced, the fuse tube is closed in the usual manner. During this operation, the contact arm opens the Transwitch contact after the fuse tube has made contact at the upper fuswitch contact, thus preventing arcing. The Transwitch contact is now broken and the combination is ready to operate as before.

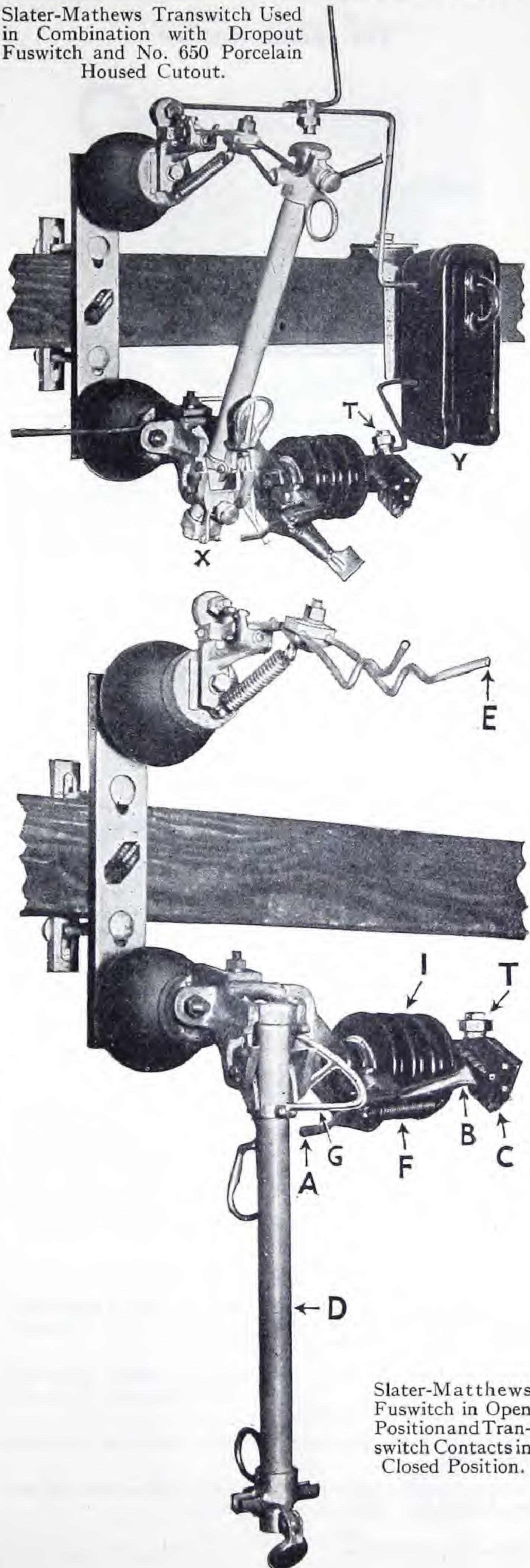
NOTE

The Transwitch is sold only with or for use with Slater-Matthews Dropout Fuswitches, as they are designed only to work satisfactorily with them. Since the Slater-Matthews Fuswitch is demonstrably better and costs no more, both items should be used together.

Also, we highly recommend the Type 100-H Universal Fuse Links described elsewhere.

SLATER-MATTHEWS TRANSWITCH

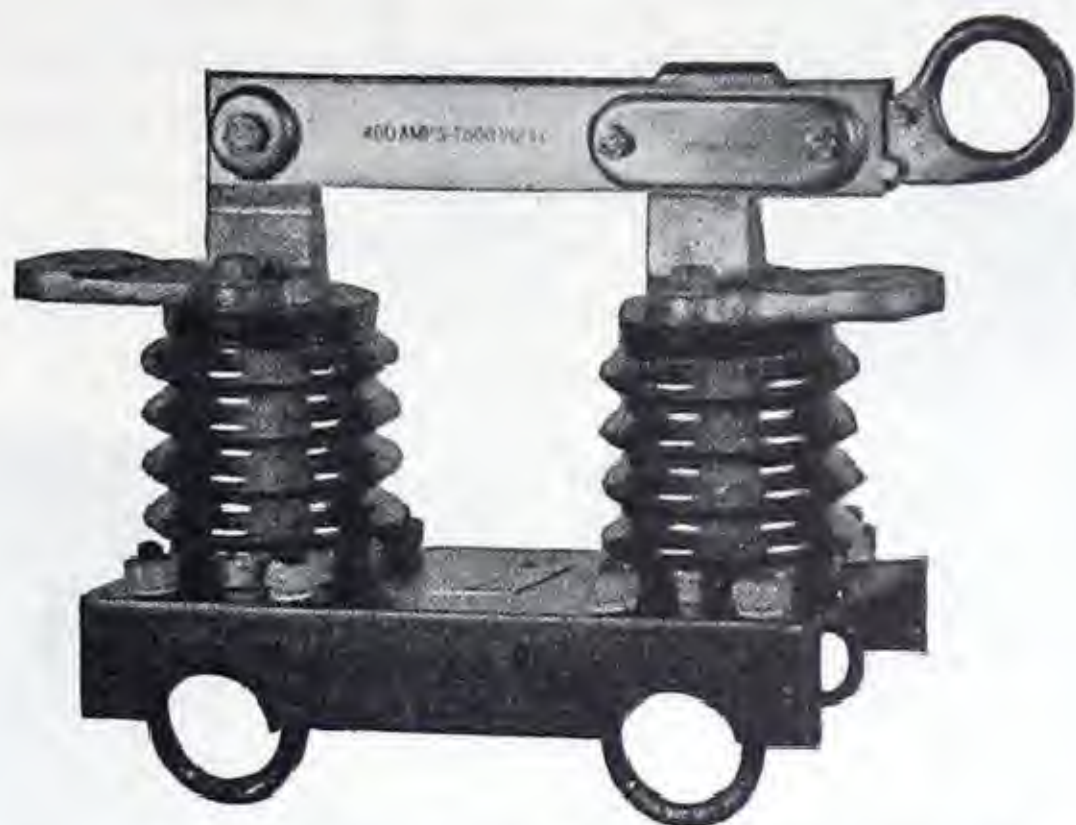
Slater-Matthews Transwitch Used in Combination with Dropout Fuswitch and No. 650 Porcelain Housed Cutout.



Slater-Matthews Fuswitch in Open Position and Transwitch Contacts in Closed Position.

SLATER DISCONNECTING SWITCHES

For Indoor Service



Type "G" 400 Ampere 7500 Volt Indoor Pipe Frame Mounting Disconnecting Switch with Latch.

A complete line of Indoor Disconnecting Switches for single pole and gang operation is available for the station engineer. The designs are in accordance with N.E.M.A. and A.I.E.E. rules, covering the temperature rise of current-carrying parts and the dielectric tests of the insulators.

CONSTRUCTION

All insulators are made of the highest grade wet process porcelain obtainable, and all inserts or caps are cemented on in jigs which makes them absolutely interchangeable. Each insulator with its fittings makes a complete unit that can be carried in stock by the customer, facilitating quick replacement and maintenance of service.

CONTACT PARTS

The blades are single bars or sets of parallel bars for the lower voltages, and are braced and reinforced to give rigidity in the higher voltages. Split blade or parallel path construction is used.

Standard duty Switches (Type G) are for the average application, for use in the small and medium sized power plants and sub-stations. Heavy Duty Switches (Type GH) are for more severe service conditions and are designed to withstand the stresses between conductors and the stresses in the switch blades, due to heavy short circuits in central stations of large capacity.

LATCHES

All Switches are equipped with a patented latch which snaps firmly in the latching position when the switch closes. The latch is released and the switch is opened by a single movement of the hook stick. The latch does not carry current, thus avoiding the danger or possibility of its becoming hot and releasing the switch blade. In case the latch is not desired, a plate having a hole for the hook will be supplied.

DISTINCTIVE FEATURES

Insulators with long striking distance, maximum mechanical strength, high flashover values and high factor of safety. Insulators are absolutely interchangeable.

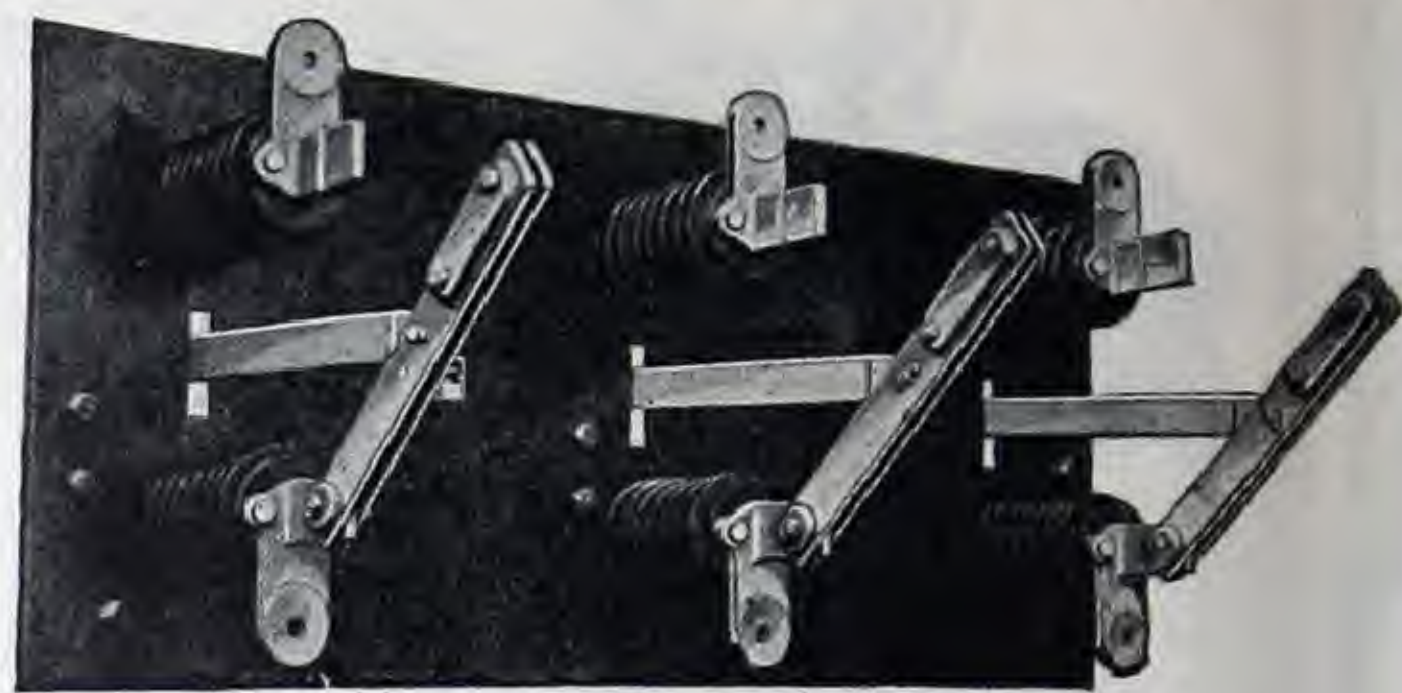
Insulators with fittings, make complete units, convenient for carrying in stock. Insulator assemblies are easily and quickly replaced if damaged.

Heavy duty insulators are extremely rugged to withstand severe service.

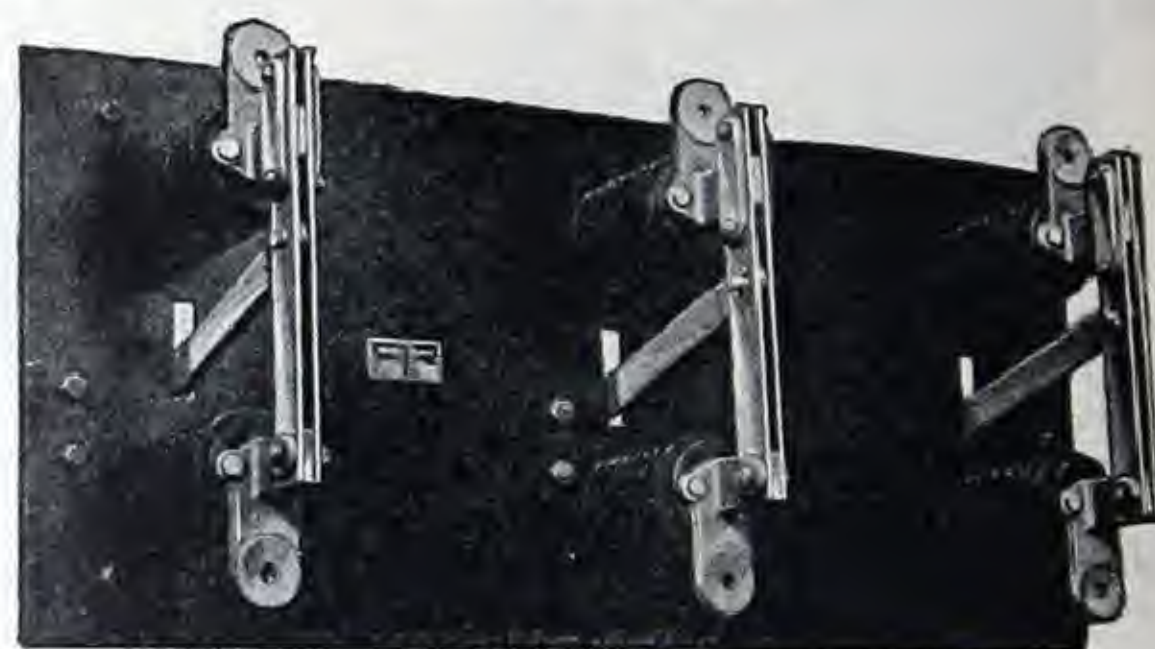
Split or parallel-path type of blade, with a positive and dependable latch for hook-stick operation.

Prices on application.

SLATER GROUP OPERATED SWITCHES



Slater Type "G" 600 Amp. 15 Kva. Group-Operated Indoor Disconnecting Switch (open position) mounted on sheet steel base.

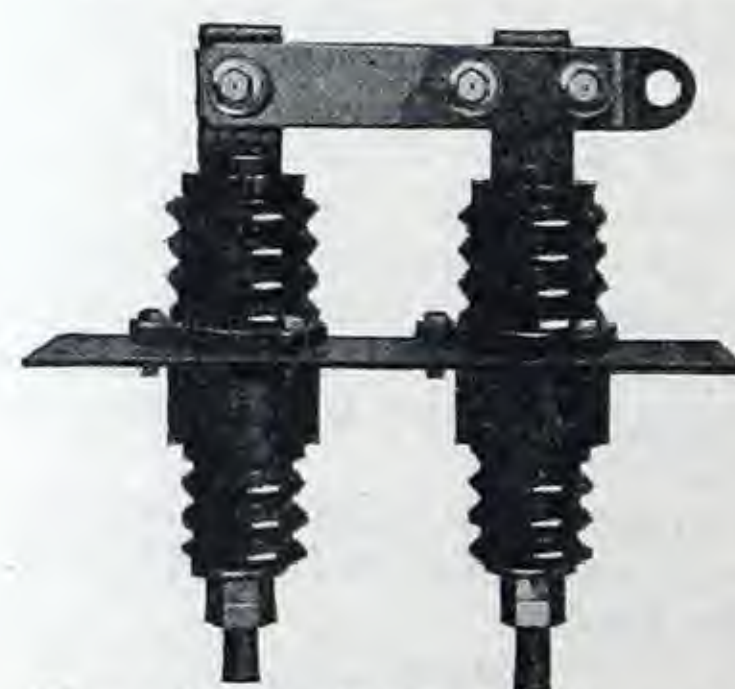


Slater Type "G" 600 Amp. 15 Kv. Group-Operated Indoor Disconnecting Switch (closed position) mounted on sheet steel base

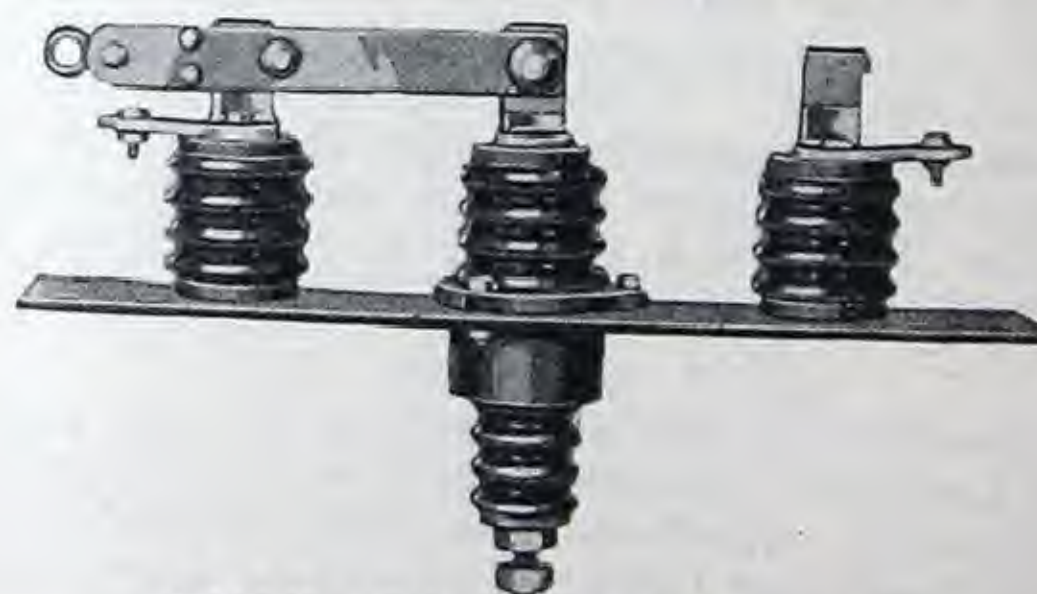
INDOOR DISCONNECTING SWITCHES



Type W-1—Front Connected



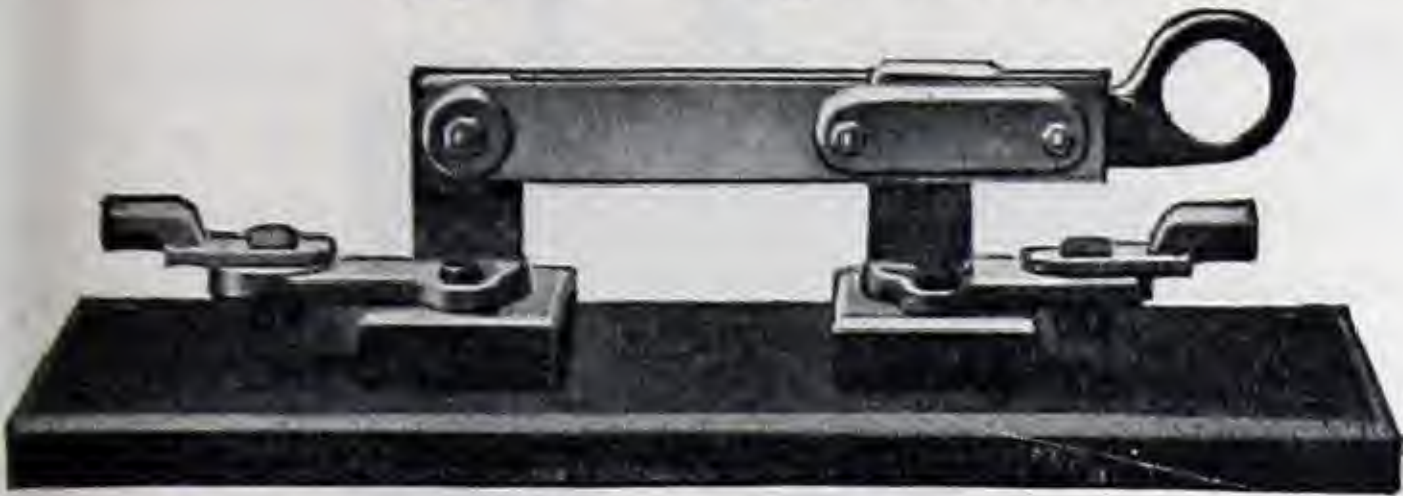
Type W-5—Back Connected



Middle Clip Back Connected

Prices on application.

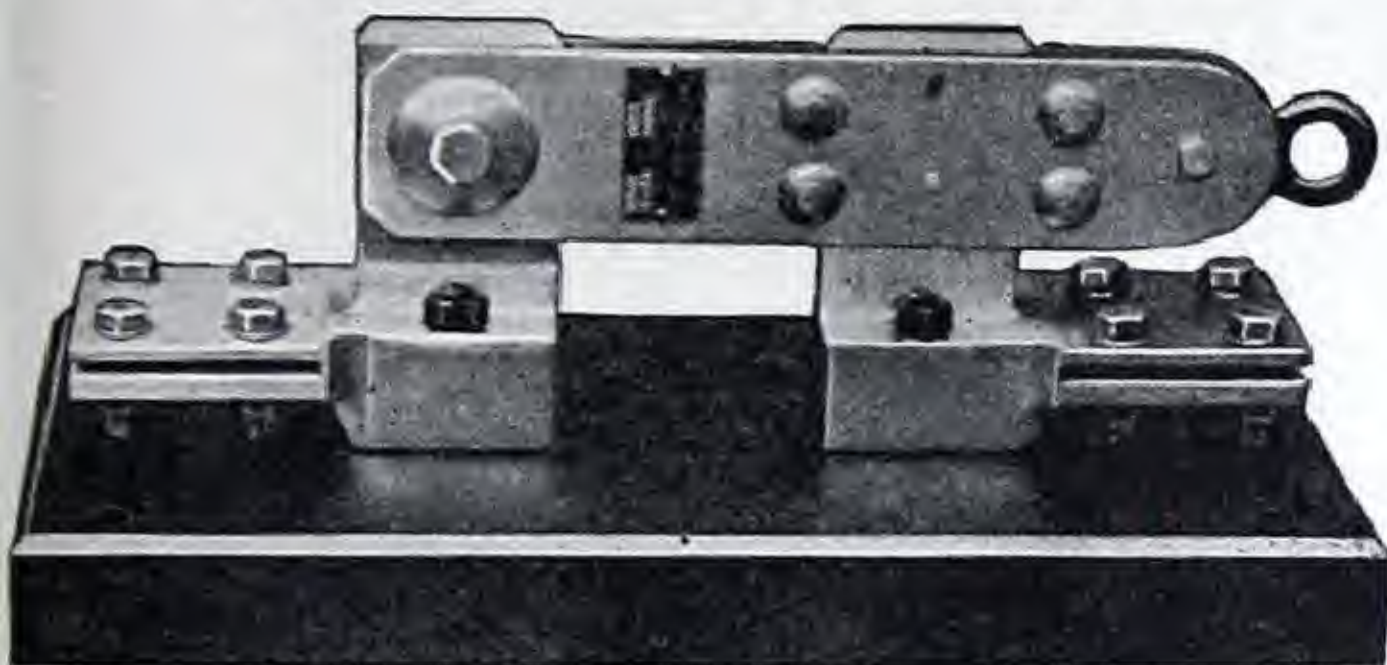
SLATER DISCONNECTING SWITCHES Type G—Single Throw



Rating—400 Amp. 2500 Volt. List No. 12201

FRONT CONNECTED, WITH BASE

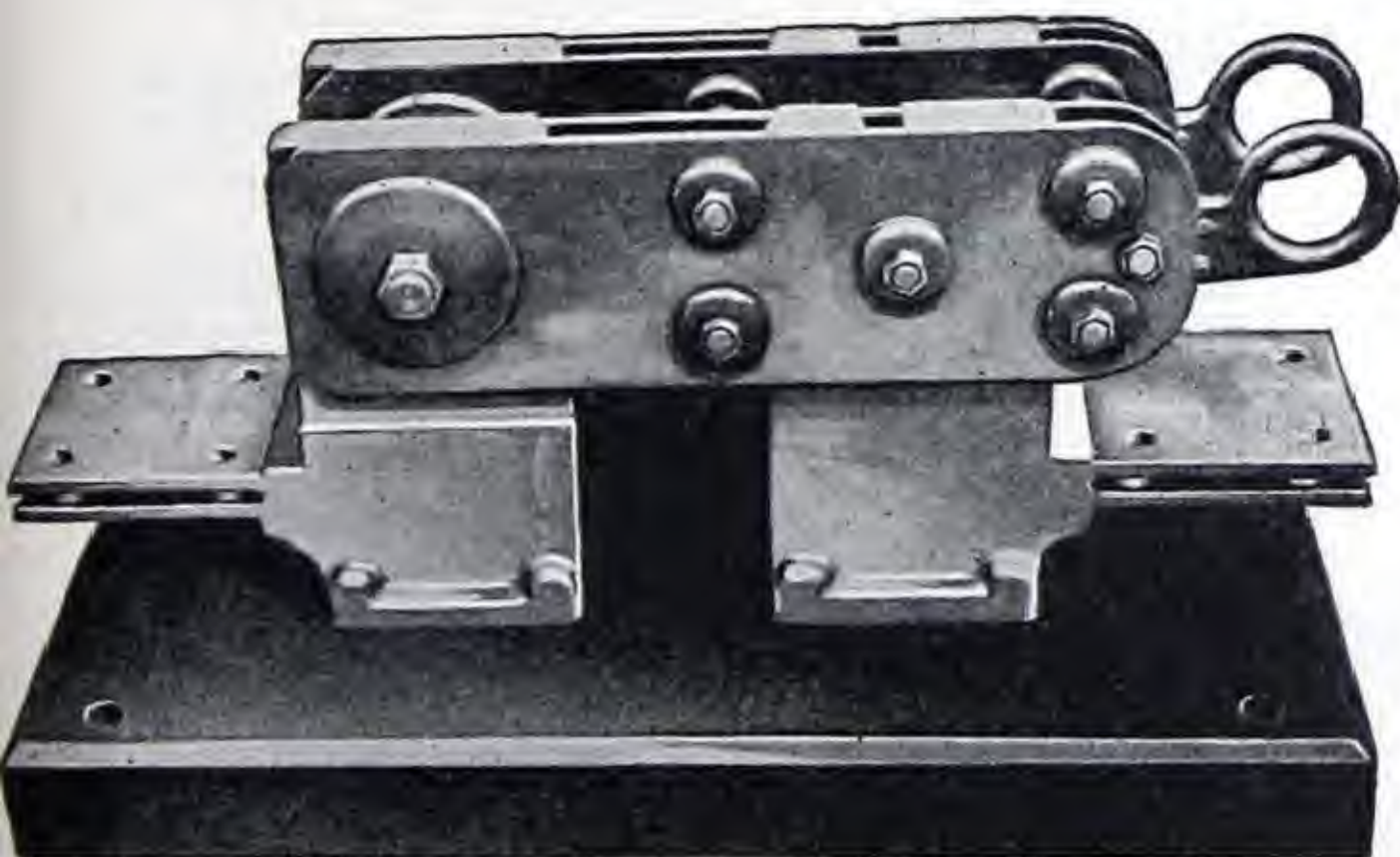
List No.	Amps.	Volts
12200	200	2500
12201	400	2500
12202	600	2500
12203	800	2500
12204	1200	2500
12205	2000	2500



Rating—1200 Amp. 2500 Volt. List No. 12204

HINGE JAW—REAR CONNECTED BREAK JAW—FRONT CONNECTED COMPLETE WITH BASE

List No.	Amps.	Volts
12400	200	2500
12401	400	2500
12402	600	2500
12403	800	2500
12404	1200	2500
12405	2000	2500



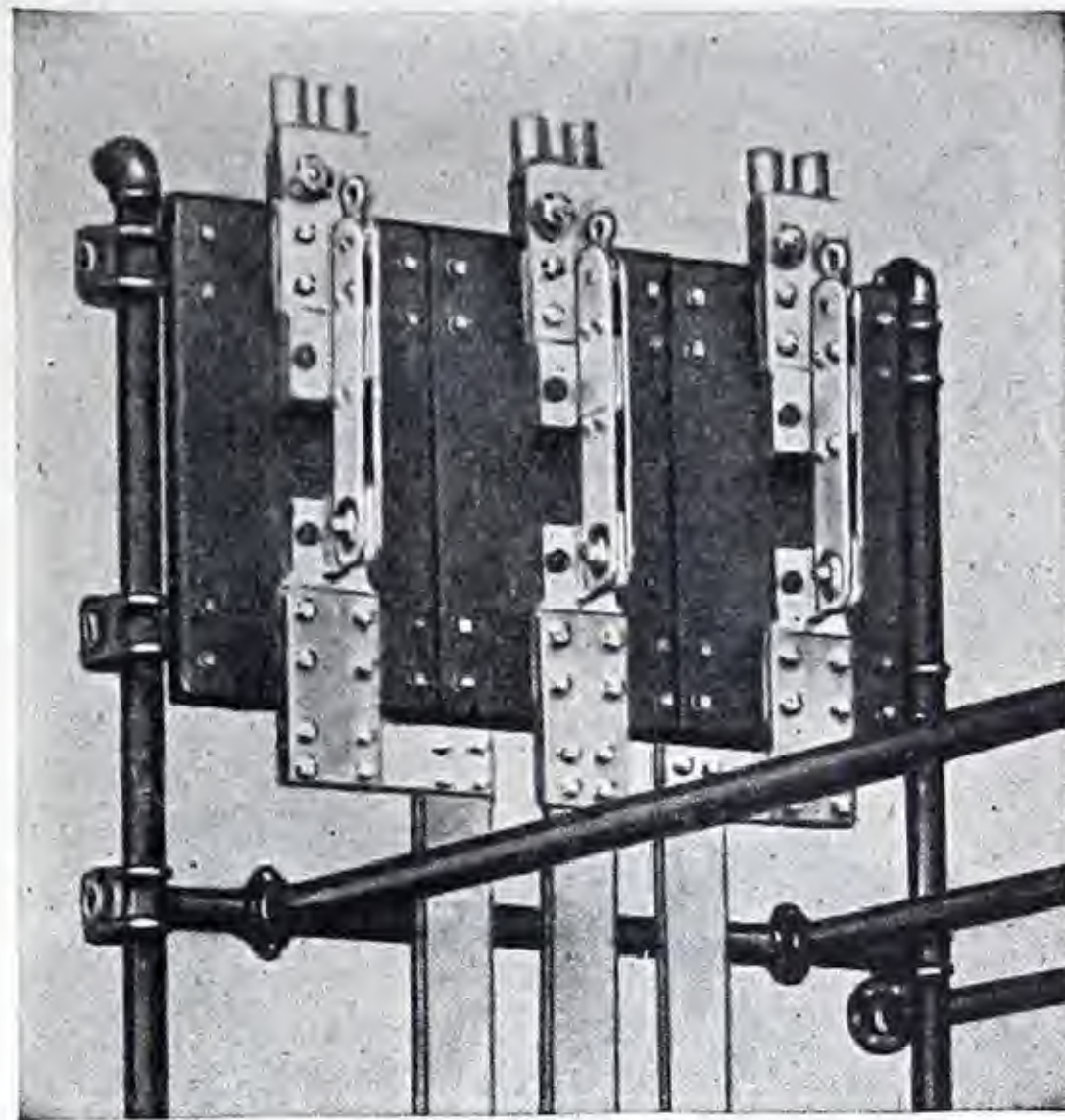
Rating—2000 Amp. 2500 Volt. List No. 12205

TYPE G—SINGLE THROW ALL REAR CONNECTED, WITH BASE

List No.	Amps.	Volts
12800	200	2500
12801	400	2500
12802	600	2500
12803	800	2500
12804	1200	2500
12805	2000	2500
12806	3000	2500

Prices on application.

SLATER DISCONNECTING SWITCHES Type G—Single Throw



Slater List No. 12204, 1200 ampere, 2500 volt S.P. Disconnecting Switches mounted on ebony asbestos bases.

Location—A well-known gold mine in Ontario.

INDOOR TYPE

Interchangeable part construction.

Double blades insuring large radiating area and consequent cool operation.

Solid copper clips, eliminating riveted or sweated joints

Simple and positive locking device.

Switches can be supplied for any combination of front or back connection.

Switches can be supplied for higher amperages and for either flat or pipe mounting.

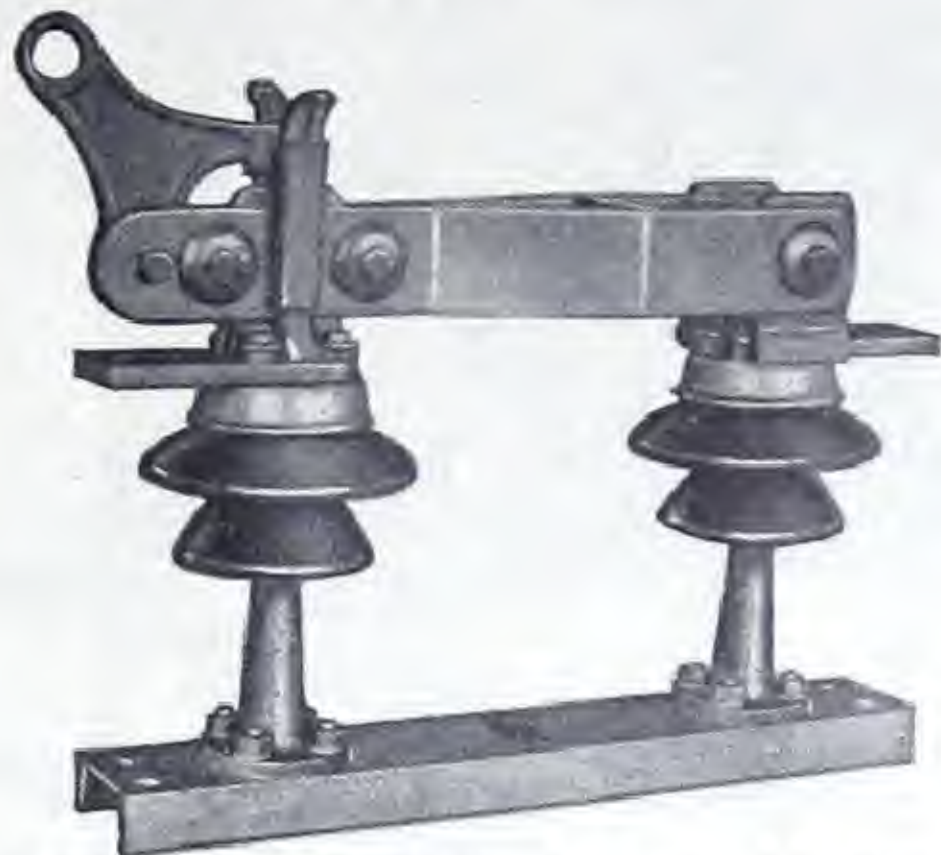
FRONT CONNECTED

List No.	Amps.	Volts
22201	400	5000
22202	600	5000
22203	800	5000
22204	1200	5000
22205	1600	5000
22206	2000	5000
32201	400	7500
32202	600	7500
32203	800	7500
32204	1200	7500
32205	1600	7500
32206	2000	7500
42201	400	15000
42202	600	15000
42203	800	15000
42204	1200	15000
42205	1600	15000
52201	400	23000
52202	600	23000
52203	800	23000
52204	1200	23000

Prices on application.

SLATER DISCONNECTING SWITCHES

For Indoor or Outdoor Service

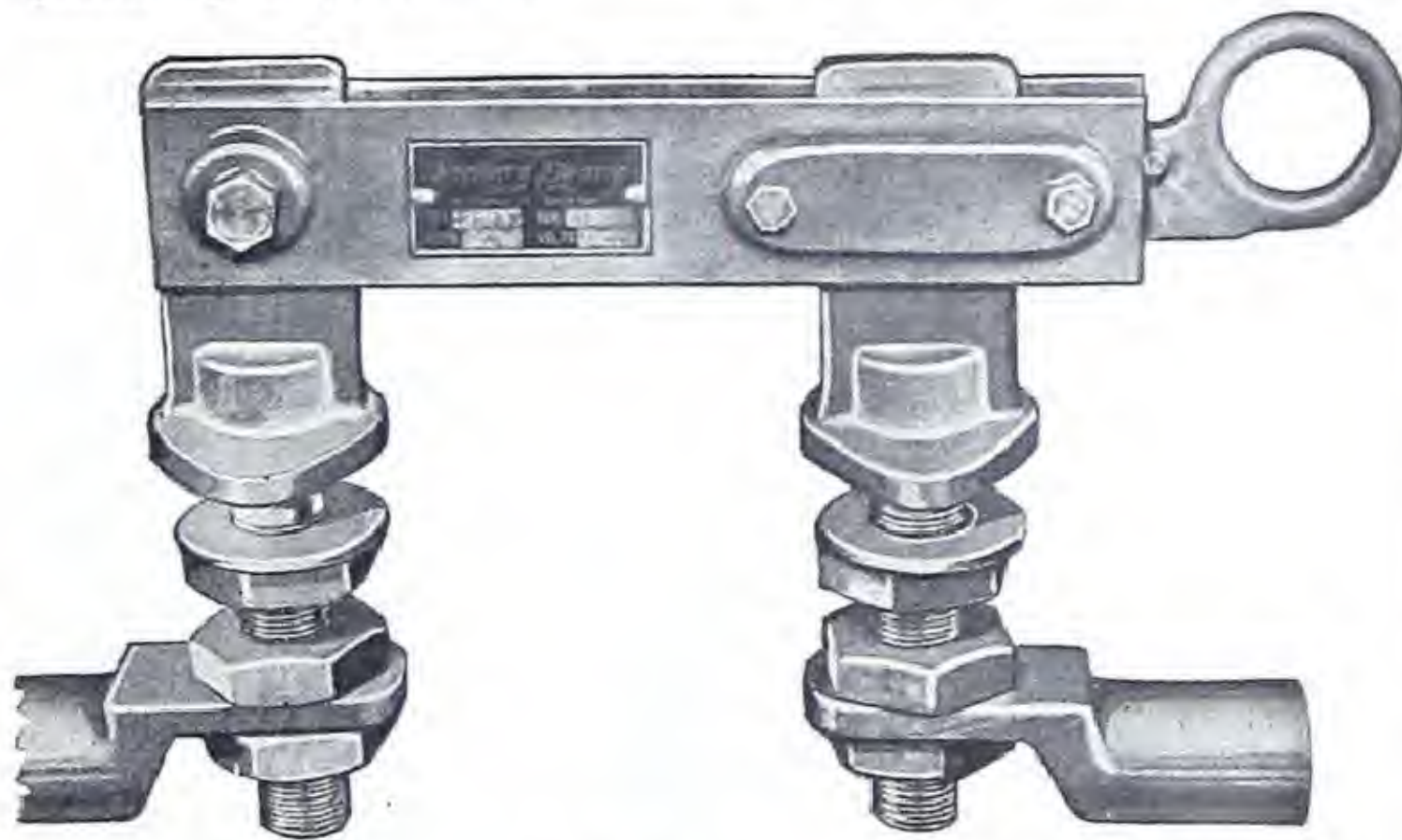
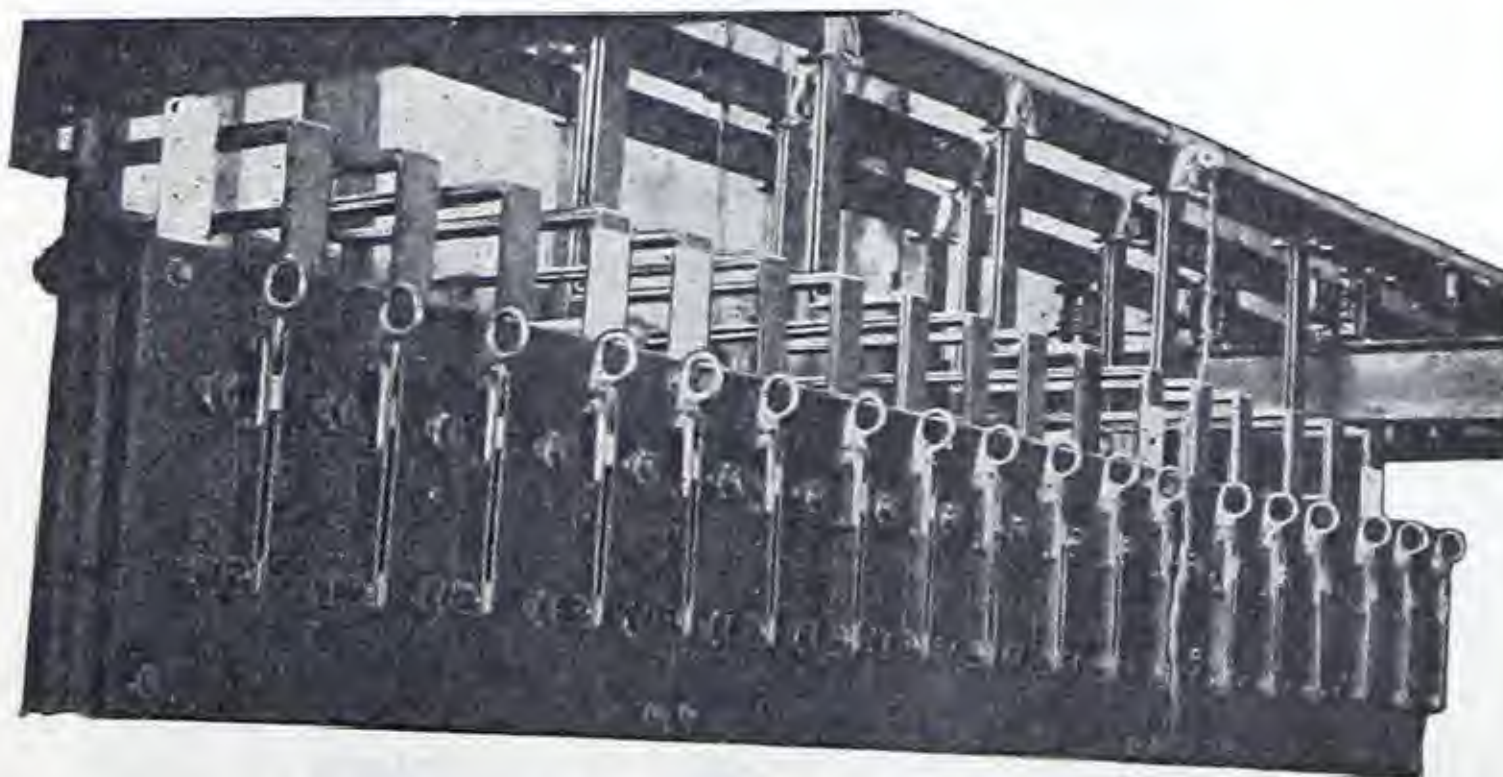
MOUNTED ON FLAT-PANEL-PIPE OR CROSS
ARM SINGLE OR DOUBLE THROW OR
GROUP OPERATEDType "GO" 1200 Ampere 15 Kv.
Outdoor Disconnecting Switch with
latch.

Sturdy bases, light but strong, which assure proper contact alignment and easy application to wall or pipe mounting in vertical or inverted position.

Ample cross section of copper parts and rugged construction of all fittings assure the full use of all other distinctive features.

When specified, terminal lugs or solderless terminal connectors can be supplied with the switch. Switch sticks in lengths of 6' and up are also available.

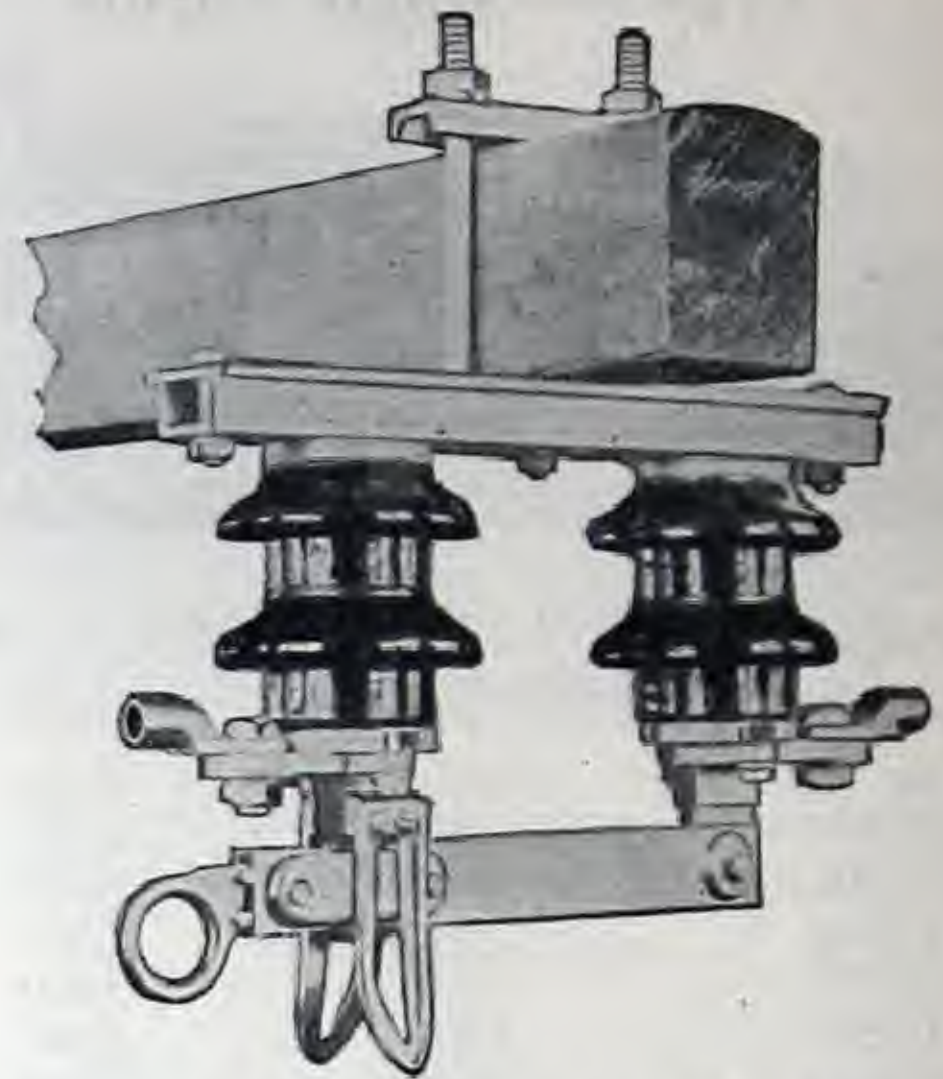
Special designs covering wide variations in current and voltage rating, special mounting arrangement, including interlocking devices, etc., have been developed by our Engineering Department.

Slater Disconnecting Switch, Type "G" 800 Amps., 2500
Volts. Rear Connected for mounting on Switch-
board Panel. No. 12803.

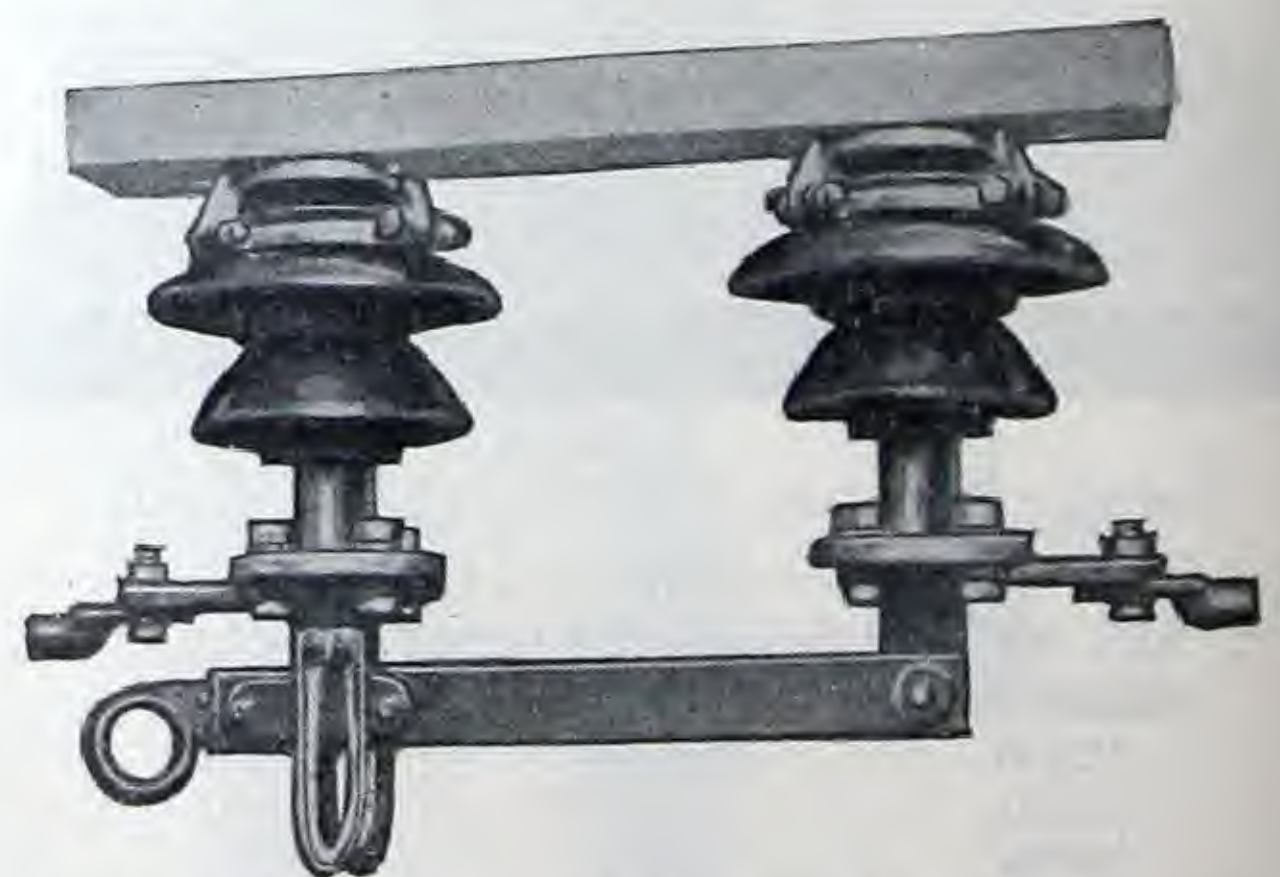
A group of 18 Slater Switches at a Prominent Industrial Plant.

Prices on application.

SLATER OUTDOOR SWITCHES

Slater Sectionalizing Switch, Cross Arm Mounting Type "GO"
400 Amps., 7500 Volts. Can also be furnished with Dead
Ending ClevisesTYPE GO—SINGLE THROW, VERTICAL MOUNTED,
FRONT CONNECTED

List No.	Amps.	Volts
37201	400	7500
37202	600	7500
37204	1200	7500
37206	2000	7500
47201	400	15000
47202	600	15000
47204	1200	15000
47206	2000	15000
57201	400	23000
57202	600	23000
57204	1200	23000
57206	2000	23000
67201	400	34500
67202	600	34500
67204	1200	34500
77201	400	46000
77202	600	46000
77204	1200	46000
87201	400	69000
87202	600	69000
87204	1200	69000

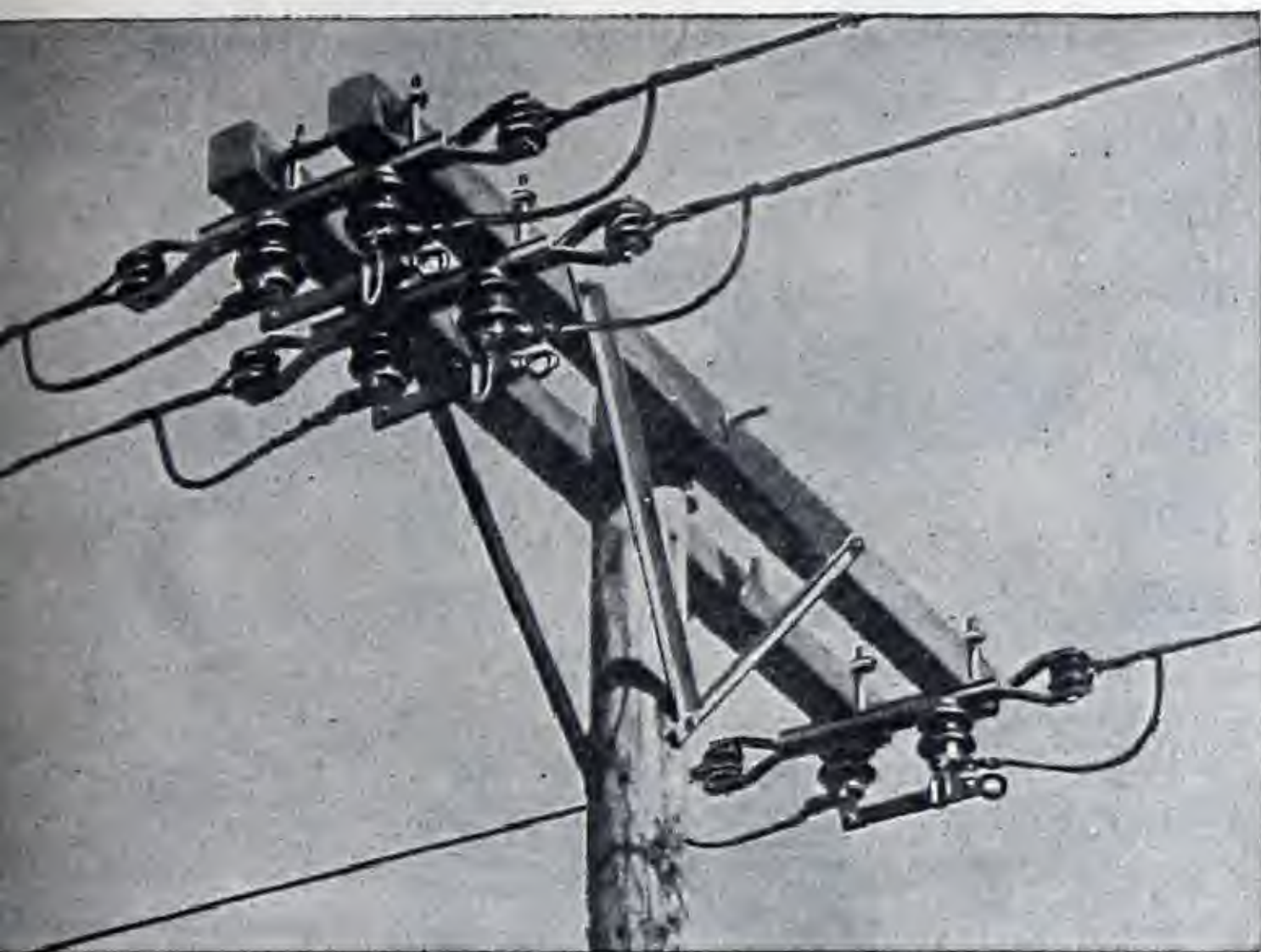
Type "GO" 600 Ampere 15000 Volt Outdoor Disconnectin
Switch, Inverted Mounting with clamp-type insulator cap.

Prices on application.

SLATER SECTIONALIZING SWITCH

The sectionalizing switch shown below is made for either single or double cross-arm mounting. The blade is the sturdy parallel blade construction equipped with the Slater Safety Latch (patented). Cast copper terminal lugs of liberal dimensions will be furnished for the conductor, when specified.

The integral dead-ending clevises give the installation a very compact appearance, and save the cost of pins or separate clevises for dead-ending at the sectionalizing point.



Slater Sectionalizing Switch, rating 400 Amps., 7500 volts, complete with dead-ending clevises, No. 11201—without clevises No. 11301.

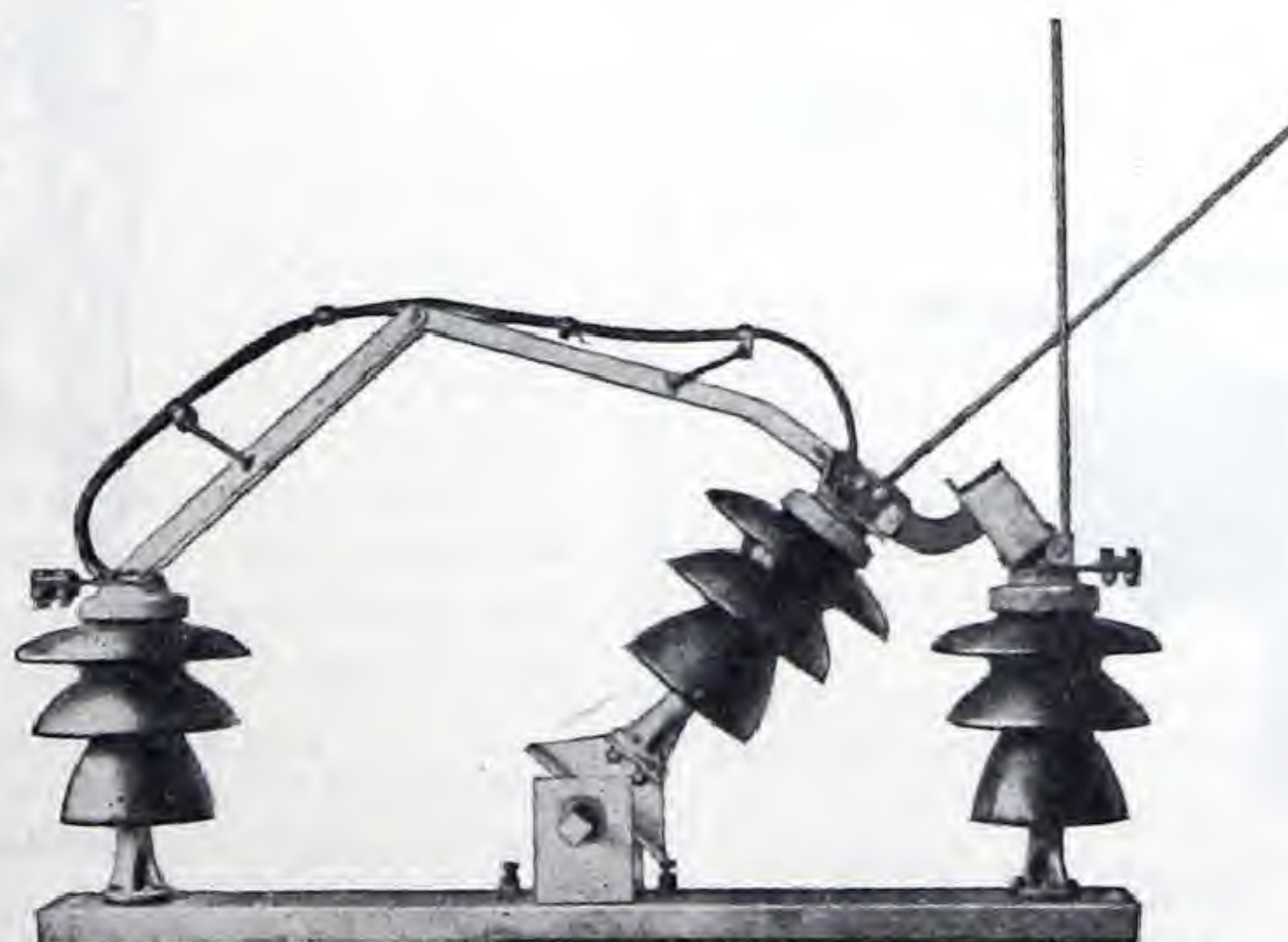
List No.	Amps.	Volts	Mounting
10200	200	5000	Cross-Arm With clevises
10201	400	5000	" "
11200	200	7500	" "
11201	400	7500	" "
13200	200	15000	" "
13201	400	15000	" "
10300	200	5000	Cross-Arm Without clevises
10301	400	5000	" "
11300	200	7500	" "
11301	400	7500	" "
13300	200	15000	" "
13301	400	15000	" "

SLATER E.E.E. GANG OPERATED AIR BRAKE SWITCHES

Type GO outdoor, remote control gang-operated disconnecting switches are applicable for use as plain disconnects for isolating apparatus. They are arranged to open all phases at one time. When arcing horns are used, they are suitable for breaking line charging current and transformer magnetizing current. Arcing horns are supplied only when they are specified on the order.

Construction Features

The vertical break permits of minimum phase spacing. There is a minimum of moving parts of comparatively simple construction. Installation is inexpensive, as the poles are assembled at the factory and shipped ready for the insertion of the connecting shaft.



Type GO, 400 amperes, 69 Kv. vertical break, tilting insulator, outdoor gang-operated, disconnecting switch, complete with arcing horns and clamp-type terminal lugs.

Insulator units are cemented assemblies, jigset in a steam bath to eliminate internal strains. These units are strictly interchangeable.

The insulator assemblies have cantilever and tensile values that give an adequate factor of safety, with the insulator axis in any position. All steel parts of the switch are Slater "hotdip" galvanized. All parts of the switch in the conducting path are non-ferrous. Bolts, nuts and lock washers on the "live" side of the switch are made of non-corrosive material with adequate mechanical strength. All hinged joints are shunted with copper shunts of ample capacity.

INDOOR DISCONNECTING SWITCHES



All Clips Back Connected

TYPE W-31—TRANSFER

List No.	List Price	Voltage	Amperes
		5000	
50025	64.80	5000	400
13055-Z	69.60	7500	400
13083-Z	78.00	15000	400
13111-Z	90.75	23000	400
50044	82.80	5000	600
13059-Z	87.60	7500	600
13087-Z	97.95	15000	600
13115-Z	112.80	23000	600
50067	137.25	5000	1200
14221	142.05	7500	1200
14223	156.45	15000	1200
14225	175.65	23000	1200

BLADE STOPS

90° Blade Stops for all single throw switches are included in Disconnect Switch prices. Other stops at following prices per switch:

Amperes	90° for D.T.Sw. Price	135° for S.T.Sw. Price
200	\$7.50	\$2.25
400	11.25	3.75
600	11.25	3.75
1200	15.00	4.50

BARRIERS

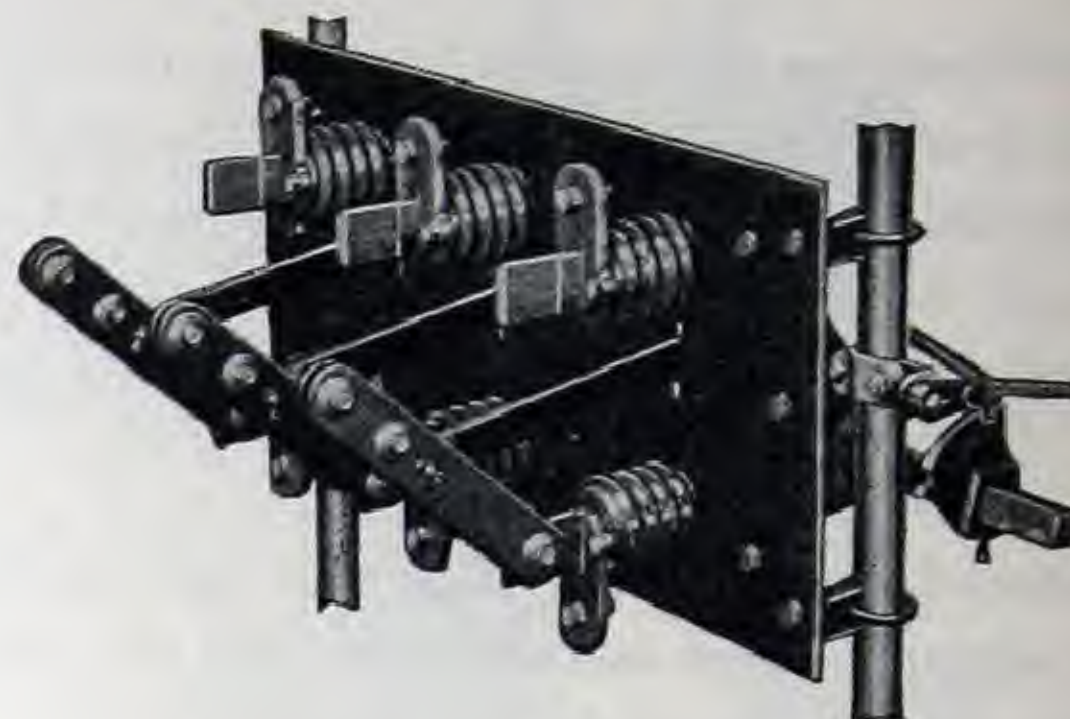
Volts	Single Throw Price	Double Throw Price
5000	\$4.50	\$7.50
7500	6.00	10.50
15000	7.50	12.00
23000	9.00	13.50

OUTDOOR DISCONNECT SWITCHES



List Number	List Price	Voltage	Amperage
OS-1192-1	\$14.25	5000	100
OS-1192-2	16.90	7500	100
OS-1192-5	14.25	5000	200
OS-1192-6	16.90	7500	200
OS-1192-10	24.00	7500	400

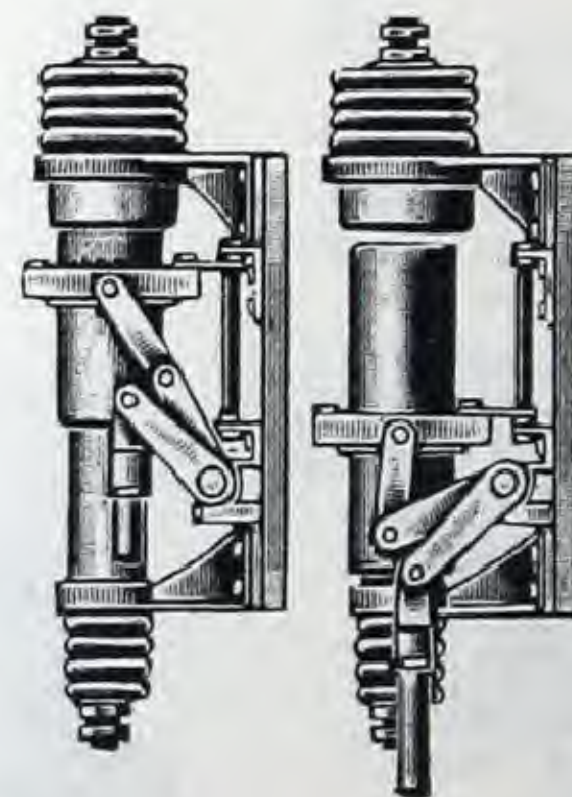
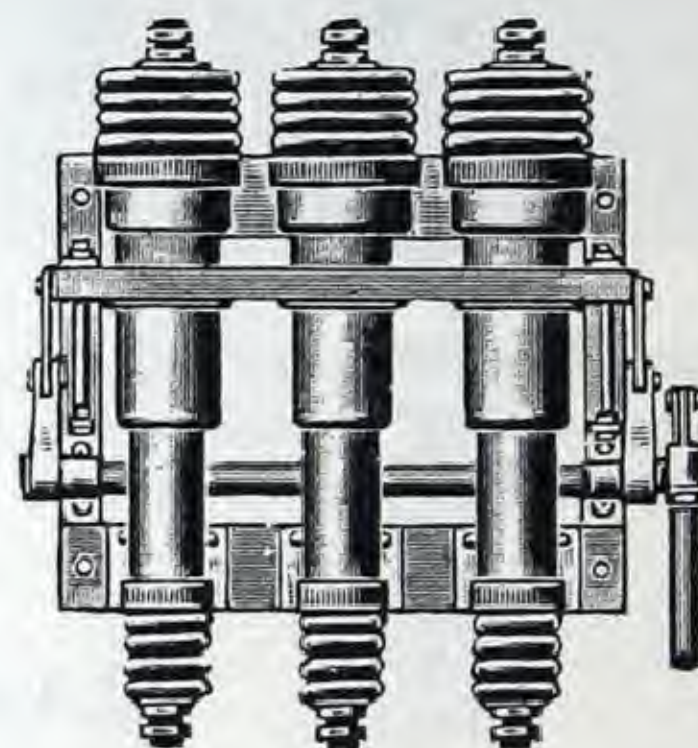
INDOOR GANG OPERATED SWITCHES



BLADE TYPE

FRONT CONNECTED—SINGLE THROW

List No.	List Price	Volts	Amps.
16100	111.50	7500	400
16103	122.75	7500	600
16101	123.75	15000	400
16104	136.20	15000	600
16102	136.70	23000	400
16105	150.50	23000	600



TELESCOPING ISOLATOR TYPE

SINGLE THROW

80004	\$190.20	7500	400
80005	218.93	7500	600
80006	211.30	15000	400
80007	236.48	15000	600

OUTDOOR GANG OPERATED SWITCHES

6600 S and V Air Break Types

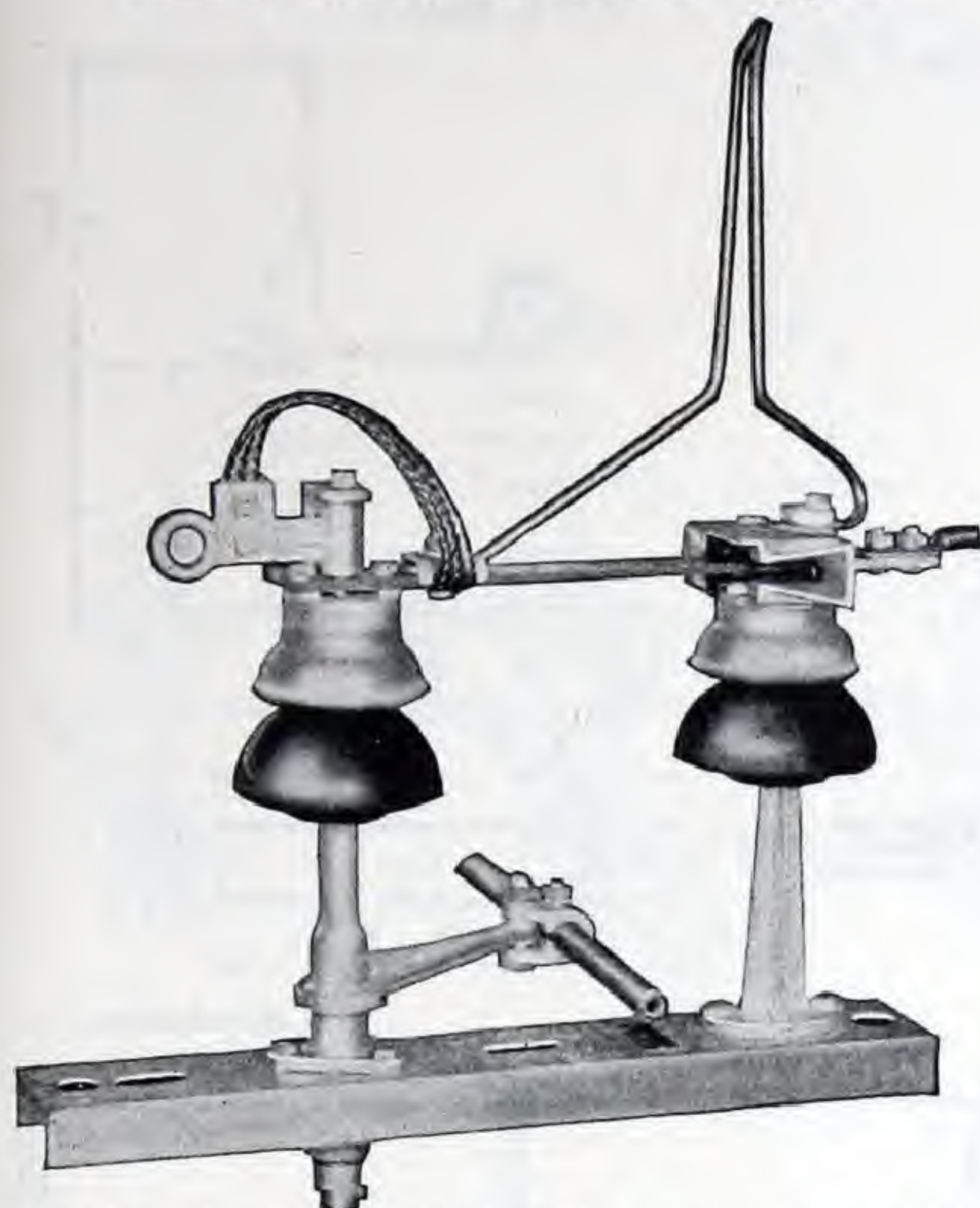


Fig. 1 Single Pole 7500 Volt Unit showing Punched Tube Terminals

GENERAL

The 6600-S type of switch is of the side break type and is designed for horizontal, upright mounting. It is listed for 100 and 400 amperes and for 7,500, 15,000, and 25,000 volts. The 6600-V type switch is designed for vertical mounting and is listed at the same ratings.

This type of switch is built with only two insulating units per pole. The operation of the switch is accomplished by rotating the rear or lower stack of insulators, as the copper switch blade is bolted rigidly to this rotating insulator. At the top of this rotating insulator unit is a swivel arrangement to which the jumper from the line wire is attached; therefore, the operation of the switch in no way disturbs the position of this jumper. A flexible copper braid connects the blade with the terminal block so that the swivel is not used to carry any current.

CONTACTS

The contacts are of the full floating type almost totally enclosed in a heavy housing. This serves to not only protect the contacts from adverse weather conditions, such as rain, sleet, ice or dirt and sand storms, but from mechanical injury as well. The two contact shoes as shown in figure one are hydraulic formed of rolled copper. This method of forming gives a perfectly flat and smooth contact surface. These shoes mount on phosphor bronze helical springs and are connected by means of copper braid to the terminal block. The ends of the contact shoes are widely flared so as to afford smooth and positive entrance of the blade even if the switch should be out of alignment.

It can be seen from these features that if the blade fully enters the contact housing the shoes will give 100% contact even if the blade be twisted or bent. A further advantage of this contact construction is that when the switch is open the contact shoes come together preventing all smoke, dust, dirt, flames, and water from getting between them. This feature is extremely valuable as it prevents pitting and roughening of the contact surfaces.

OUTDOOR GANG OPERATED SWITCHES

6600 S & V Air Break Switches

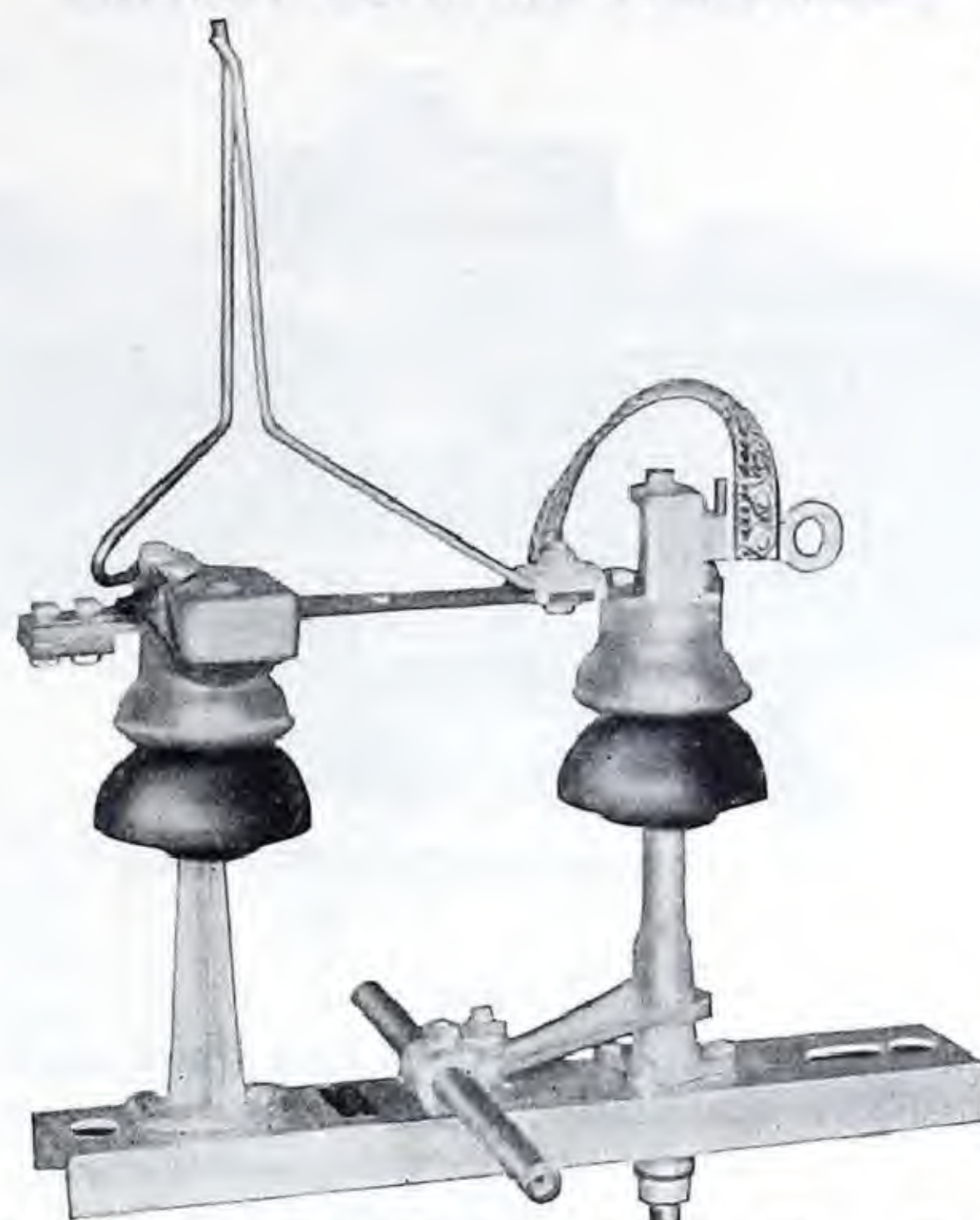


Fig. 2 Single Pole 7500 Volt Unit Showing Clamp Terminals

OPERATING MECHANISM

Cranks, hangers, and other parts of the operating mechanisms are of malleable iron, hot dipped galvanized. The operating handle of the upright switch is of the rotating type and so arranged that the switch can be locked in either the open or closed position. The operating handle of the vertical switch is of the 180° style and can also be locked open or closed. The tie pipe between poles of the switches are shipped undrilled so that after the switch has been properly installed and aligned holes can be drilled through it and bolted by means of the bolts supplied. It can be seen that after drilling and bolting into place the tie rod all chance of slipping on the part of the tie pipe is absolutely eliminated. This is a valuable safety feature in that all poles must open when the operating handle is moved.

BASES

Bases of the 6600-S type upright switches are made of hot dipped galvanized steel channels. They are punched with slotted holes so that they may be mounted on standard cross arms with allowance for the variation in diameter of mounting poles to which the cross arms may be attached. There is a large hole drilled in each end of the base to which the insulator strings may be attached. This eliminates the necessity of drilling extra holes in the cross arms for this purpose. The bases of the vertical switches are also of hot dipped galvanized steel channels but mounting holes at the four corners only. Special drillings can be provided to meet any desired conditions of mounting that the customer may have.

INSULATORS

The insulators used on these switches have the following characteristics:

Rating of switch	Rating of insulator	Dry flashover	Wet flashover
7500 volts	17000 volts	60000 volts	40000 volts
15000 volts	27000 volts	85000 volts	60000 volts
25000 volts	35000 volts	110000 volts	75000 volts

FINISH

All corrosive parts of these switches are hot dipped galvanized, the galvanizing being of the highest quality.

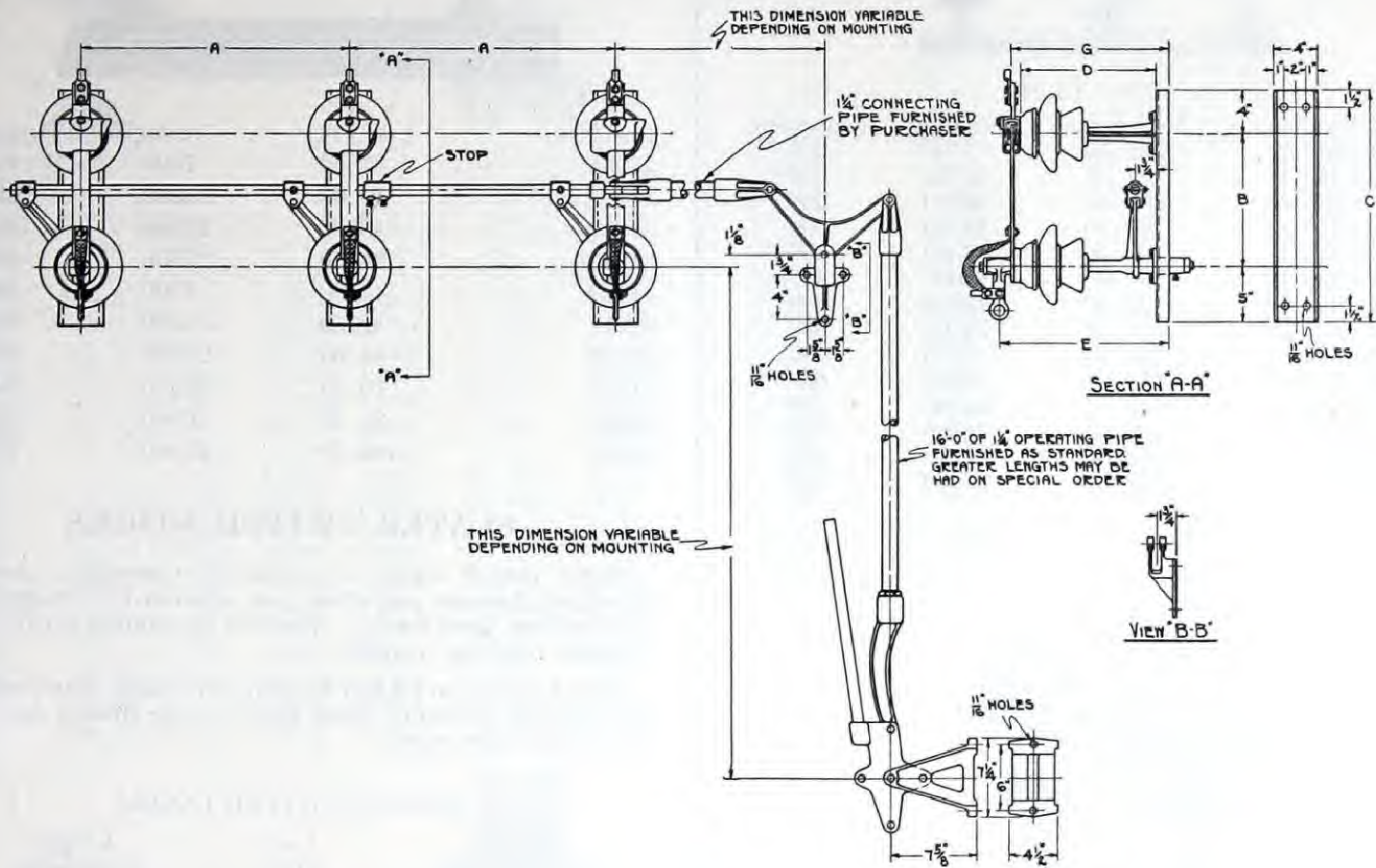
INSTALLATION SUGGESTIONS

In setting up these switches the bases should be lined up so that they are parallel to each other and at the same level. If this is carefully done, the switches will operate very easily and freely. A stop is provided on the tie pipe connecting the switch poles. This stop should be so adjusted that the blades do not quite strike the contact housing in closing. When this is properly adjusted there is absolutely no shock or strain on the insulator when closing the switch.

OUTDOOR GANG OPERATED SWITCHES

6600 S and V Air Break Types

TYPE 6600-V



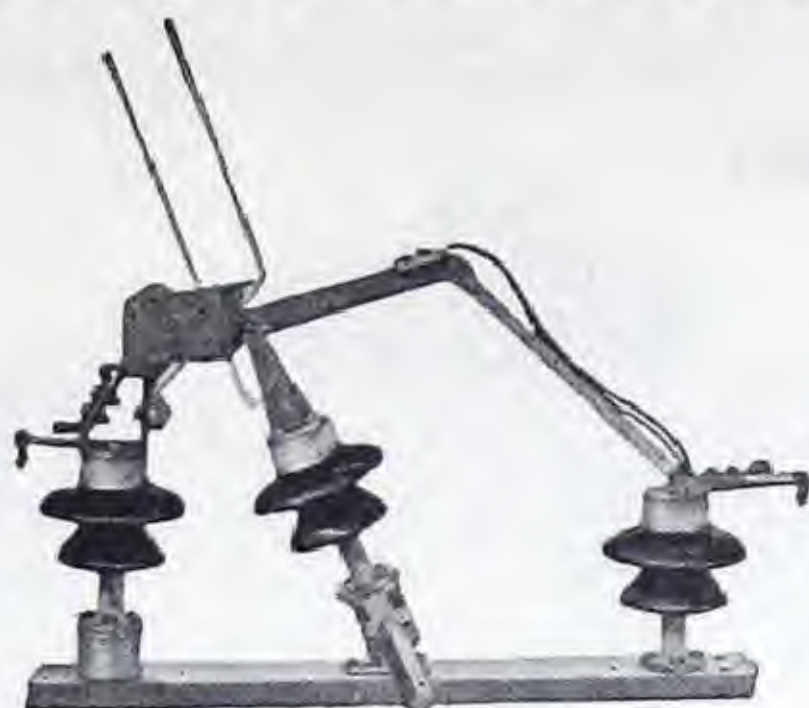
List Price	Voltage	Amp- erage	No. of Poles	Dimensions in Inches						Shpg. Wt. in Lbs.
				A	B	C	D	E	G	
\$174.00	7500	200	2	24	12	21	11 1/4	15	14 1/8	175
238.50	7500	200	3	24	12	21	11 1/4	15	14 1/8	235
306.00	7500	200	4	24	12	21	11 1/4	15	14 1/8	295
279.00	15000	200	3	24	12	21	13 1/4	17	16 1/8	265
300.00	25000	200	3	36	15	24	13 1/2	17 1/4	16 3/8	325
186.00	7500	400	2	24	12	21	11 1/4	15	14 1/8	180
256.50	7500	400	3	24	12	21	11 1/4	15	14 1/8	240
330.00	7500	400	4	24	12	21	11 1/4	15	14 1/8	305
297.00	15000	400	3	24	12	21	13 1/4	17	16 1/8	275
318.00	25000	400	3	36	15	24	13 1/2	17 1/4	16 3/8	335

All switches are supplied with operating pipes 16 feet long, unless otherwise specified.

For longer operating pipes add \$0.60 per foot list prices.

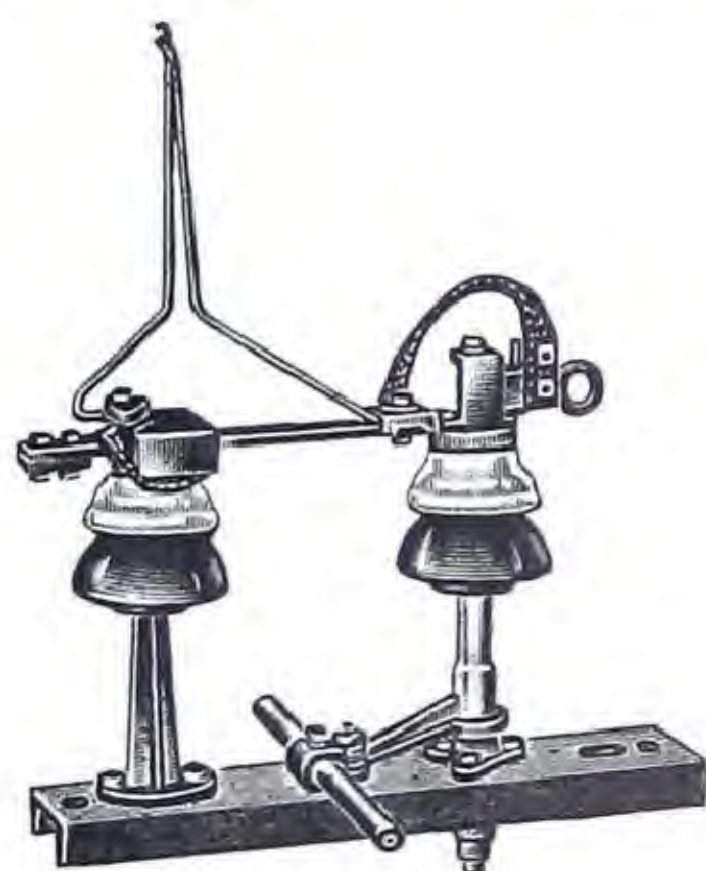
If purchaser desires, the connecting pipe noted in cut at top of page will be furnished threaded at both ends, and of the length
red at \$0.60 list price per foot.

OUTDOOR AIR BREAK SWITCHES



"8700" TYPE

List Number	List Price	Voltage	Amperage
OS-1380-2	\$142.50	7500	200
OS-1380-4	177.00	15000	200
OS-1380-6	202.50	23000	200
OS-1380-8	262.50	34500	200
OS-1355-4	252.50	7500	400
OS-1355-10	297.00	15000	400
OS-1355-16	322.50	23000	400
OS-1355-22	387.00	34500	400
OS-1355-5	230.50	7500	600
OS-1355-11	333.00	15000	600
OS-1355-17	361.50	23000	600
OS-1355-23	436.50	34500	600
OS-1355-29	592.50	46000	600
OS-1355-35	942.00	69000	600



"6600" TYPE

List Number	List Price	Voltage	Amperage
6601	234.00	7500	200
6603	274.50	15000	200
6604	295.50	23000	200
6610	415.00	34500	200
OS-1245-4	202.50	7500	400
OS-1245-10	240.00	15000	400
OS-1245-16	259.50	23000	400
OS-1245-22	307.50	34500	400
OS-1245-5	228.00	7500	600
OS-1245-11	267.00	15000	600
OS-1245-17	288.00	23000	600
OS-1245-23	345.00	34500	600
OS-1245-29	468.00	46000	600
OS-1245-35	744.00	69000	600

Above ratings and prices cover Three Pole Single Throw Switches complete with arcing horns and interphase connections, but without operating mechanism. Mechanisms can be of direct type or indirect type with one offset bearing.

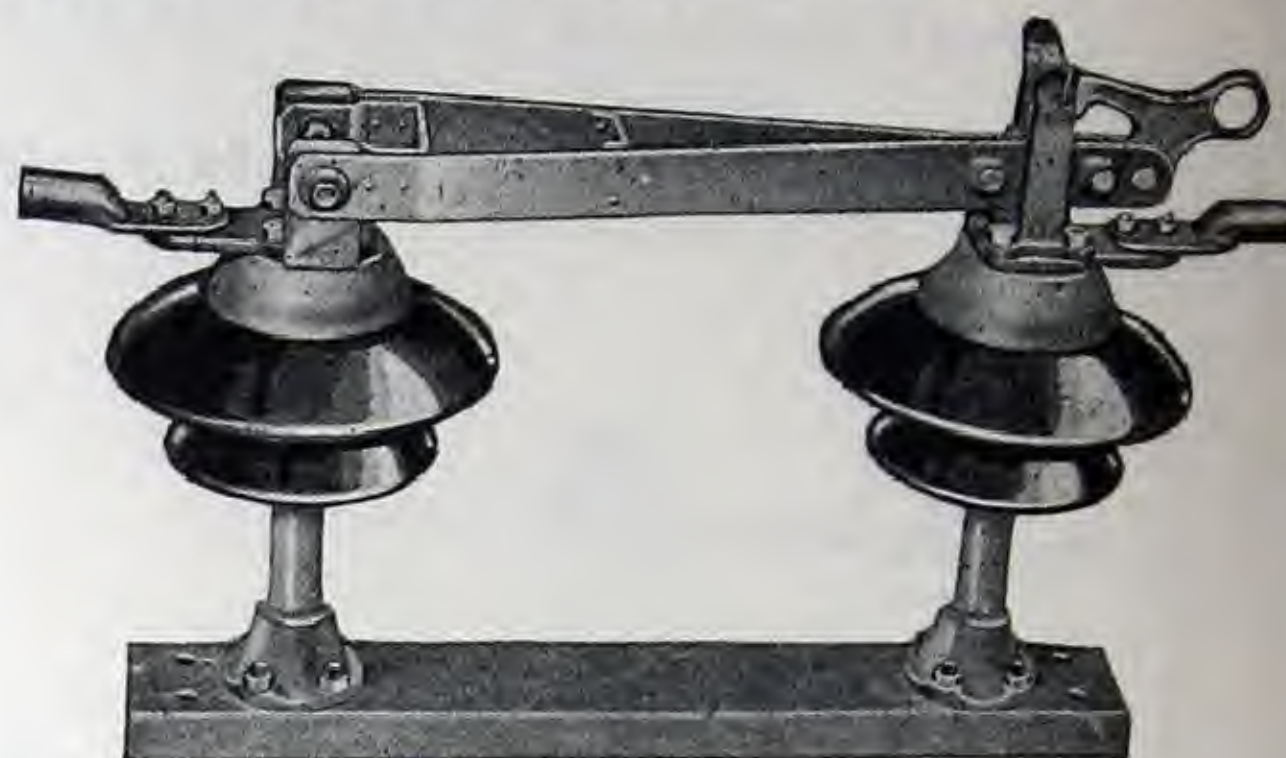
Mechanisms can be priced as follows:

List No. of Switch	Direct Mechanism	Indirect Mechanism with one offset bearing
OS-1380-2 to OS-1380-8	\$15.00	\$15.00
6601 to 6610	15.00	15.00
OS-1355-4 to OS-1355-35	37.50	52.50
OS-1245-4 to OS-1245-35	37.50	52.50

For 1, 2 and 4 Pole Single Throw Switches use the following multipliers on 3 Pole Single Throw price list, then add proper mechanism:

1 Pole—3 Pole x .4 2 Pole—3 Pole x .7 4 Pole—3 Pole x 1.4

OUTDOOR DISCONNECT SWITCHES



List No.	List Price	Voltage	Amperage
31001	\$ 37.50	7500	400
31015	45.00	15000	400
31029	48.00	23000	400
31043	64.50	34500	400
31003	42.00	7500	600
31017	49.50	15000	600
31031	54.00	23000	600
31045	70.50	34500	600
31059	88.50	46000	600
31073	146.50	69000	600

SLATER SWITCH STICKS

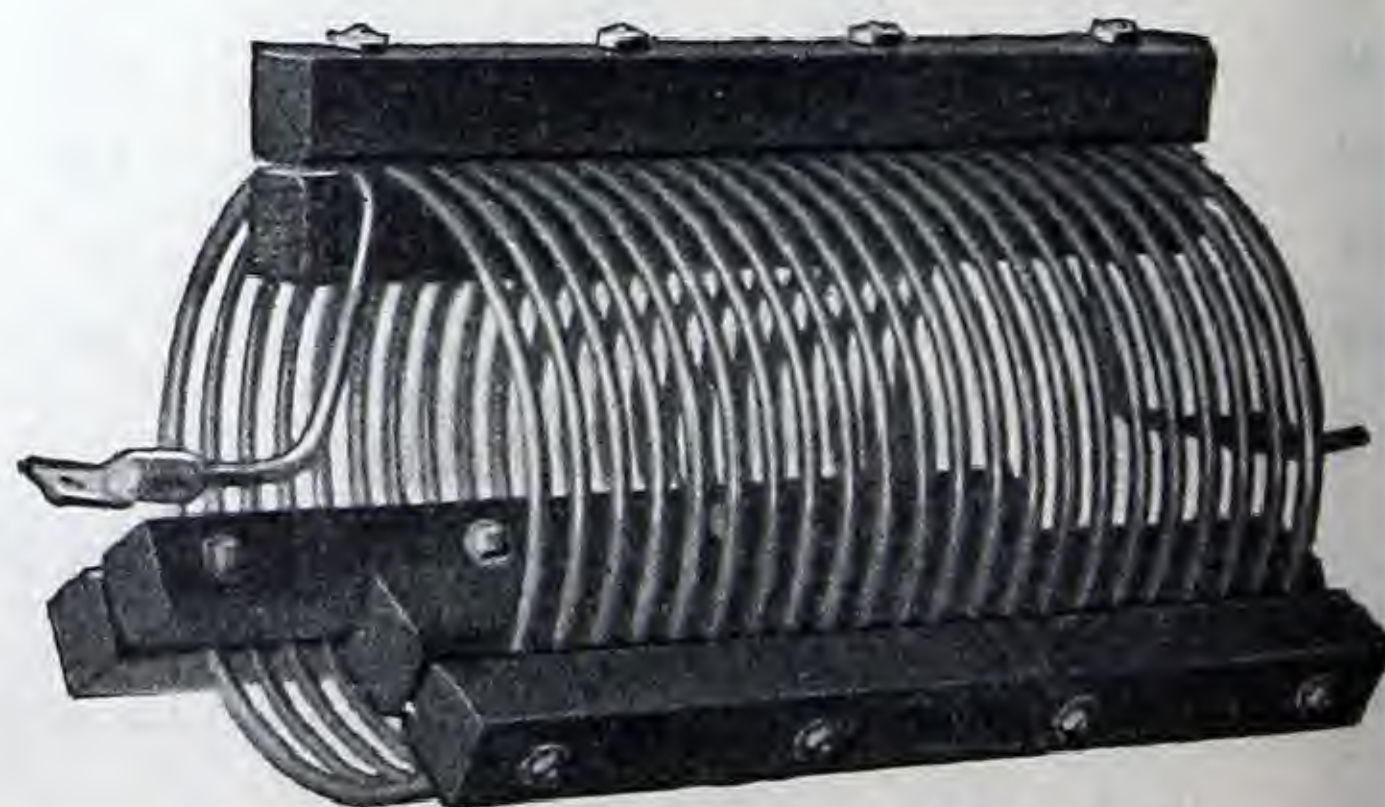
Slater switch sticks are made of thoroughly seasoned kiln-dried hickory and white ash, selected for straight grain and freedom from knots. All sticks are painted with a special weather resisting varnish.

Switch sticks over 8 feet in length are made in two sections. The lengths available (from stock) range from 4 feet to 22 feet in two foot steps.

INDOOR SWITCH HOOKS

List No.	List Price	Length in feet
7111	\$ 9.00	4
7103	12.00	6
7112	15.00	8
7105	18.00	10
7113	21.00	12
7114	24.00	14
7116	27.00	16
7118	36.00	18
7120	40.50	20
7130	45.00	22

SLATER CHOKE COILS



Slater choke coil 22 Turns—9" Diameter

Prices on application.

OUTDOOR BUS SUPPORTS



Type AFU

TYPE AFU
FLAT MOUNTING

List No.	Price	Size Conductor	Voltage
200	\$ 8.10	2" Bar	7500
201	11.20	2" Bar	15000
202	11.65	2" Bar	23000
203	16.05	2" Bar	34500
204	21.30	2" Bar	46000
205	37.45	2" Bar	69000
206	8.55	3" Bar	7500
207	11.35	3" Bar	15000
208	12.10	3" Bar	23000
209	16.50	3" Bar	34500
210	21.75	3" Bar	46000
211	37.90	3" Bar	69000
212	9.60	4" Bar	7500
213	12.40	4" Bar	15000
214	13.15	4" Bar	23000
215	17.55	4" Bar	34500
216	22.80	4" Bar	46000
217	38.95	4" Bar	69000



Type HPU

TYPE HFU
FLAT MOUNTING*

List No.	Price	Size Conductor	Voltage
3200	\$ 8.65	2" Bar	7500
3201	11.40	2" Bar	15000
3202	12.15	2" Bar	23000
3203	16.60	2" Bar	34500
3204	21.85	2" Bar	46000
3205	37.95	2" Bar	69000
3206	9.15	3" Bar	7500
3207	11.95	3" Bar	15000
3208	12.70	3" Bar	23000
3209	17.10	3" Bar	34500
3210	22.35	3" Bar	46000
3211	38.50	3" Bar	69000
3212	10.35	4" Bar	7500
3213	13.15	4" Bar	15000
3214	13.90	4" Bar	23000
3215	18.30	4" Bar	34500
3216	23.55	4" Bar	46000
3217	39.70	4" Bar	69000



Type MFU

TYPE MFU
FLAT MOUNTING

List No.	Price	Size Conductor	Voltage
400	\$ 8.65	2" Bar	7500
401	11.40	2" Bar	15000
402	12.15	2" Bar	23000
403	16.60	2" Bar	34500
404	21.85	2" Bar	46000
405	37.95	2" Bar	69000
406	9.15	3" Bar	7500
407	11.95	3" Bar	15000
408	12.70	3" Bar	23000
409	12.10	3" Bar	34500
410	22.35	3" Bar	46000
411	38.50	3" Bar	69000
412	10.35	4" Bar	7500
413	13.15	4" Bar	15000
414	13.90	4" Bar	23000
415	18.30	4" Bar	34500
416	23.55	4" Bar	46000
417	39.70	4" Bar	69000



Type TPU

TYPE TFU
FLAT MOUNTING*

List No.	Price	Size Conductor	Voltage
32600	\$ 8.10	2" Bar	7500
32601	10.90	2" Bar	15000
32602	11.65	2" Bar	23000
32603	16.05	2" Bar	34500
32604	21.30	2" Bar	46000
32605	37.45	2" Bar	69000
32606	53.55	3" Bar	7500
32607	11.35	3" Bar	15000
32608	12.10	3" Bar	23000
32609	16.50	3" Bar	34500
32610	21.75	3" Bar	46000
32611	37.90	3" Bar	69000
32612	9.60	4" Bar	7500
32613	12.40	4" Bar	15000
32614	13.15	4" Bar	23000
32615	17.55	4" Bar	34500
32616	22.80	4" Bar	46000
32617	38.95	4" Bar	69000

*Illustration shows pipe mounting type.

OUTDOOR BUS SUPPORTS



Type FFU

TYPE FFU—FLAT MOUNTING

List No.	Price	Size Conductor	Voltage
33200	\$ 6.30	0- $\frac{13}{16}$	7500
33201	9.10	0- $\frac{13}{16}$	15000
33202	9.85	0- $\frac{13}{16}$	23000
33203	14.25	0- $\frac{13}{16}$	34500
33204	19.50	0- $\frac{13}{16}$	46000
33205	35.65	0- $\frac{13}{16}$	69000
33206	6.85	$\frac{7}{8}$ -1 $\frac{5}{16}$	7500
33207	9.50	$\frac{7}{8}$ -1 $\frac{5}{16}$	15000
33208	10.35	$\frac{7}{8}$ -1 $\frac{5}{16}$	23000
33209	14.80	$\frac{7}{8}$ -1 $\frac{5}{16}$	34500
33210	20.05	$\frac{7}{8}$ -1 $\frac{5}{16}$	46000
33211	36.15	$\frac{7}{8}$ -1 $\frac{5}{16}$	69000
33218	7.90	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	7500
33219	10.65	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	15000
33220	11.40	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	23000
33221	15.85	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	34500
33222	21.10	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	46000
33223	37.20	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	69000



Type RPU

TYPE RFU—FLAT MOUNTING*

List No.	Price	Size Conductor	Voltage
32800	\$ 7.45	0- $\frac{13}{16}$	7500
32801	10.20	0- $\frac{13}{16}$	15000
32802	10.95	0- $\frac{13}{16}$	23000
32803	15.40	0- $\frac{13}{16}$	34500
32804	20.65	0- $\frac{13}{16}$	46000
32805	36.75	0- $\frac{13}{16}$	69000
32818	7.80	$\frac{7}{8}$ -1 $\frac{5}{16}$	7500
32819	10.60	$\frac{7}{8}$ -1 $\frac{5}{16}$	15000
32820	11.35	$\frac{7}{8}$ -1 $\frac{5}{16}$	23000
32821	15.75	$\frac{7}{8}$ -1 $\frac{5}{16}$	34500
32822	21.00	$\frac{7}{8}$ -1 $\frac{5}{16}$	46000
32823	37.15	$\frac{7}{8}$ -1 $\frac{5}{16}$	69000
32836	8.95	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	7500
32837	11.70	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	15000
32838	12.45	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	23000
32839	16.90	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	34500
32840	12.15	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	46000
32841	37.75	1 $\frac{3}{8}$ -2 $\frac{3}{8}$	69000

NOTES—The foregoing prices are for flat mounting supports, either upright or underhung mounting. Add \$2.25 to the above prices for 1 $\frac{1}{4}$ and 1 $\frac{1}{2}$ pipe mounting. All clamps for rectangular bars are one-half ferrous and one-half non-ferrous. The same applies to the Type F clamp. The Type R clamp is all non-ferrous.

*Illustration shows pipe mounting type.

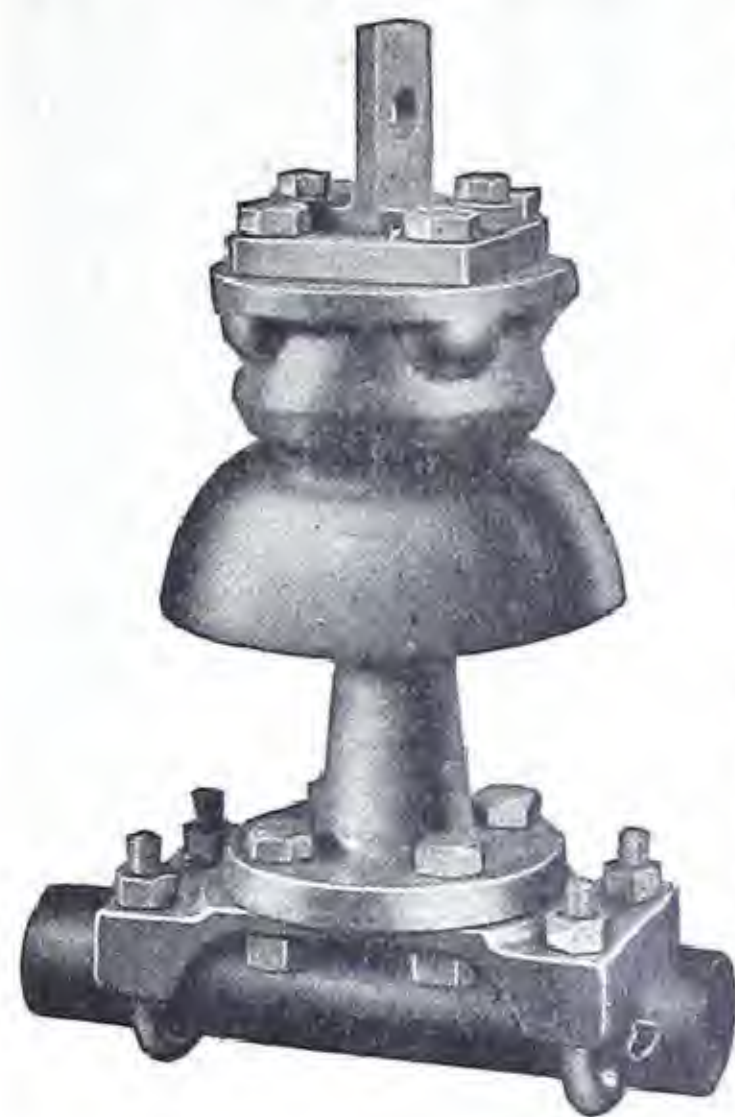
SLATER BUS SUPPORTS



Type G 7500 volt Bus Support for indoor service 1 1/4" pipe frame mounting.



Type G 7500 volt Bus Support for indoor service, flat mounting.



Supplementing the line of Disconnecting Switches described, a complete line of Bus Supports is provided for wall or pipe structure mounting, and for indoor or outdoor service, and to accommodate either flat bus-bar or copper tubing conductors.

Heavy duty porcelain insulators will be supplied where great cantilever strength is required due to heavy short circuit stresses between busses. All bus insulators are carried in stock and are interchangeable with switch insulators of the same rating. Immediate shipment from stock can usually be made.

TYPE "G"—INDOOR SERVICE—STANDARD DUTY

Volts	List No. 1 1/4" Pipe Frame Mounting	List No. Flat Mounting	Conductor Sizes
5000	23200	23400	Up to 1/2" I.P.S. Tubing.
5000	23201	23401	3/4" to 1" I.P.S. Tubing.
5000	23202	23402	1 1/4" to 2" I.P.S. Tubing.
7500	33200	33400	Up to 1/2" I.P.S. Tubing.
7500	33201	33401	3/4" to 1" I.P.S. Tubing.
7500	33202	33402	1 1/4" to 2" I.P.S. Tubing.
15000	43200	43400	Up to 1/2" I.P.S. Tubing.
15000	43201	43401	3/4" to 1" I.P.S. Tubing.
15000	43202	43402	1 1/4" to 2" I.P.S. Tubing.
23000	53200	53400	Up to 1/2" I.P.S. Tubing.
23000	53201	53401	3/4" to 1" I.P.S. Tubing.
23000	53202	53402	1 1/4" to 2" I.P.S. Tubing.

TYPE "GO"

OUTDOOR SERVICE—STANDARD DUTY

5000	24200	24400	Up to 1/2" I.P.S. Tubing.
5000	24201	24401	3/4" to 1" I.P.S. Tubing.
5000	24202	24402	1 1/4" to 2" I.P.S. Tubing.
7500	34200	34400	Up to 1/2" I.P.S. Tubing.
7500	34201	34401	3/4" to 1" I.P.S. Tubing.
7500	34202	34402	1 1/4" to 2" I.P.S. Tubing.
15000	44200	44400	Up to 1/2" I.P.S. Tubing.
15000	44201	44401	3/4" to 1" I.P.S. Tubing.
15000	44202	44402	1 1/4" to 2" I.P.S. Tubing.
23000	54200	54400	Up to 1/2" I.P.S. Tubing.
23000	54201	54401	3/4" to 1" I.P.S. Tubing.
23000	54202	54402	1 1/4" to 2" I.P.S. Tubing.

Prices on application.

INDOOR BUS SUPPORTS



Type AF



Type MF



Type HP



Type BP



Type FF



Type RP

TYPE AF

List No.	List Price	Size Conductor	Voltage	List No.	List Price	Size Conductor
27108	\$ 6.70	2" Bar	5000	27008	\$ 7.20	2" B
27109	7.45	2" Bar	7500	27009	7.95	2" B
27110	8.20	2" Bar	15000	27010	8.70	2" B
27111	9.70	2" Bar	23000	27011	10.20	2" B
27116	12.15	3" Bar	5000	27016	7.75	3" B
27117	7.90	3" Bar	7500	27017	8.50	3" B
27118	8.65	3" Bar	15000	27018	9.25	3" B
27119	10.15	3" Bar	23000	27019	10.75	3" B
27120	8.20	4" Bar	5000	27020	8.95	4" B
27121	8.95	4" Bar	7500	27021	10.20	4" B
27122	9.70	4" Bar	15000	27022	10.45	4" B
27123	11.20	4" Bar	23000	27023	11.95	4" B

TYPE MF

List No.	List Price	Size Conductor	Voltage	List No.	List Price	Size Conductor
27400	\$ 7.20	2" Bar	5000	27508	\$ 6.70	2" B
27401	7.95	2" Bar	7500	27509	7.45	2" B
27402	8.70	2" Bar	15000	27510	8.20	2" B
27403	10.20	2" Bar	23000	27511	9.70	2" B
27404	7.75	3" Bar	5000	27516	12.15	3" B
27405	8.50	3" Bar	7500	27517	7.90	3" B
27406	9.25	3" Bar	15000	27518	8.65	3" B
27407	10.75	3" Bar	23000	27519	10.15	3" B
27408	8.95	4" Bar	5000	27520	8.20	4" B
27409	10.20	4" Bar	7500	27521	8.95	4" B
27410	10.45	4" Bar	15000	27522	9.70	4" B
27411	11.95	4" Bar	23000	27523	11.20	4" B

TYPE FF

List No.	List Price	Size Conductor	Voltage	List No.	List Price	Size Conductor
27900	\$ 4.90	0- 1/8"	5000	27700	\$ 6.00	0- 1/8"
27901	5.65	0- 1/8"	7500	27701	6.75	0- 1/8"
27902	6.40	0- 1/8"	15000	27702	7.50	0- 1/8"
27903	7.90	0- 1/8"	23000	27703	9.00	0- 1/8"
27904	5.40	7/8-1 1/8"	5000	27712	6.40	7/8-1 1/8"
27905	6.15	7/8-1 1/8"	7500	27713	7.50	7/8-1 1/8"
27906	6.90	7/8-1 1/8"	15000	27714	7.90	7/8-1 1/8"
27907	8.40	7/8-1 1/8"	23000	27715	9.40	7/8-1 1/8"
27908	6.45	1 3/8-2 3/8"	5000	27724	7.50	1 3/8-2 3/8"
27909	7.20	1 3/8-2 3/8"	7500	27725	8.25	1 3/8-2 3/8"
27910	7.95	1 3/8-2 3/8"	15000	27726	9.00	1 3/8-2 3/8"
27911	9.45	1 3/8-2 3/8"	23000	27727	10.50	1 3/8-2 3/8"

TYPE RF *

The above prices are for flat mounting supports. Add \$1.50 to above prices for pipe mounting supports. Prices for cast bases same as above. Supports for other sizes conductors, other styles of conductor clamps and styles mounting can be supplied.

*Illustration shows pipe mounting type.

SWITCHBOARD AND BUS RACK STRUCTURAL FITTINGS



SIDE OUTLET TEES (Figure 1)

Full Threaded

List No.	List Price	Pipe Size
00	\$.75	3/4"
01	.85	1"
16	1.05	1 1/4"
80	1.75	1 1/2"

Reamed on Run

List No.	List Price	Pipe Size
02	\$.80	3/4"
03	.95	1"
17	1.20	1 1/4"
81	2.00	1 1/2"

90° CROSSES (Figure 16)

Full Threaded

List No.	List Price	Pipe Size
04	\$.55	3/4"
05	.65	1"
26	.75	1 1/4"
82	1.15	1 1/2"

Reamed on Run

List No.	List Price	Pipe Size
06	\$.75	3/4"
07	.80	1"
27	.95	1 1/4"
83	1.40	1 1/2"

FLOOR FLANGE (Figure 6)

45° Double U-Bolt

List No.	List Price	Pipe Size
50	\$1.15	3/4"
51	1.30	1"
72	1.40	1 1/4"
52	1.60	1 1/2"

90° Double U-Bolt (Figure 2)

List No.	List Price	Pipe Size
39	\$1.20	3/4"
70	1.35	1"

90° ELBOWS (Figure 8)

Full Threaded

List No.	List Price	Pipe Size
5032	\$.35	3/4"
5033	.45	1"
5011	.55	1 1/4"
5075	.75	1 1/2"

One End Reamed

List No.	List Price	Pipe Size
9250	\$.45	3/4"
5044	.55	1"
5047	.65	1 1/4"
5048	.85	1 1/2"

TEES (Figure 14)

Full Threaded

List No.	List Price	Pipe Size
5096	\$.45	3/4"
5097	.55	1"
5014	.75	1 1/4"
5078	.95	1 1/2"

Reamed on Run

List No.	List Price	Pipe Size
5098	\$.55	3/4"
5099	.65	1"
5015	.85	1 1/4"
5079	1.15	1 1/2"

FLOOR FLANGE Oval (Figure 5)

List No.	List Price	Pipe Size
1643	\$.35	3/4"
5120	.45	1"
1651	.50	1 1/4"
5092	.65	1 1/2"

List No.	List Price	Pipe Size
5171	1.45	1 1/4"
5172	1.70	1 1/2"

SWITCHBOARD AND BUS RACK STRUCTURAL FITTINGS

SINGLE PANEL SUPPORTS (Figure 4)

I-U-Bolt

List No.	List Price	Pipe Size
1513	\$.55	3/4"
1519	.65	1"
1618	.80	1 1/4"
1514	.85	1 1/2"

DOUBLE PANEL SUPPORTS (Figure 7)

Double End

List No.	List Price	Pipe Size
5159	\$1.25	3/4"
5161	1.60	1"
5163	1.75	1 1/4"
5165	1.80	1 1/2"

CLAMP TEE

Solid Base Type—90°

(Figure 12)

List No.	List Price	Pipe Run	Pipe Tap
5010	\$.85	3/4"	3/4"
5053	.85	3/4"	1"
5020	.85	3/4"	1 1/4"
5138	.90	1"	3/4"
5054	.95	1"	1"
5139	.95	1"	1 1/4"
1635	1.00	1 1/4"	3/4"
1667	1.00	1 1/4"	1"
1634	1.05	1 1/4"	1 1/4"
5140	1.50	1 1/4"	1 1/2"
5141	1.35	1 1/2"	1 1/4"
1604	1.55	1 1/2"	1 1/2"

CLAMP TEE STUD

U-Bolt Type

(Figure 11)

List No.	List Price	Pipe Size	Tap
5041	\$.70	3/4"	3/8-16
5042	.70	3/4"	1/2-12
5035	.80	1 1/4"	3/8-16
5046	.80	1 1/4"	1/2-12

CLAMP TEE

U-Bolt Type—Clamp Outlet—90°

(Figure 3)

List No.	List Price	Pipe Size	Tap
9472	\$1.05	3/4"	3/4"
9473	1.15	1"	1"
9474	1.20	1 1/4"	3/4"
9475	1.30	1 1/4"	1"
9007	1.35	1 1/4"	1 1/4"
9476	1.55	1 1/2"	1 1/4"
9477	1.80	1 1/2"	1 1/2"

CLAMP TEE

U-Bolt Type—Side Outlet—90°

(Figure 13)

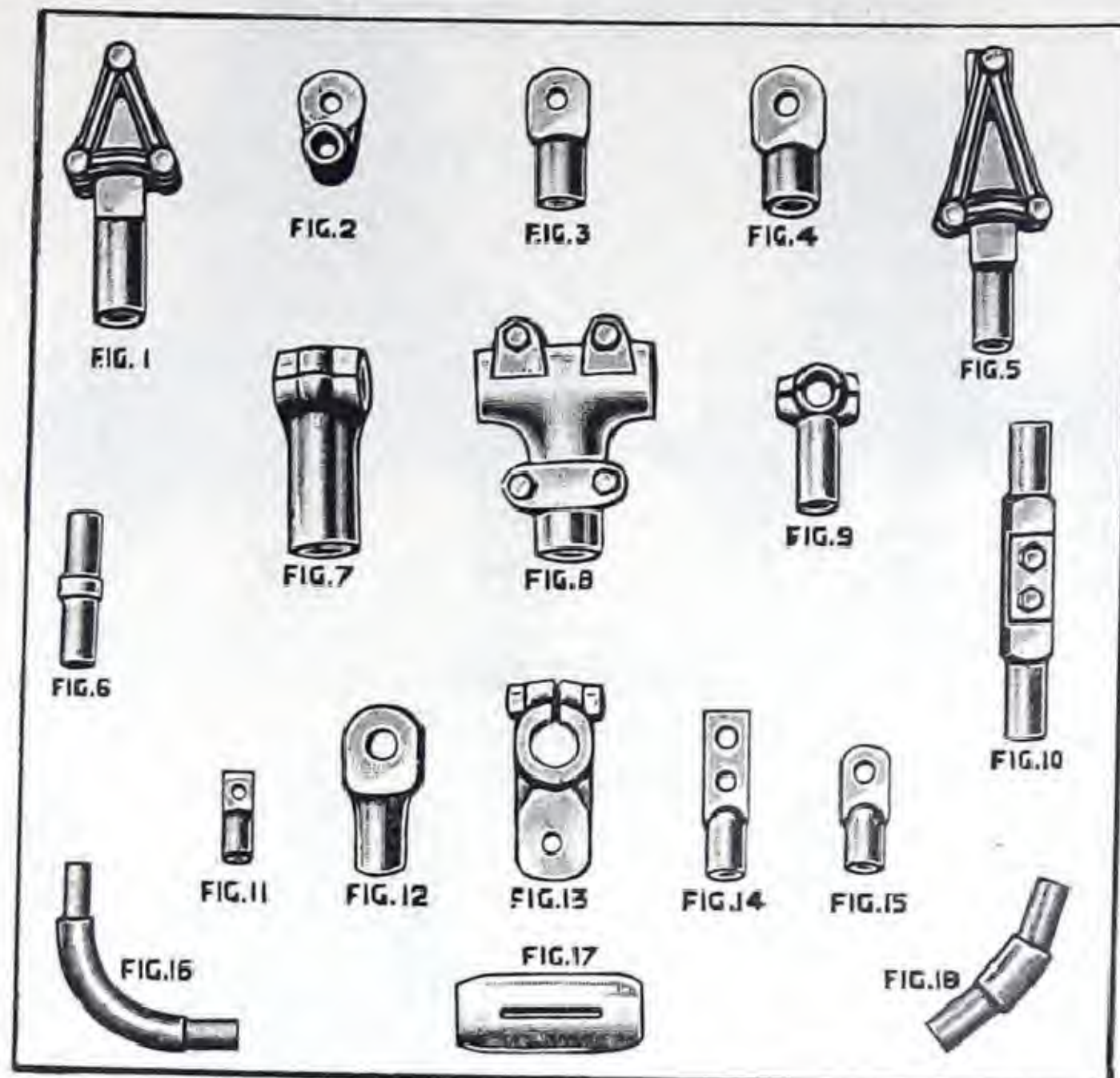
List No.	List Price	A-Pipe Size	B-Pipe Size	C-Pipe Size
9496	\$2.60	3/4"	3/4"	3/4"
9497	2.75	1"	1"	1"
9269	3.60	1 1/4"	1 1/4"	1 1/4"
9499	4.95	1 1/2"	1 1/2"	1 1/2"

4-U-BOLT CLAMP CROSS

Plate Type (Figure 9)

List No.	List Price	Vertical Pipe	Horizontal Pipe
5181	\$1.70	3/4"	3/4"
5182	1.70	1"	3/4"
5183	1.75	1 1/4"	3/4"
5184	1.95	1"	1"
5185	1.95	1 1/4"	1"
5186	2.00	1 1/4"	1 1/4"
5187	2.10	1 1/2"	1 1/4"
5188	2.25	1 1/2"	1 1/2"

ELECTRICAL CONDUCTOR FITTINGS



TEE CONNECTORS—CLAMP STYLE
(Figure 8)

	Max. IPS Size	Max. Cable MCM	Max. IPS Size				
			2/0	4/0	1/2" 300	3/4" (Taps) 500	1" 700
RUN		2/0	\$ 2.25	\$ 3.00	\$ 3.75	\$ 4.80	\$ 6.00
		4/0	2.65	3.00	3.75	4.80	6.00
	1/2"	300	3.00	3.40	3.75	4.80	6.00
	3/4"	500	3.40	3.75	4.30	4.80	6.00
	1 "	700	3.75	4.30	4.80	5.40	6.00
		800	4.30	4.80	5.40	6.00	6.40
	1 1/4"	1000	4.80	5.40	6.00	6.40	6.75
	1 1/2"	1500	5.40	6.00	6.40	6.75	7.50
		2000	6.00	6.40	6.75	7.50	8.25
	2 "	2500	6.40	6.75	7.50	8.25	9.40
		3000	6.75	7.50	8.25	9.40	10.50
	2 1/2"		7.50	8.25	9.40	10.50	12.00
	3 "		8.25	9.40	10.50	12.00	13.50
	3 1/2"		9.40	10.50	12.00	13.50	14.25
	4 "		10.50	12.00	13.50	14.25	15.00
	4 1/2"		12.00	13.50	14.25	15.00	15.75
	5 "		13.50	14.25	15.00	15.75	16.50
RUN			800	1000	1500	2000	2500
		2/0	\$ 6.75	\$ 8.25	\$10.50	\$13.50	\$15.00
		4/0	6.75	8.25	10.50	13.50	15.00
	1/2"	300	6.75	8.25	10.50	13.50	15.00
	3/4"	500	6.75	8.25	10.50	13.50	15.00
	1 "	700	6.75	8.25	10.50	13.50	15.00
		800	6.75	8.25	10.50	13.50	15.00
	1 1/4"	1000	7.50	8.25	10.50	13.50	15.00
	1 1/2"	1500	8.25	9.40	10.50	13.50	15.00
		2000	9.40	10.50	12.00	13.50	15.00
	2 "	2500	10.50	12.00	13.50	14.25	15.00
		3000	12.00	13.50	14.25	15.00	15.75
	2 1/2"		13.50	14.25	15.00	15.75	16.50
	3 "		14.25	15.00	15.75	16.50	17.65
	3 1/2"		15.00	15.75	16.50	17.65	18.75
	4 "		15.75	16.50	17.65	18.75	21.00
	4 1/2"		16.50	17.65	18.75	21.00	22.95
	5 "		17.65	18.75	21.00	22.50	25.90

ELECTRICAL CONDUCTOR FITTINGS

(Continued)

TEE CONNECTORS—SHRINK FIT OR
SOLDER STYLE

For IPS Copper Tubing, Cable, Wire or Rod.

	Max. IPS Size	Max. Cable MCM	Max. IPS Size				
			2/0	4/0	1/2" 300	3/4" (Taps) 500	1" 700
RUN		2/0	\$ 1.80	\$ 2.40	\$ 3.00	\$ 3.90	\$ 4.8
		4/0	2.10	2.40	3.00	3.90	4.8
	1/2"	300	2.40	2.70	3.00	3.90	4.8
	3/4"	500	2.70	3.00	3.45	3.90	4.8
	1 "	700	3.00	3.45	3.90	4.35	4.8
		800	3.45	3.90	4.35	4.80	5.1
	1 1/4"	1000	3.90	4.35	4.80	5.10	5.4
	1 1/2"	1500	4.35	4.80	5.10	5.40	6.0
		2000	4.80	5.10	5.40	6.00	6.6
	2 "	2500	5.10	5.40	6.00	6.60	7.5
		3000	5.40	6.00	6.60	7.50	8.4
	2 1/2"		6.00	6.60	7.50	8.40	9.6
	3 "		6.60	7.50	8.40	9.60	10.8
	3 1/2"		7.50	8.40	9.60	10.80	11.4
	4 "		8.40	9.60	10.80	11.40	12.0
	4 1/2"		9.60	10.80	11.40	12.00	12.6
	5 "		10.80	11.40	12.00	12.60	13.2
RUN			800	1000	1500	2000	2500
		2/0	\$ 5.40	\$ 6.60	\$ 8.40	\$10.80	\$12.0
		4/0	5.40	6.60	8.40	10.80	12.0
	1/2"	300	5.40	6.60	8.40	10.80	12.0
	3/4"	500	5.40	6.60	8.40	10.80	12.0
	1 "	700	5.40	6.60	8.40	10.80	12.0
		800	5.40	6.60	8.40	10.80	12.0
	1 1/4"	1000	6.00	6.60	8.40	10.80	12.0
	1 1/2"	1500	6.60	7.50	8.40	10.80	12.0
		2000	7.50	8.40	9.60	10.80	12.0
	2 "	2500	8.40	9.60	10.80	11.40	12.0
		3000	9.60	10.80	11.40	12.00	12.6
	2 1/2"		10.80	11.40	12.00	12.60	13.2
	3 "		11.40	12.00	12.60	13.20	14.1
	3 1/2"		12.00	12.60	13.20	14.10	15.0
	4 "		12.60	13.20	14.10	15.00	16.8
	4 1/2"		13.20	14.10	15.00	16.80	18.6
	5 "		14.10	15.00	16.80	18.60	20.7

1. For Tee Connectors using any combination of cable wire or rod smaller than 2/0 use 2/0 price.

2. For Tee Connectors using any combination of IP copper tube, cable, wire or rod smaller than 1/2" IPS use 1/2" IPS to 2/0 price.

3. For Tee Connectors for conductor sizes not listed use next larger size. For example, Tee Connector for 600 MCM cable on run and tap, price same as 700 MCM.

4. For Tee Connectors for conductor sizes larger than maximum listing, prices on application.

CLAMP INSULATOR SUPPORTS



TYPE AM

TYPE AD

List No.	AC or DC List Price	List No.	AC or DC List Price	Bar Size Run Tap
0021	\$ 2.40	331011	\$ 3.00	1½x1
0033	2.40	331022	3.00	1½x1½
0044	2.40	331033	3.00	2 x1½
0055	2.40	331044	3.00	2 x2
0066	2.55	331055	3.30	2½x1½
0077	2.55	331066	3.30	2½x2
0088	2.70	331077	3.45	2½x2½
0099	2.55	331088	3.30	3 x1½
0100	2.55	331099	3.30	3 x2
0111	2.70	331100	3.45	3 x3
0122	3.00	331111	4.05	4 x1½
0133	3.00	331122	4.05	4 x2
0144	3.45	331133	4.35	4 x3
0155	3.60	331144	4.50	4 x4
0166	4.35	331155	5.85	5 x1½
0177	4.35	331166	5.85	5 x2
0188	4.80	331177	6.30	5 x3
0199	5.10	331188	6.60	5 x4
0200	5.40	331199	6.75	5 x5
0211	5.40	331200	7.50	6 x2
0222	6.15	331211	8.10	6 x3
0233	6.45	331222	8.40	6 x4
0244	7.20	331233	8.70	6 x5
0255	8.40	331244	9.00	6 x6
0266	8.40	331255	15.75	10 x3
0277	8.70	331266	16.20	10 x4
0288	10.35	331277	17.25	11 x4



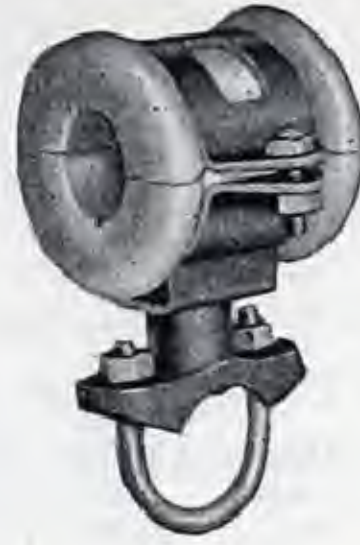
TYPE HM

TYPE HD

List No.	AC or DC List Price	List No.	AC or DC List Price	Bar Size Run Tap
0299	\$ 3.00	331288	\$ 3.75	2x1
0300	3.00	331299	3.75	2x1½
0311	3.00	331300	3.75	2x2
0322	3.00	331311	4.05	3x2
0333	3.30	331322	4.20	3x3
0344	3.30	331333	5.25	4x2
0355	3.45	331344	5.55	4x3
0366	3.30	331355	5.70	4x4
0377	3.30	331366	7.65	5x2
0388	3.45	331377	8.10	5x3
0399	4.05	331388	8.25	5x4
0400	4.05	331399	8.55	5x5
0411	4.35	331400	10.35	6x3
0422	4.65	331411	10.65	6x4
0433	5.85	331422	10.95	6x5
0444	5.85	331433	11.25	6x6
0455	6.45	331444	13.95	8x4
0466	6.75	331455	14.70	8x6
0477	6.90	331466	15.00	8x8
0488	7.50	331477	20.70	10x4
0499	8.25	331488	21.60	10x6
0500	8.55	331499	22.05	10x8
0511	8.85	331500	22.50	10x10

The above clamps are for either direct current or alternating current. One-half is magnetic and one-half is non-magnetic.

CLAMP INSULATOR SUPPORTS



TYPE CIL

1¼" PIPE MOUNTING

FLAT MOUNTING

Conductor Size	List No.	List Price	List No.	List Price
5/16"	1350	\$1.45	1250	\$1.30
3/8"	1351	1.45	1251	1.30
1/2"	1352	1.45	1252	1.30
5/8"	1353	1.45	1253	1.30
3/4"	1354	1.45	1254	1.30
7/8"	1355	1.45	1255	1.30
1"	1356	1.45	1256	1.30
1 1/8"	1357	1.45	1257	1.30
1 1/4"	1358	2.10	1258	1.95
1 3/8"	1359	2.10	1259	1.95
1 1/2"	1360	2.10	1260	1.95
1 3/4"	1361	3.60	1261	3.40
2"	1362	3.60	1262	3.40
2 1/4"	1363	3.60	1263	3.40
2 1/2"	1364	5.55	1264	5.35
2 3/4"	1365	5.55	1265	5.35
3"	1366	5.55	1266	5.35
3 1/4"	1367	6.30	1267	6.00
3 1/2"	1368	6.30	1268	6.00

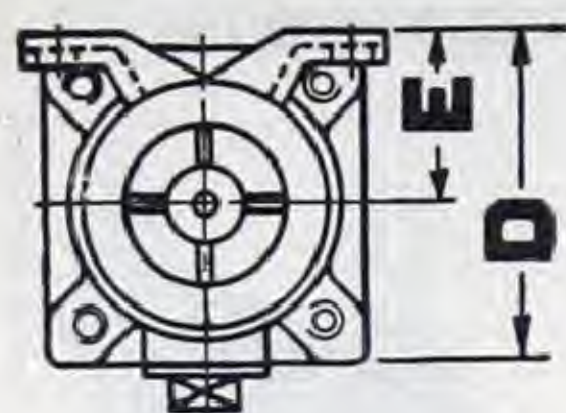


TYPE MIL

1¼" PIPE MOUNTING

FLAT MOUNTING

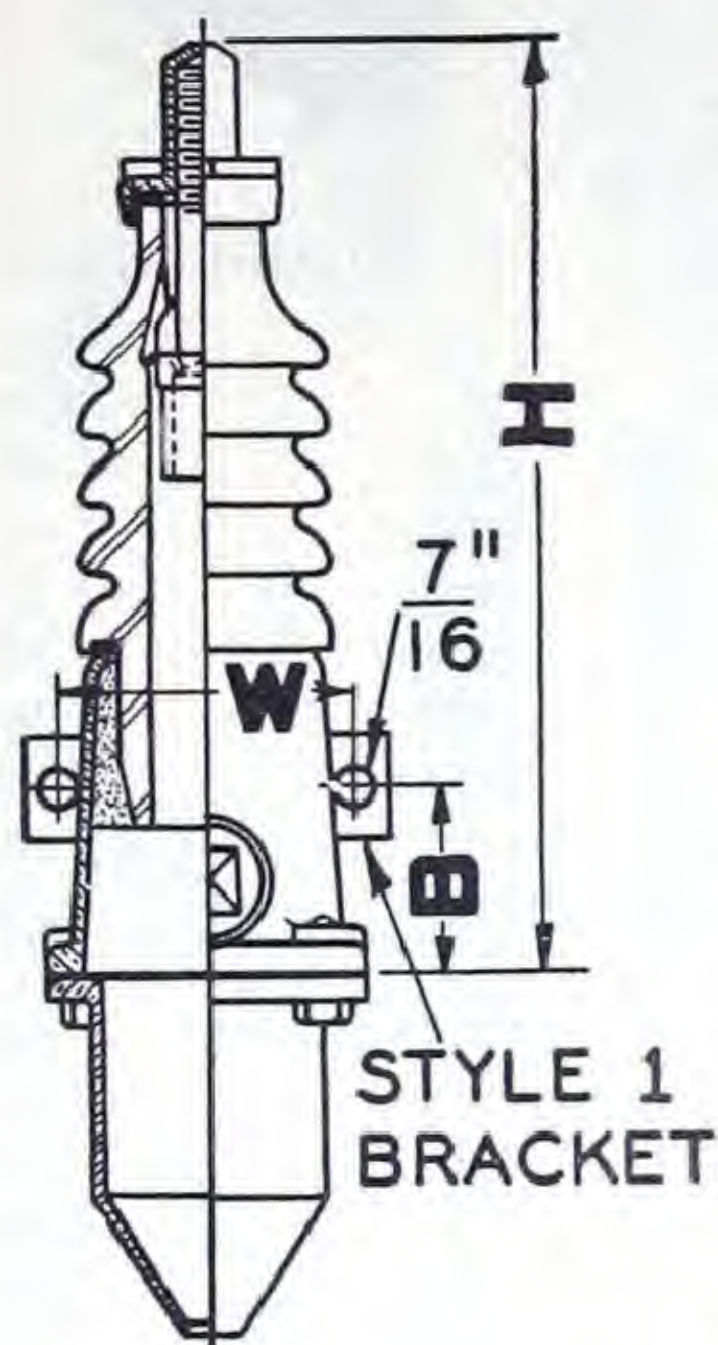
Conductor Size	List No.	List Price	List No.	List Price
5/16"	1439	\$ 1.90	1401	1.45
3/8"	1441	1.90	1403	1.45
1/2"	1443	1.90	1405	1.45
5/8"	1445	1.90	1407	1.45
3/4"	1447	1.90	1409	1.45
7/8"	1449	1.90	1411	1.45
1"	1451	1.90	1413	1.45
1 1/8"	1453	1.90	1415	1.45
1 1/4"	1455	2.55	1417	2.10
1 3/8"	1457	2.55	1419	2.10
1 1/2"	1459	2.55	1421	2.10
1 3/4"	1461	4.20	1423	3.60
2"	1463	4.20	1425	3.60
2 1/4"	1465	4.20	1427	3.60
2 1/2"	1467	6.15	1429	5.55
2 3/4"	1469	6.15	1431	5.55
3"	1471	6.15	1433	5.55
3 1/4"	1473	6.90	1435	6.30
3 1/2"	1475	6.90	1437	6.30



G. & W. OUTDOOR POTHEADS—TYPE "T" CAPNUT—SINGLE CONDUCTOR

Metal Body With Bracket

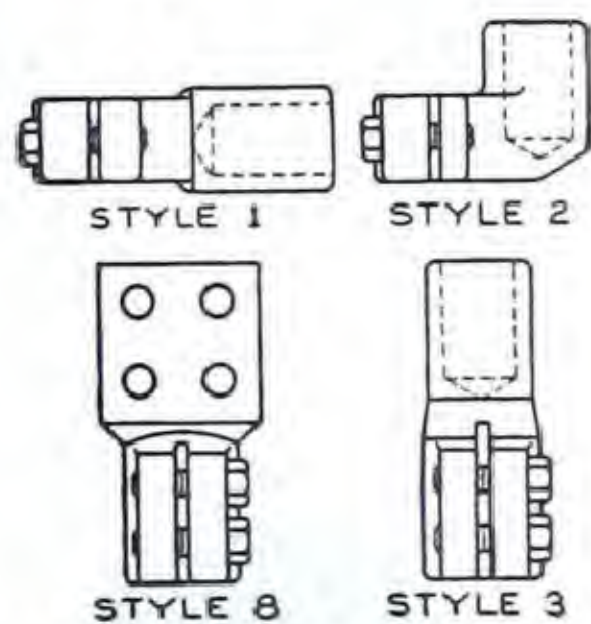
Interchangeable Cable Entrances



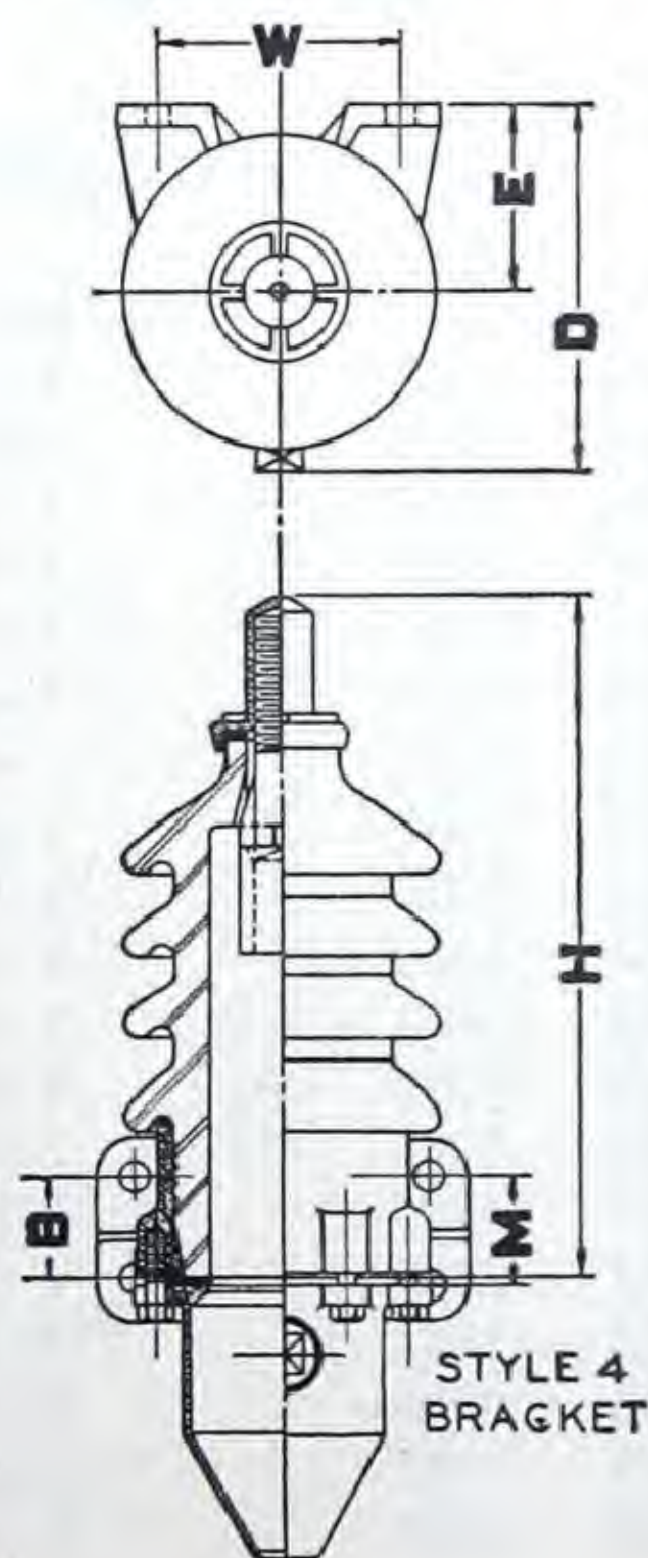
Max. Oper. Volts	Max. Amp-eres	Max. Cond'r. Size Mcm	Max. Diam. Cable Inches	Style Bracket	List Number	List Price	Porcelain Tube	Dimensions in Inches					Approx. Shpg. Wt. Lbs.	Comp. Req'd Gal.
W	B	D	E	H										
3000	1350	1500	2 3/4	4	T13943	\$33.00	FA	5 1/2	1 1/2	7 1/8	3 3/4	12 5/8	32	3/8
3000	1650	2000	2 3/4	4	T13X43	40.00	FA	5 1/2	1 1/2	7 1/8	3 3/4	12 5/8	36	3/8
5000	100	1/0	1	1	T14033	12.50	CB	3 1/4	2	4 1/8	1 3/8	9 3/4	9	1/8
5000	250	250	1	1	T14233	14.25	CB	3 1/4	2	4 1/8	1 3/8	10 3/8	10	3/8
7500	100	1/0	1 1/8	2	T15033	16.00	DC	4 1/4	2	5 1/8	2 3/8	11 1/4	15	1/4
7500	250	250	1 1/8	2	T15233	17.00	DC	4 1/4	2	5 1/8	2 3/8	11 3/8	16	1/4
7500	500	500	1 5/8	2	T15533	22.00	DC	4 1/4	2	5 1/8	2 3/8	12 1/8	18	1/4
7500	750	750	2 1/8	2	T15733	27.00	EB	4 1/4	2	5 1/4	2 3/8	13 1/4	22	3/8
7500	750	750	2	4	T15743	31.00	EB	5 1/2	1 1/2	6 1/4	3 3/8	13 1/4	26	3/8
7500	1000	1000	2 1/8	2	T15833	31.00	EB	4 1/4	2	5 1/4	2 3/8	13 3/8	25	3/8
7500	1000	1000	2	4	T15843	34.00	EB	5 1/2	1 1/2	6 1/4	3 3/8	13 3/8	29	3/8
7500	1350	1500	2 3/4	4	T15943	40.00	FB	5 1/2	1 1/2	7 1/8	3 3/4	14 1/8	36	3/8
7500	1650	2000	2 3/4	4	T15X43	47.00	FB	5 1/2	1 1/2	7 1/8	3 3/4	13 3/8	40	3/8

15,000 Volt and 25,000 Volt on request.

When ordering specify voltage, size of conductor and outside diameter of cable. Clamping ring and stuffing box form of entrances supplied unless otherwise specified.



Specify style of lug wanted.

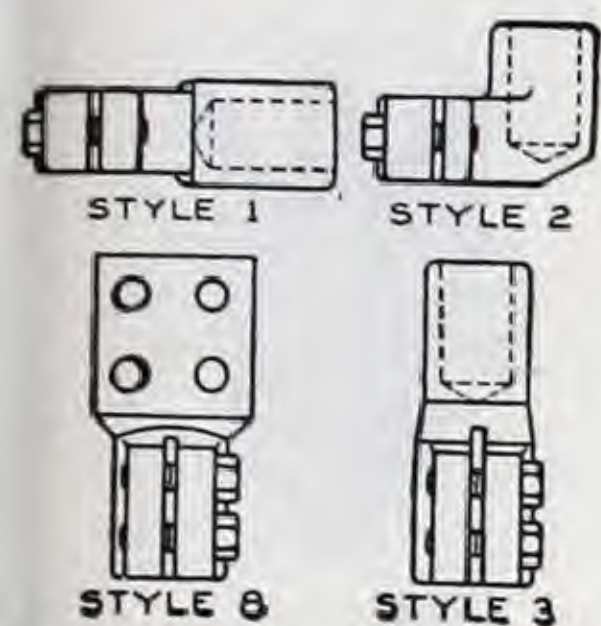


G. & W. OUTDOOR POTHEADS—TYPE "T" CAPNUT—SINGLE CONDUCTOR

Bracket Ring—Wiping Sleeve Bolted Against Porcelain Base

Max. Oper. Volts	Max. Amp-eres	Max. Cond'r Size Mcm	Max. Diam. Cable Inches	Style Bracket	List Number	List Price	Porcelain Tube	Dimensions in Inches							Approx. Shpg. Wt. Lbs.	Comp Req'd Gallo
								W	M	B	D	E	H			
600	100	1/0	1	1	T12020	\$ 9.00	CA	3¼	..	1	3¼	1⅞	5⅜	9	1½	
600	250	250	1	1	T12220	10.00	CA	3¼	..	1	3¼	1⅞	5¾	10	1½	
600	500	500	1⅝	1	T12530	18.00	DA	4¼	..	⅞	4¼	2½	6¼	14	1½	
600	750	750	1⅞	4	T12710	19.00	EA	4½	2	1½	5	3	7¼	18	⅝	
600	1000	1000	1⅞	4	T12810	20.00	EA	4½	2	1½	5	3	7⅞	21	⅝	
3000	1350	1500	2⅞	4	T13940	31.00	FA	4½	2	1¾	6¼	3½	10	36	⅝	
3000	1650	2000	2⅞	4	T13X40	38.00	FA	4½	2	1¾	6¼	3½	9¾	38	⅝	
5000	100	1/0	1	1	T14020	12.00	CB	3¼	..	1	3¼	1⅞	8⅞	10	1½	
5000	250	250	1	1	T14220	13.00	CB	3¼	..	1	3¼	1⅞	8½	11	1½	
7500	100	1/0	1⅝	1	T15030	15.00	DC	4¼	..	⅞	4½	2½	8⅜	12	⅝	
7500	250	250	1⅝	1	T15230	16.00	DC	4¼	..	⅞	4½	2½	8¾	15	⅝	
7500	500	500	1⅝	1	T15530	22.00	DC	4¼	..	⅞	4½	2½	9¼	17	⅝	
7500	750	750	1⅞	4	T15710	24.00	EB	4½	2	1½	5⅝	3	10¼	21	¾	
7500	1000	1000	1⅞	4	T15810	30.00	EB	4½	2	1½	5⅝	3	10⅞	23	¾	
7500	1350	1500	2⅞	4	T15940	39.00	FB	4½	2	1¾	6¼	3½	11½	40	¾	
7500	1650	2000	2⅞	4	T15X40	46.00	FB	4½	2	1¾	6¼	3½	11¼	42	¾	
15000	100	1/0	1⅞	4	T17010	19.50	EE	4½	2	1½	5½	3	11⅝	17	¾	
15000	250	250	1⅞	4	T17210	24.00	EE	4½	2	1½	5½	3	11¾	18	¾	
15000	500	500	1⅞	4	T17510	27.00	EE	4½	2	1½	5½	3	12¼	20	¾	
15000	750	750	2⅝	4	T17740	34.00	FD	4½	2	1¾	6¼	3½	12⅝	33	1½	
15000	1000	1000	2⅝	4	T17840	37.50	FD	4½	2	1¾	6¼	3½	13¼	36	1½	
15000	1350	1500	3⅝	4	T17950	48.00	GA	7¾	3	2⅝	7¼	4	13½	50	¾	
15000	1650	2000	3⅝	4	T17X50	50.00	GA	7¾	3	2⅝	7¼	4	13¼	53	¾	

G. & W. OUTDOOR POTHEADS—TYPE "T" CAPNUT—SHAPE "B"



If required for indoor use—specify.

For other shapes see hereinafter.

Four styles of cable entrances—specify type required.

(a) wiping sleeve.

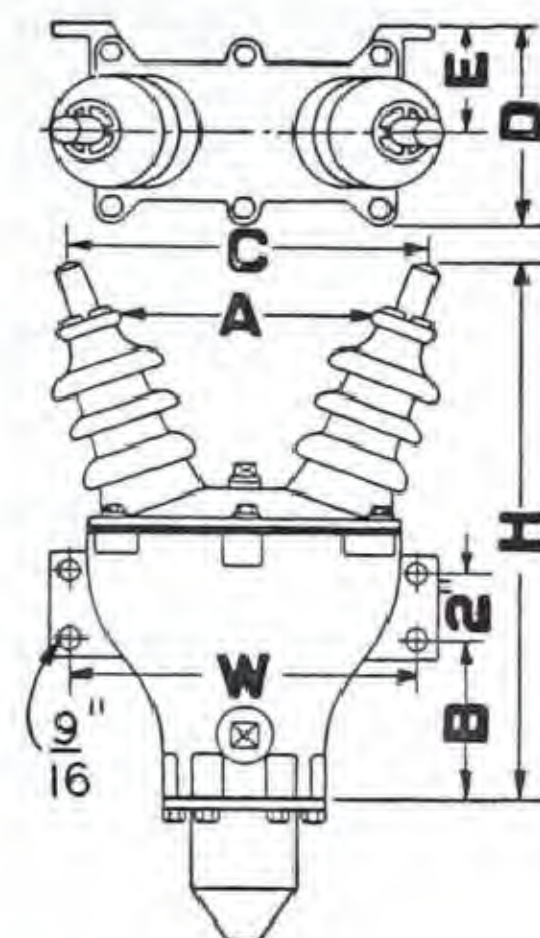
(b) clamping ring and stuffing box—give O.S. diameter of cable.

(c) CR and SB and conduit coupling—give O.S. diameter of cable and size of coupling.

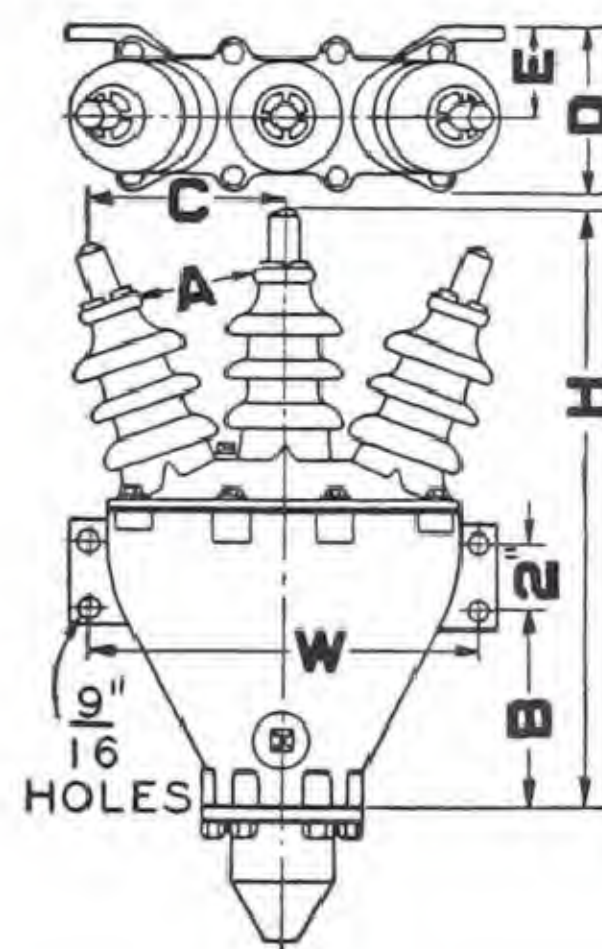
(d) CR and SB and armour clamp—give O.S. diameter of cable over lead and O.S. diameter of cable over armour.

Specify style of aerial lug.

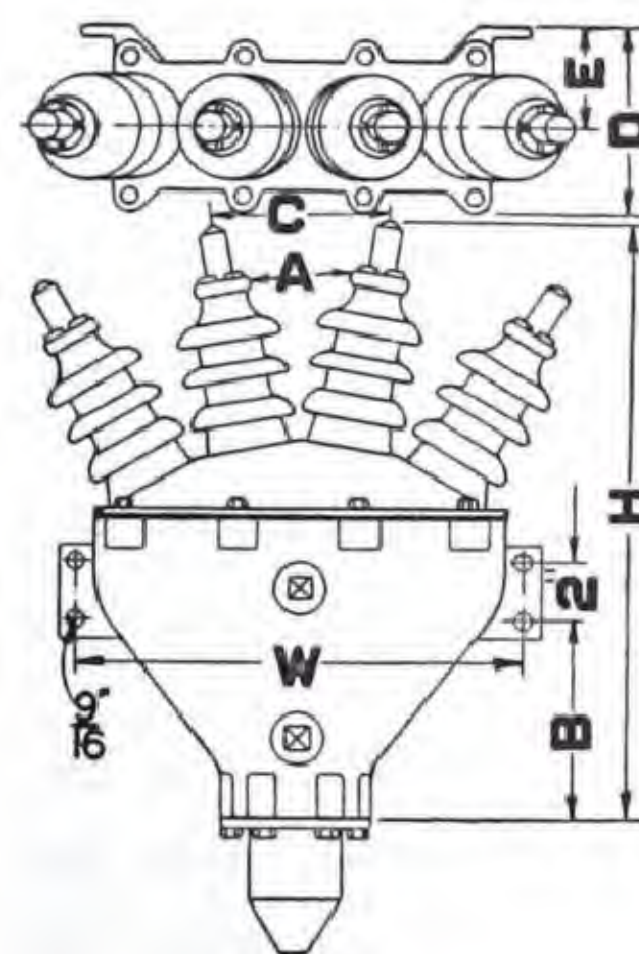
Max. Oper. Volts	Max. Cond'r Size Mcm	Max. Diam. Cable Inches	List Number	List Price	W	Dimensions H	A	Approx. Shpg. Wt. Lbs.	Comp'd Req'd. Gallons
5000	1/0	1 3/4	T2403B	\$22.00	5 1/4	12 5/8	3 1/4	28	3/8
5000	250	2 3/4	T2424B	24.00	5 1/4	13	3 1/4	32	3/8
7500	1/0	2 3/4	T2504B	27.00	11 1/4	16 1/4	6	52	1 1/2
7500	250	2 3/4	T2524B	33.00	11 1/4	16 5/8	6	54	1 1/2
7500	500	2 3/4	T2554B	36.00	11 1/4	17	6	52	1 1/2
7500	750	3 5/8	T2575B	40.00	11 1/4	19	7 1/2	65	1 3/4
7500	1000	3 5/8	T2585B	60.00	11 1/4	19 5/8	7 1/2	70	1 3/4



600	1/0	1 3/4	T3203B	28.00	9	12	1 7/8	32	3/4
600	250	2 3/4	T3224B	33.00	9	14 3/8	1 7/8	40	1
600	500	2 3/4	T3254B	51.00	11 1/4	14 7/8	2 1/8	58	1 1/2
5000	1/0	1 3/4	T3403B	29.00	9	14 3/4	2 7/8	36	3/4
5000	250	1 3/4	T3423B	34.00	9	15 1/8	2 7/8	38	3/4
5000	250	2 3/4	T3424B	34.00	9	17 1/8	2 7/8	44	1
7500	1/0	2 3/4	T3504B	39.00	13	19 3/4	3 3/4	66	1 3/4
7500	250	2 3/4	T3524B	47.00	13	20 1/8	3 3/4	68	1 3/4
7500	350	2 3/4	T3554B	52.00	13	20 5/8	3 3/4	68	1 3/4
7500	500	3 5/8	T3555B	56.00	15 1/2	21 1/2	5 5/8	90	3 1/2
7500	750	3 5/8	T3575B	68.00	15 1/2	22 5/8	5 1/8	98	3 1/2
7500	1000	3 5/8	T3585B	85.00	15 1/2	23 1/4	5 1/8	106	3 1/2
15000	1/0	3 5/8	T3705B	60.00	21	27 1/8	9	125	5
15000	250	3 5/8	T3725B	67.00	21	27 1/2	9	127	5
15000	500	3 5/8	T3755B	85.00	21	28	9	115	5
15000	750	3 5/8	T3775B	95.00	21	28 3/8	8 5/8	122	5
15000	1000	3 5/8	T3785B	100.00	21	29	8 5/8	130	5



5000	1/0	2 3/4	T4404B	46.00	13	19 3/8	3	63	1 3/4
5000	250	2 3/4	T4424B	53.00	13	19 3/4	3	66	1 3/4
7500	1/0	2 3/4	T4504B	51.00	15 1/2	20 1/2	3 7/8	90	3
7500	250	2 3/4	T4524B	61.00	15 1/2	20 3/4	3 7/8	93	3
7500	500	3 5/8	T4555B	70.00	15 1/2	22 3/4	3 7/8	98	3 1/2
7500	750	3 5/8	T4575B	85.00	21	27	4 3/4	128	5
7500	1000	3 5/8	T4585B	105.00	21	27 5/8	4 3/4	138	5



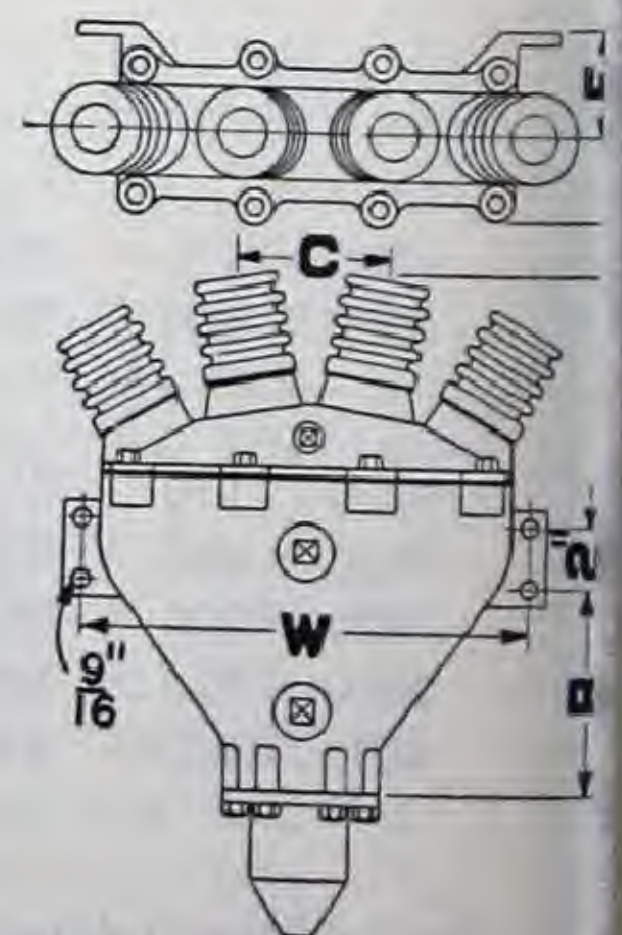
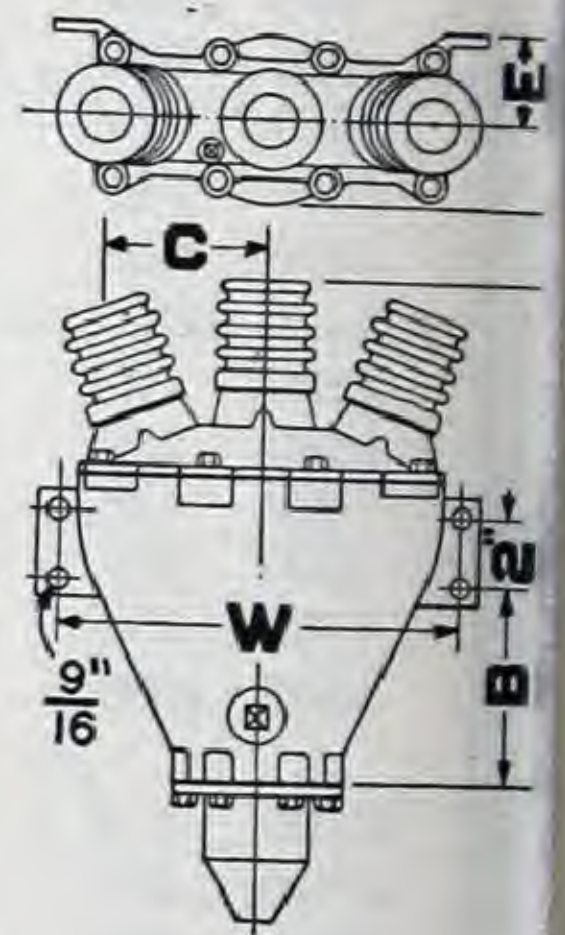
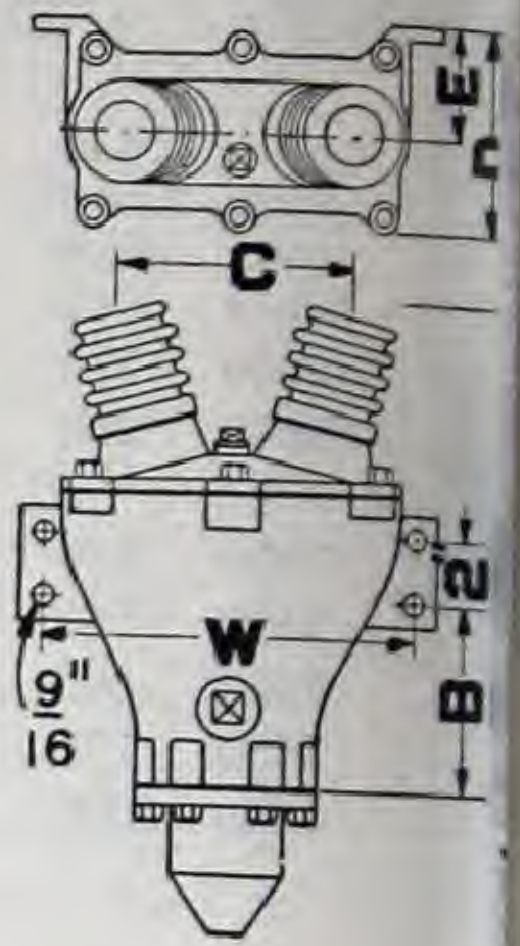
For additional data ask for G. & W. Bulletin "B".

G. & W. INDOOR POTHEADS—TYPE "N"—SHAPE "B"

For other shapes see page hereinafter.

Four styles of cable entrances—see previous page.

	Max. Oper. Volts	Nom'l Max. Cond'r Diam.		List Number	List Price	Bore Insu-lator Inch.	Dimensions in inches					App. Shpg. Wt. Lbs.	Comp'd Req'd Gal.
		Size	Cable				W	D	E	H	C		
Two Cond.	5000	2/0	1 $\frac{3}{4}$	N2423B	\$13.00	1	4 $\frac{1}{2}$	3 $\frac{5}{8}$	1 $\frac{7}{8}$	7 $\frac{1}{4}$	3 $\frac{1}{2}$	10	$\frac{1}{8}$
	5000	500	2 $\frac{3}{4}$	N2454B	15.00	1 $\frac{7}{16}$	5 $\frac{1}{4}$	5 $\frac{1}{2}$	2 $\frac{3}{4}$	9 $\frac{1}{4}$	4	18	$\frac{3}{8}$
	7500	3/0	1 $\frac{3}{4}$	N2523B	13.50	1	5 $\frac{1}{4}$	5 $\frac{1}{4}$	2 $\frac{3}{4}$	9 $\frac{1}{2}$	4 $\frac{1}{8}$	18	$\frac{3}{8}$
	7500	300	2 $\frac{3}{4}$	N2534B	14.50	1	5 $\frac{1}{4}$	5 $\frac{1}{2}$	2 $\frac{3}{4}$	9 $\frac{1}{2}$	4 $\frac{1}{8}$	21	$\frac{3}{8}$
	7500	400	2 $\frac{3}{4}$	N2544B	15.00	1	5 $\frac{1}{4}$	5 $\frac{1}{2}$	2 $\frac{3}{4}$	9 $\frac{1}{2}$	4 $\frac{1}{8}$	19	$\frac{3}{8}$
	7500	600	2 $\frac{3}{4}$	N2564B	20.00	1 $\frac{1}{2}$	11 $\frac{1}{4}$	7 $\frac{1}{8}$	3 $\frac{3}{4}$	12 $\frac{3}{4}$	6 $\frac{7}{8}$	40	1 $\frac{1}{2}$
	7500	1000	3 $\frac{5}{8}$	N2585B	29.00	2	11 $\frac{1}{4}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	14 $\frac{1}{2}$	8 $\frac{1}{4}$	46	1 $\frac{3}{4}$
	15000	3/0	2 $\frac{3}{4}$	N2724B	14.00	1	5 $\frac{1}{4}$	5 $\frac{1}{2}$	2 $\frac{3}{4}$	9 $\frac{7}{8}$	4 $\frac{3}{8}$	22	$\frac{3}{8}$
	15000	400	2 $\frac{3}{4}$	N2744B	23.50	1 $\frac{1}{2}$	11 $\frac{1}{4}$	7 $\frac{1}{8}$	3 $\frac{3}{4}$	13 $\frac{1}{8}$	7 $\frac{1}{8}$	40	1 $\frac{1}{2}$
	15000	600	3 $\frac{5}{8}$	N2765B	27.00	1 $\frac{1}{2}$	11 $\frac{1}{4}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	14 $\frac{5}{8}$	7 $\frac{1}{8}$	46	1 $\frac{3}{4}$
	15000	1000	3 $\frac{5}{8}$	N2785B	30.00	2	11 $\frac{1}{4}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	14 $\frac{7}{8}$	8 $\frac{1}{2}$	47	1 $\frac{3}{4}$
Three Cond.	5000	2/0	1 $\frac{3}{4}$	N3413B	15.00	1	5 $\frac{1}{4}$	5 $\frac{1}{4}$	2 $\frac{3}{4}$	8 $\frac{7}{8}$	2 $\frac{3}{4}$	16	$\frac{3}{8}$
	5000	250	2 $\frac{3}{4}$	N3424B	17.00	1	5 $\frac{1}{4}$	5 $\frac{1}{2}$	2 $\frac{3}{4}$	9	2 $\frac{3}{4}$	22	$\frac{3}{8}$
	5000	350	2 $\frac{3}{4}$	AN3454B	18.00	1	9	5 $\frac{3}{4}$	3	12 $\frac{3}{4}$	3 $\frac{1}{2}$	28	1
	5000	500	2 $\frac{3}{4}$	N3454B	22.00	1 $\frac{7}{16}$	9	5 $\frac{3}{4}$	3	13 $\frac{1}{8}$	3 $\frac{5}{8}$	28	1
	7500	3/0	1 $\frac{3}{4}$	N3523B	16.00	1	9	5 $\frac{1}{2}$	3	11 $\frac{3}{8}$	3 $\frac{3}{4}$	25	$\frac{3}{4}$
	7500	300	2 $\frac{3}{4}$	N3534B	18.00	1	9	5 $\frac{3}{4}$	3	13 $\frac{3}{8}$	3 $\frac{3}{4}$	32	1
	7500	400	2 $\frac{3}{4}$	N3544B	19.50	1	9	5 $\frac{3}{4}$	3	13 $\frac{3}{8}$	3 $\frac{3}{4}$	30	1
	7500	600	2 $\frac{3}{4}$	N3564B	26.00	1 $\frac{1}{2}$	13	6	3 $\frac{1}{8}$	16 $\frac{1}{8}$	5	48	1 $\frac{3}{4}$
	7500	1000	3 $\frac{5}{8}$	N3585B	36.00	2	15 $\frac{1}{2}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	17 $\frac{3}{4}$	6 $\frac{1}{4}$	68	3 $\frac{1}{2}$
	15000	3/0	2 $\frac{3}{4}$	N3724B	20.00	1	13	6	3 $\frac{1}{8}$	15 $\frac{3}{8}$	4 $\frac{1}{4}$	54	1 $\frac{3}{4}$
	15000	400	2 $\frac{3}{4}$	N3744B	27.00	1 $\frac{1}{2}$	13	6	3 $\frac{1}{8}$	16 $\frac{5}{8}$	5 $\frac{1}{4}$	50	1 $\frac{3}{4}$
	15000	600	3 $\frac{5}{8}$	N3765B	35.00	1 $\frac{1}{2}$	15 $\frac{1}{2}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	17 $\frac{5}{8}$	6 $\frac{7}{8}$	68	3 $\frac{1}{2}$
Four Cond.	15000	1000	3 $\frac{5}{8}$	N3785B	40.00	2	15 $\frac{1}{2}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	18 $\frac{1}{4}$	6 $\frac{1}{4}$	70	3 $\frac{1}{2}$
	5000	2/0	2 $\frac{3}{4}$	N4424B	20.00	1	9	5 $\frac{3}{4}$	3	12 $\frac{1}{2}$	2 $\frac{1}{2}$	32	1
	5000	500	2 $\frac{3}{4}$	N4454B	30.00	1 $\frac{7}{16}$	13	6	3 $\frac{1}{8}$	16	4	47	1 $\frac{3}{4}$
	7500	3/0	2 $\frac{3}{4}$	N4534B	22.00	1	13	6	3 $\frac{1}{8}$	16 $\frac{1}{8}$	4 $\frac{1}{8}$	53	1 $\frac{3}{4}$
	7500	300	2 $\frac{3}{4}$	N4544B	25.00	1	13	6	3 $\frac{1}{8}$	16 $\frac{1}{8}$	4 $\frac{1}{8}$	49	1 $\frac{3}{4}$
	7500	400	2 $\frac{3}{4}$	N4554B	27.00	1 $\frac{1}{2}$	15 $\frac{1}{2}$	7 $\frac{1}{4}$	3 $\frac{3}{4}$	16 $\frac{3}{8}$	5 $\frac{1}{8}$	55	3
	7500	600	3 $\frac{5}{8}$	N4565B	39.00	1 $\frac{1}{2}$	15 $\frac{1}{2}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	18 $\frac{1}{8}$	5 $\frac{1}{8}$	64	3 $\frac{1}{2}$
	7500	1000	3 $\frac{5}{8}$	N4585B	49.00	2	21	7 $\frac{3}{8}$	3 $\frac{3}{4}$	22 $\frac{1}{8}$	6 $\frac{1}{2}$	100	5
	15000	3/0	2 $\frac{3}{4}$	N4724B	26.00	1	13	6	3 $\frac{1}{8}$	16 $\frac{5}{8}$	4 $\frac{1}{4}$	55	1 $\frac{3}{4}$
	15000	600	3 $\frac{5}{8}$	N4765B	40.00	1 $\frac{1}{2}$	15 $\frac{1}{2}$	7 $\frac{3}{8}$	3 $\frac{3}{4}$	18 $\frac{3}{8}$	5 $\frac{1}{4}$	66	3 $\frac{1}{2}$
	15000	1000	3 $\frac{5}{8}$	N4785B	50.00	2	21	7 $\frac{3}{8}$	3 $\frac{3}{4}$	22 $\frac{5}{8}$	6 $\frac{3}{4}$	102	5



No conductor
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TAPE
PORC
TUBE
LID
BODY
PLAIN
BUSHING
ENTRANCE
CONDUIT
COUPLING
1/4-3 COND
/ SINGLE CO
COUPLING.

Terminals
para
"B" in
diverging
letters "K"
body shape

G. & W. LOW VOLTAGE POTHEADS

TYPE "LP"

INDOOR 600 VOLT

Dimensions $4\frac{1}{2}$ " mounting centres.Dimensions $5\frac{3}{4}$ " overall width.Dimensions $6\frac{1}{8}$ " overall height (without entrance fitting).Compound required $\frac{1}{2}$ pint.

Specify Type of entrance required. Potheads will be furnished with CR & SB unless otherwise stated.

2 conductor—Shape "C"— $\frac{7}{16}$ " bore tubes—List No. L2103C-3 \$6.503 conductor—Shape "B"— $\frac{7}{16}$ " bore tubes—List No. L3103B-3 7.502 conductor—Shape "C"— $\frac{11}{16}$ " bore tubes—List No. L2203C-3 6.503 conductor—Shape "B"— $\frac{11}{16}$ " bore tubes—List No. L3203B-3 7.50

If conduit coupling required—State size.

TYPE "P"—PORCELAIN LID

OUTDOOR 600 VOLT

Indoor—2500 Volt.

Dimensions $5\frac{1}{4}$ " mounting centres.Dimensions $7\frac{1}{4}$ " overall height (without entrance fitting).Compound required— $\frac{1}{2}$ gal.The porcelain lid has 3 holes of $\frac{7}{8}$ " diameter. Two holes have Keyways or slots for compounding.

Flashover value—40 Kv dry, 20 Kv Wet.

3 conductor—Shape "C"—Max. Diam. cable $1\frac{3}{4}$ " List No. P3523C \$10.003 conductor—Shape "C"—Max. Diam. cable $2\frac{3}{4}$ " List No. P3524C \$12.00

Approximate shipping weight—20 lbs.

TYPE "L"

OUTDOOR 600 VOLT OR INDOOR 2300 VOLTS

Type "L" 600 Volt Potheads With 1" Bore Porcelain

Max. Ampere Rating	Max. Cond'r. size Mcm.	Max. Diam. Cable Inches	List Number	List Price	Dimensions in inches				App. Shipg. Wt. Lbs.	App. Com'd Req'd. Gal.
					W	B	D	H		
2 Conductor—Shape C										
...	4/0	$1\frac{3}{4}$	L2223C	\$ 8.00	$5\frac{1}{4}$	$3\frac{1}{8}$	$5\frac{1}{4}$	$8\frac{3}{8}$	18	$\frac{3}{8}$
300	300	$2\frac{7}{8}$	L2234C	8.00	$5\frac{1}{4}$	$3\frac{1}{8}$	$5\frac{1}{2}$	$8\frac{3}{8}$	20	$\frac{3}{8}$
...	500	$2\frac{7}{8}$	L2254C	12.50	$5\frac{1}{4}$	$3\frac{1}{8}$	$5\frac{1}{2}$	$8\frac{3}{8}$	18	$\frac{3}{8}$
2 Conductor—Shape CK										
300	300	$2\frac{7}{8}$	L2234CK	11.00	$5\frac{7}{8}$	2	$5\frac{3}{4}$	$11\frac{1}{8}$	32	$\frac{3}{4}$
...	500	$2\frac{7}{8}$	L2254CK	15.50	$5\frac{7}{8}$	2	$5\frac{3}{4}$	$11\frac{1}{8}$	30	$\frac{3}{4}$
2 Conductor—Shape CU										
300	300	$2\frac{7}{8}$	L2234CU	11.00	$5\frac{1}{4}$	$2\frac{7}{8}$	$7\frac{7}{8}$	$10\frac{7}{8}$	26	$\frac{3}{4}$
...	500	$2\frac{7}{8}$	L2254CU	15.50	$5\frac{1}{4}$	$2\frac{7}{8}$	$7\frac{7}{8}$	$10\frac{7}{8}$	24	$\frac{3}{4}$
3 Conductor—Shape C										
...	4/0	$1\frac{3}{4}$	L3223C	12.50	9	$4\frac{1}{2}$	$5\frac{1}{2}$	$9\frac{3}{4}$	26	$\frac{3}{4}$
300	300	$2\frac{7}{8}$	L3234C	12.50	9	$6\frac{1}{2}$	$5\frac{3}{4}$	$11\frac{3}{4}$	32	1
...	500	$2\frac{7}{8}$	L3254C	12.50	9	$6\frac{1}{2}$	$5\frac{3}{4}$	$11\frac{3}{4}$	30	1
3 Conductor—Shape CK										
300	300	$2\frac{7}{8}$	L3234CK	15.50	$12\frac{3}{4}$	$3\frac{1}{2}$	$5\frac{3}{4}$	$12\frac{3}{4}$	42	$1\frac{1}{2}$
...	500	$2\frac{7}{8}$	L3254CK	15.50	$12\frac{3}{4}$	$3\frac{1}{2}$	$5\frac{3}{4}$	$12\frac{3}{4}$	40	$1\frac{1}{2}$
3 Conductor—Shape CU										
300	300	$2\frac{7}{8}$	L3234CU	15.50	9	4	10	12	36	$1\frac{1}{2}$
...	500	$2\frac{7}{8}$	L3254CU	15.50	9	4	10	12	34	$1\frac{1}{2}$
4 Conductor—Shape B										
300	300	$2\frac{7}{8}$	L4234B	16.00	13	7	6	$15\frac{3}{8}$	52	$1\frac{3}{4}$
...	500	$2\frac{7}{8}$	L4254B	16.00	13	7	6	$15\frac{3}{8}$	48	$1\frac{3}{4}$
4 Conductor—Shape BK										
300	300	$2\frac{7}{8}$	L4234BK	19.00	16	$5\frac{1}{4}$	$6\frac{1}{2}$	$16\frac{1}{8}$	64	$2\frac{1}{2}$
...	500	$2\frac{7}{8}$	L4254BK	19.00	16	$5\frac{1}{4}$	$6\frac{1}{2}$	$16\frac{1}{8}$	60	$2\frac{1}{2}$
4 Conductor—Shape BU										
300	300	$2\frac{7}{8}$	L4234BU	19.00	13	4	$13\frac{5}{8}$	$15\frac{1}{8}$	64	$2\frac{1}{2}$
...	500	$2\frac{7}{8}$	L4254BU	19.00	13	4	$13\frac{5}{8}$	$15\frac{1}{8}$	60	$2\frac{1}{2}$

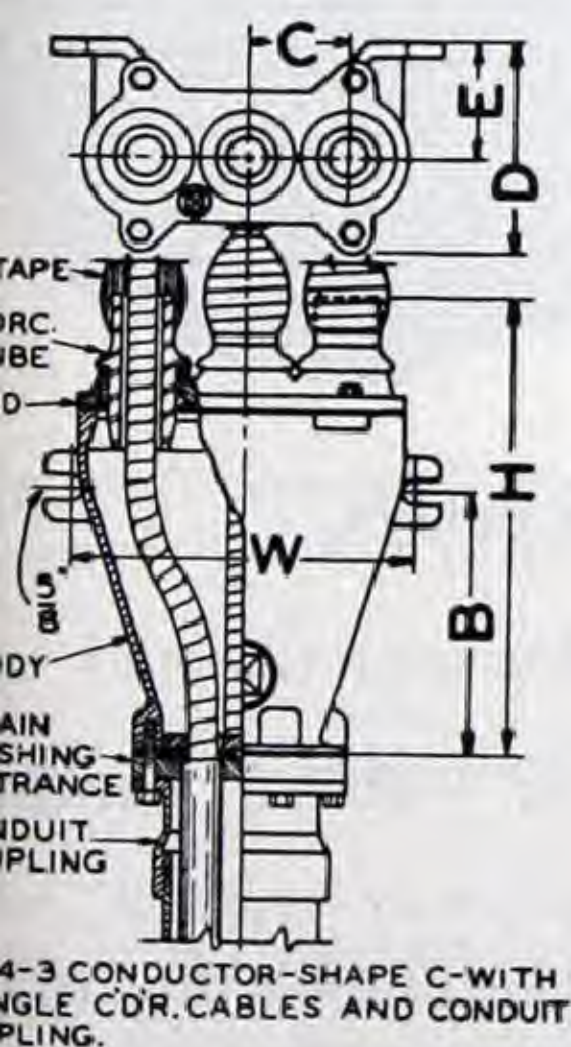


Type LP, Shape B



Type P, Shape C

No connectors are used and conductors are brought through the porcelain tubes without cutting. Limited to conductor sizes that will pass through the 1" bore tubes. Cast iron lids used up to 2500 amperes. Non-magnetic use this.



4-3 CONDUCTOR-SHAPE C-WITH SINGLE COUPLING AND CONDUIT COUPLING.

Shape C

Terminal letter "C" indicates parallel porcelain. Letter "B" in List No. means arging porcelain. Last letters "K" and "U" indicate y shape.

G. & W. CABLE ACCESSORIES

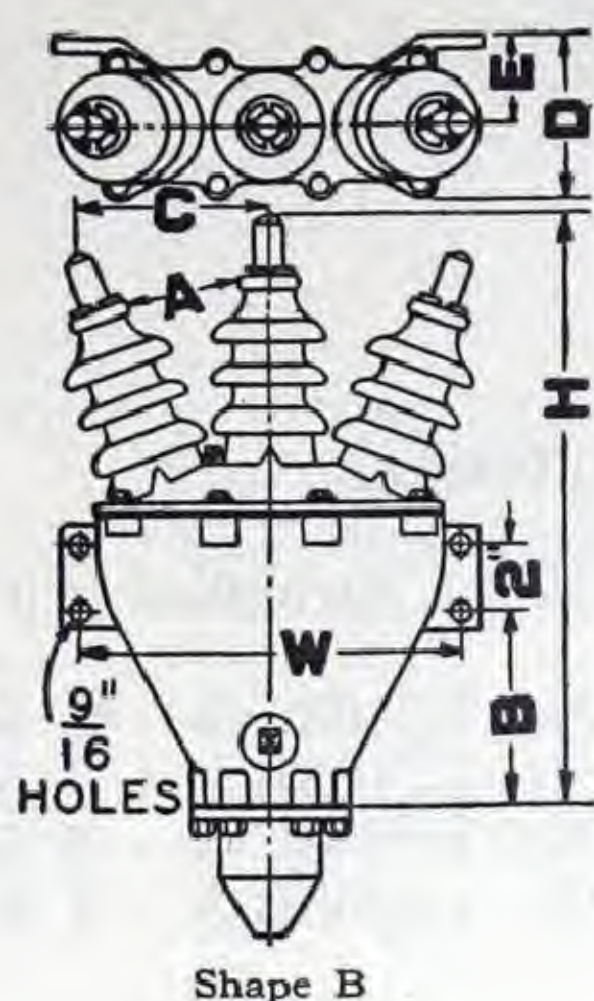
General Data

The price schedules on previous pages are for shape "B" only.

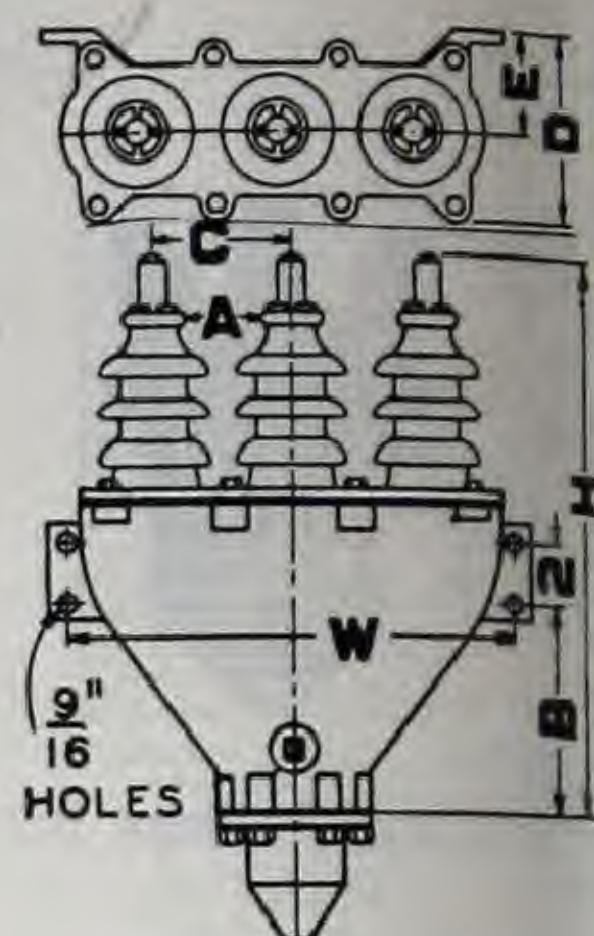
On indoor work especially it is sometimes desirable to have the cable outlets parallel. We offer shape "C" for this purpose.

Prices of shape "C"—Type "T," Type "NT," Type "S"—7500 v. and under, add \$4.00 list over 7500 v., no additional.

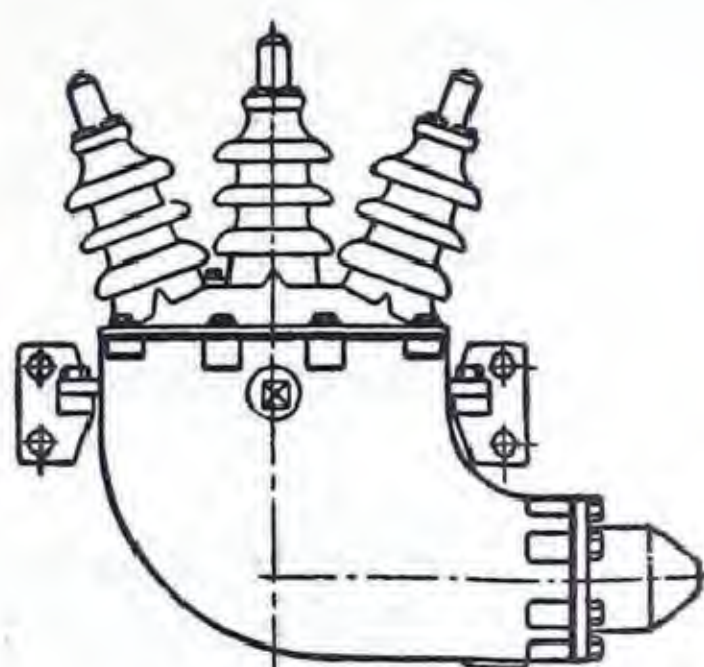
Type "N," no additional.



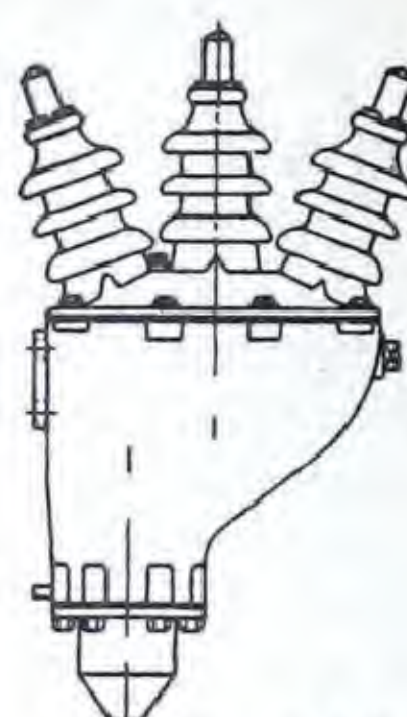
Shape B



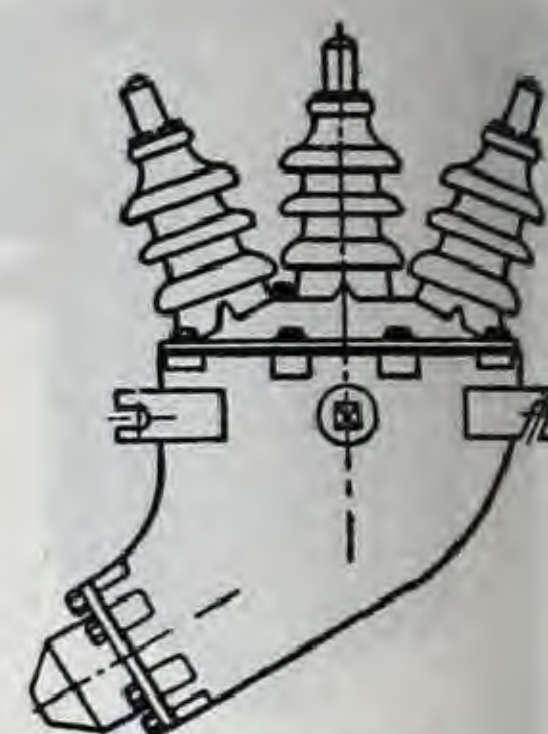
Shape C



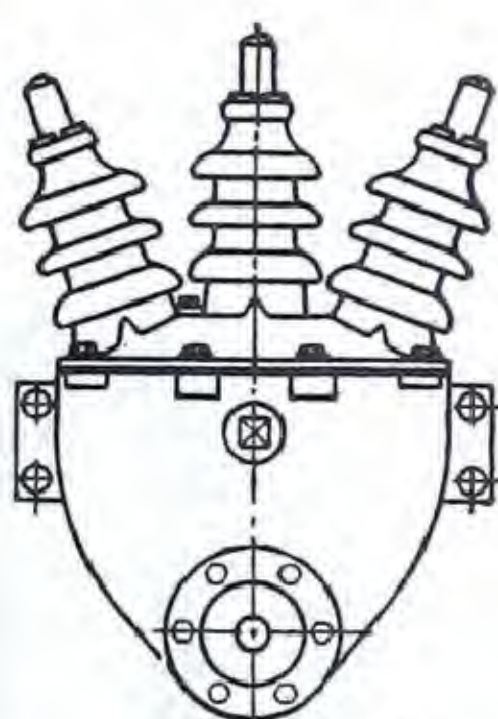
Shape BK



Shape BW



Shape BY



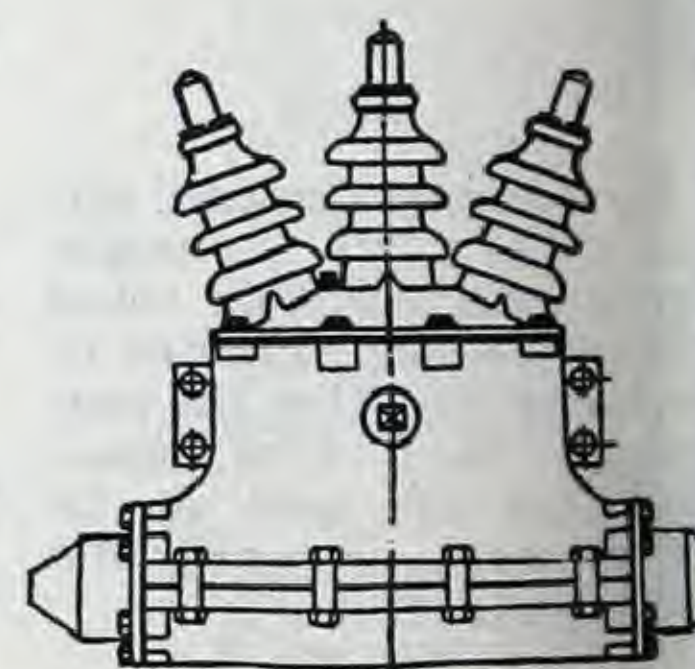
Shape BU

Use Shape "CK" "CU" "CW" "CY" and "CT" for same shaped bodies but with shape "C" lids having parallel insulators.

Prices of Shapes BK, BU, BW, BY: 7500 v. and under add \$3.00 list; over 7500 v. add \$5.00 list.

Prices of shapes CK, CU, CW, CY: 7500 v. and under add \$5.00 list; over 7500 v. add \$7.00 list.

Price of shapes BT and CT add 50% to price of similar shape "B."



Shape BT

GENERAL ORDERING INSTRUCTIONS

Please make the following information a part of the order and avoid delays.

1. Number of terminals required
2. Catalog number
3. Style of lug required
4. Type of cable entrance required
5. If used with conduit, give conduit size
6. Size of conductors and whether round or sector shape
7. Outside diameter of cable over the lead
8. Kind of insulation, i.e., rubber, varnished cambric, or paper
9. Outside diameter of the cable over the armour when armour clamp is required
10. Working voltage and whether delta or Y connected grounded neutral circuit

The compound used to fill the terminal will not be furnished unless ordered as a separate item.

MATHER & PLATT CENTRIFUGAL PUMPS

In developing their very large range of pumps Mather & Platt have ever kept before them the aim of meeting the requirements of a widely diversified market. Though these pumps differ greatly in appearance and hydraulic capacity, they are similar in one respect—they are of the simplest possible design which means:—

1. The wearing parts are reduced to an absolute minimum, ensuring long life of the pump and a reduction of spare parts to be kept at hand by the customer.
2. Ready accessibility to all parts of the pump.
3. Minimum attention during operation.

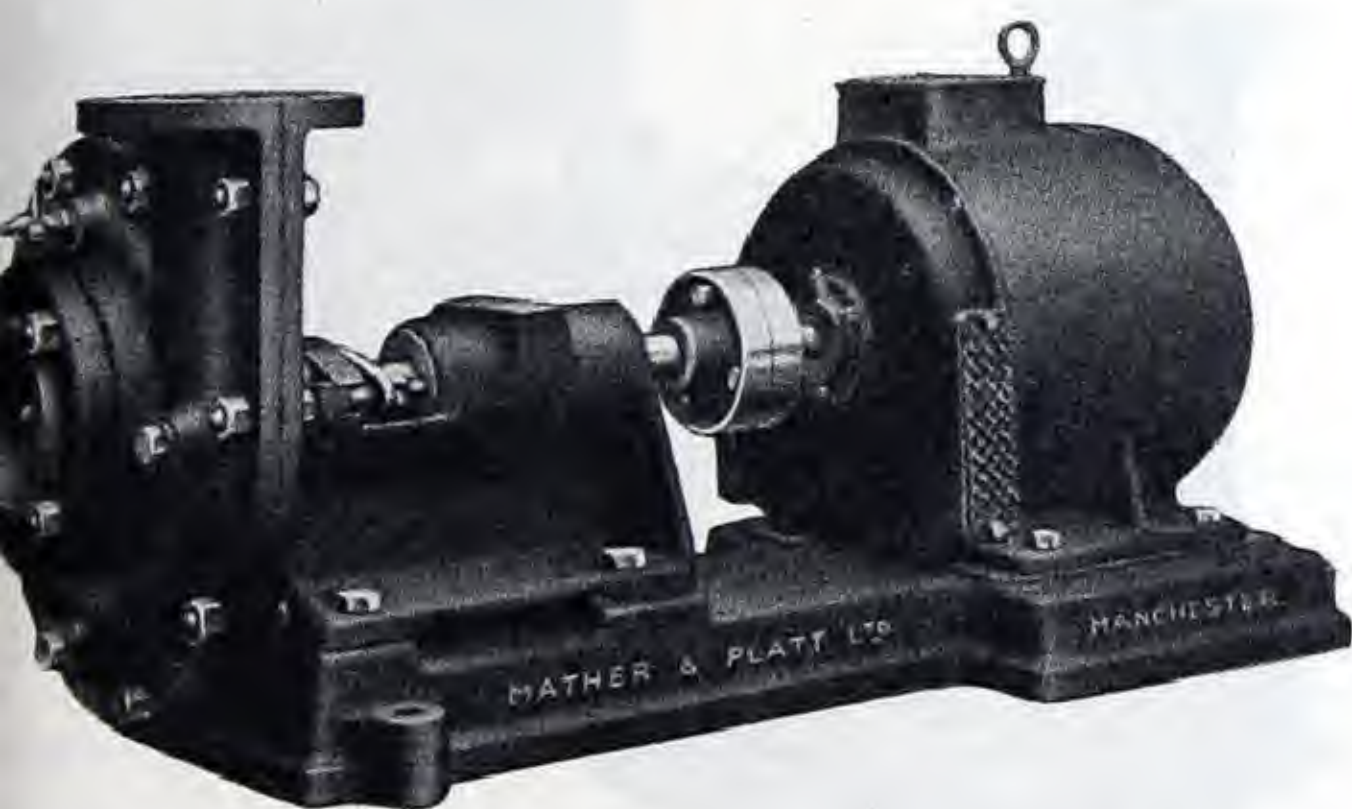
These are qualities of the greatest importance where the continuous operation of the plant is vital. In outlying districts the nearest resources for repairs may be hundreds of miles distant; further, the operation of plant may have been entrusted to uneducated, unskilled labour.

They manufacture these pumps in large batches and, here again, the simplicity of design enables them to offer a really first-class production at a low price.

No unit is allowed to leave the works unless they are fully satisfied that it will fulfil its duty, i.e., head, output and efficiency, and for this purpose they possess what we believe to be the finest and most completely equipped pump testing plant in existence.

Automatic machinery, skilled workmen, together with years of experience in the choice of the very best and most reliable materials, enable them to maintain a quantity production on a quality basis.

Where an electricity supply is available Mather & Platt are able to offer a motor of their own manufacture to drive any size or type of pump they make. Thus it is possible for our customers to have a first-class plant manufactured throughout in one works, with the attendant advantages.



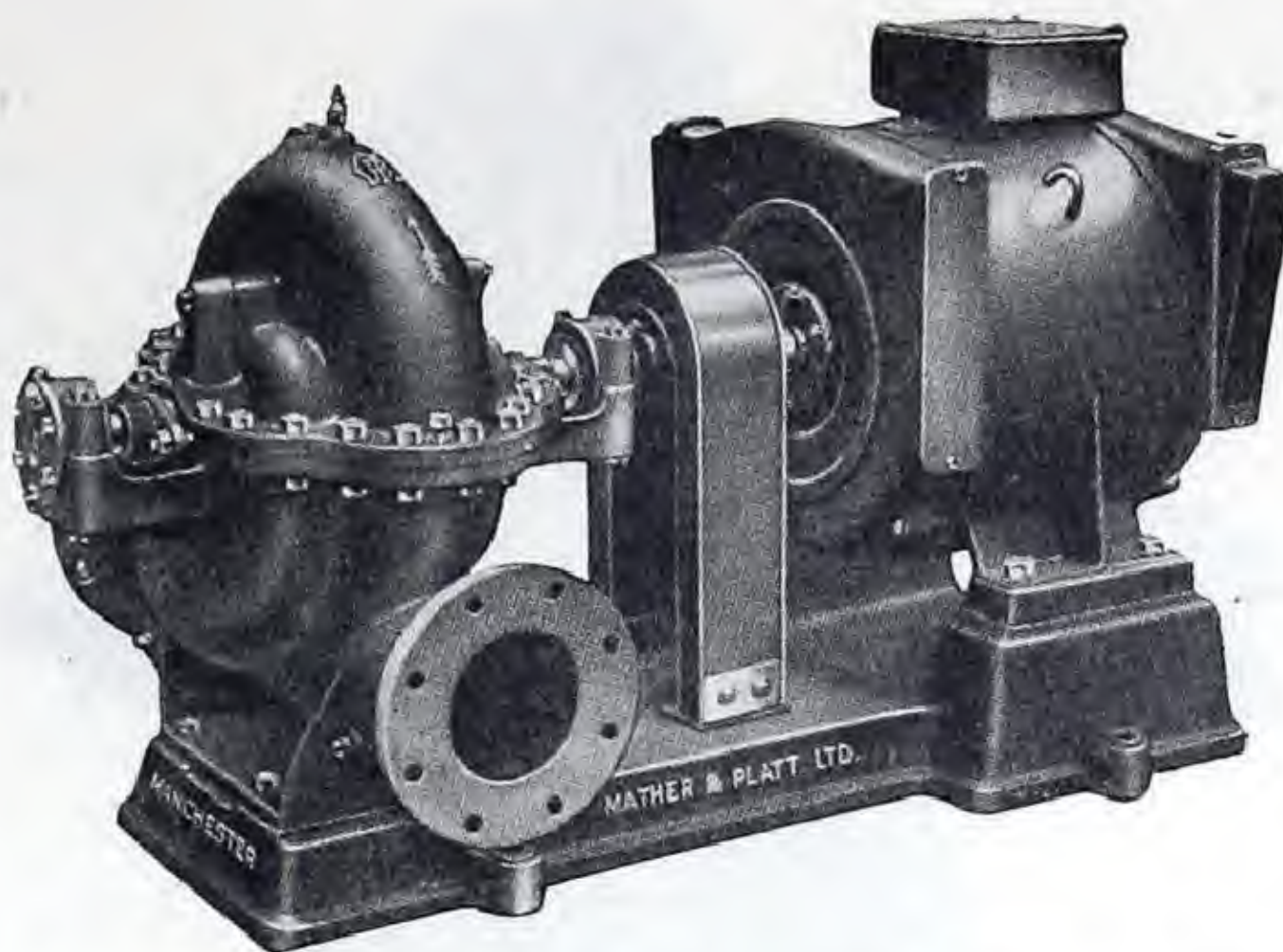
Standard "Solovane" Pump, Solid Coupling and Bedplate for A.C. or D.C. Electric Motor Drive.

"Solovane" Type Pump

The "Solovane" Centrifugal Pump is of highly efficient hydraulic and mechanical design and consists of only 23 different parts. It can be supplied bare or suitable for motor or belt drive. The pump is designed for general service where a pump of sound material and construction is required, but where first cost is a prime consideration.

There are two types; the "A" type, available in sizes from 1 in. to 5 in., capable of delivering quantities of 10 to 1,200 Imperial gallons per minute against heads up to 85 ft. The "B" type Pumps are available in sizes from 1½ in. to 3 in. and are suitable for smaller duties, 10 to 350 Imperial gallons per minute against heads up to 125 ft.

MATHER & PLATT CENTRIFUGAL PUMPS



Motor Driven "Medivane"—Coupling Guard shown is Provided at an Extra Cost.

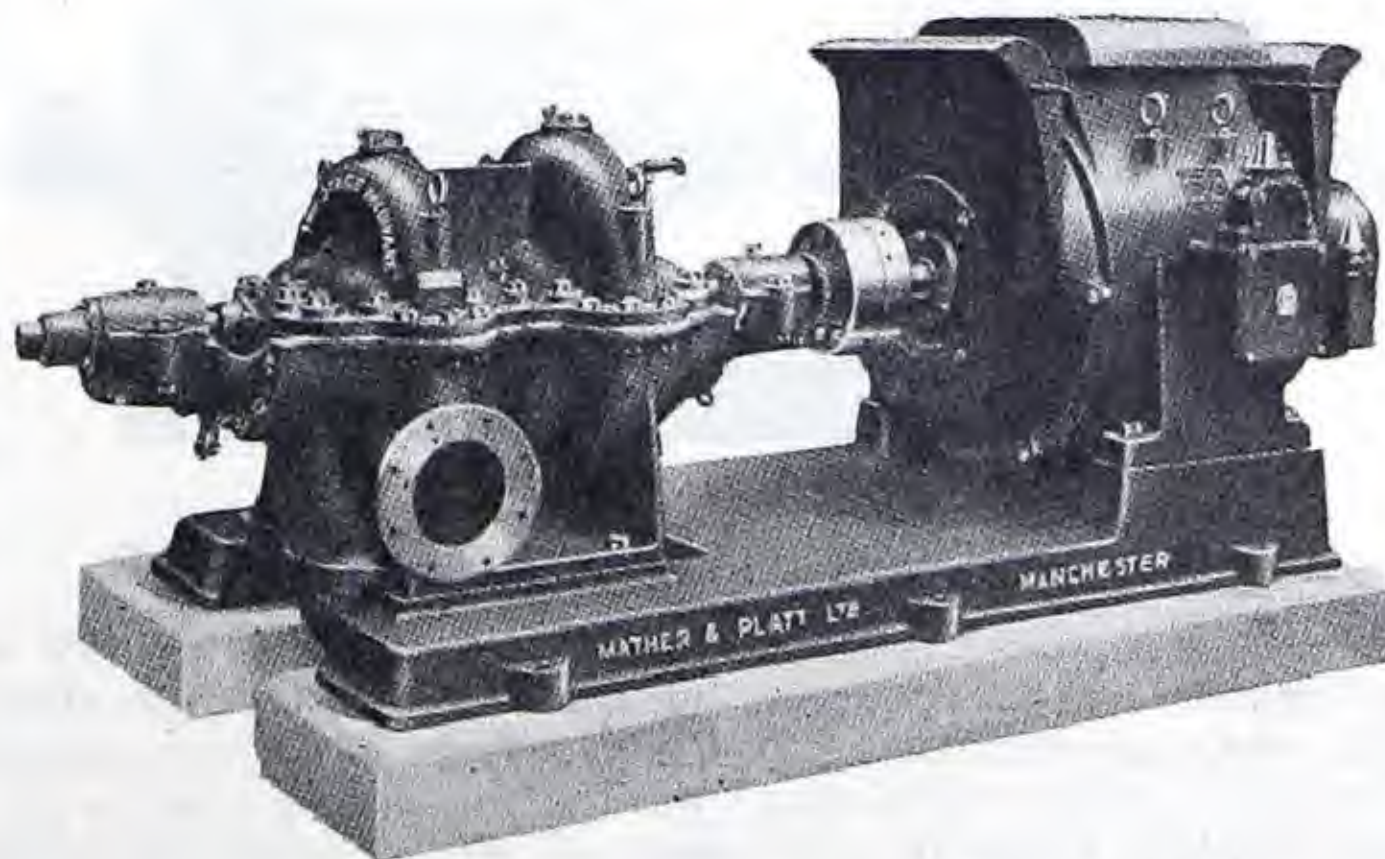
The "Medivane" Type Pump

The "Medivane" is offered for large outputs against medium heads where a pump of the highest class in design is required.

The impeller is of the double-entry type; the casing is split on the horizontal centre line so that the top half can be removed, exposing the impeller and stuffing boxes without disturbing the pipe joints or bearings. The standard pump has a cast iron casing, bronze impeller, neck rings, sleeves and glands. The pump can be cast iron fitted throughout if desired.

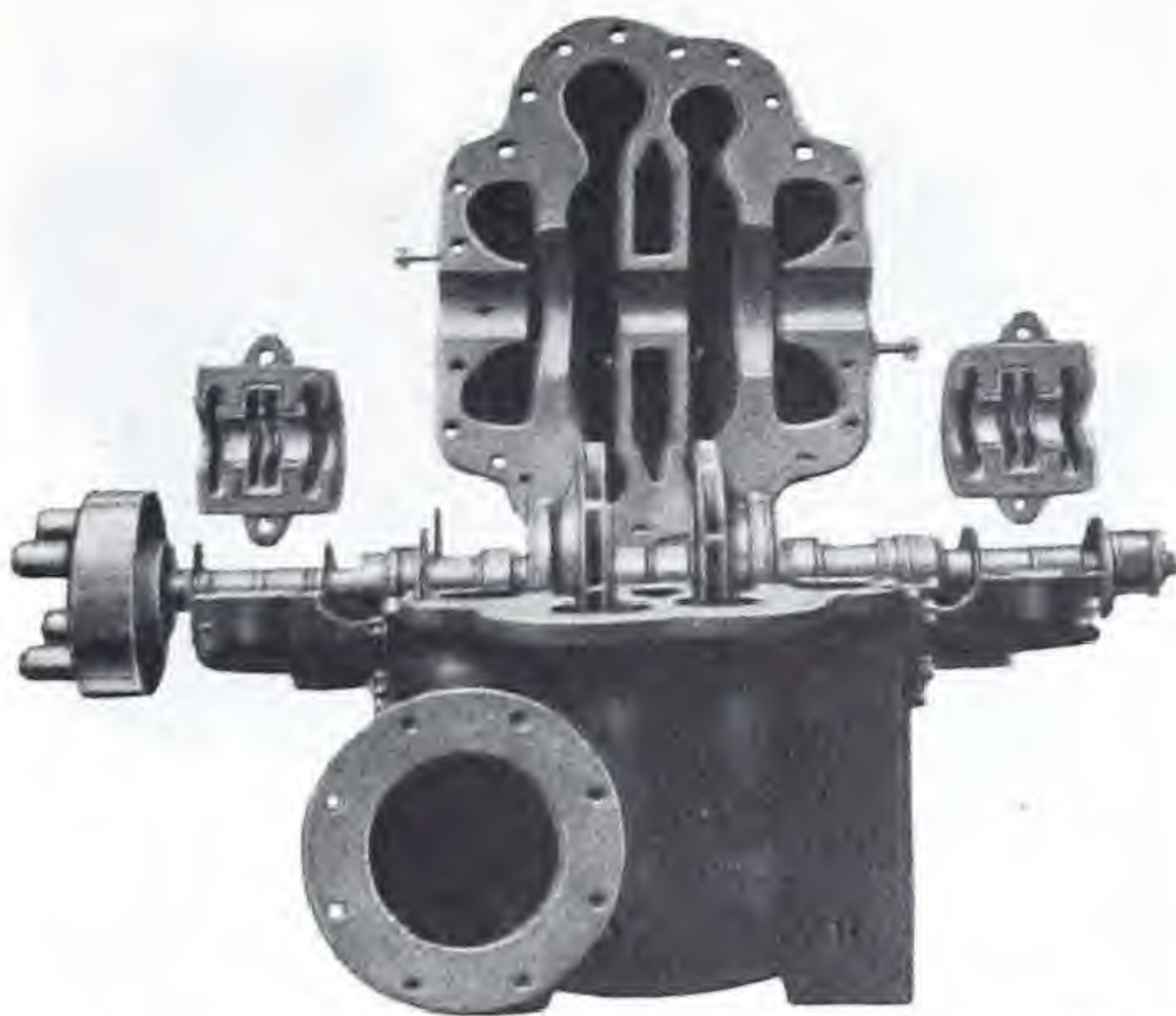
This type is suitable for heads up to 250 ft. The sizes stocked are 2 in. to 6 in., but we can supply up to very large outputs for any type of drive. For fast or fast and loose pulley drive, the shaft is extended and the pulley or pulleys are supported by an outboard pedestal; the whole unit being mounted on a bedplate of generous proportions.

See our pamphlet P431



Standard Motor Driven Pumps Double Inlet Balanced Propellers.

MATHER & PLATT CENTRIFUGAL PUMPS



Two-Stage "Medivane" Pump open for inspection.

Two-Stage "Medivane" Pump

The Two-Stage "Medivane" is similar in mechanical details to the single-stage "Medivane" just described, but, having two impellers arranged in series in the same casing it is suitable for approximately twice the head of the single-stage pump.

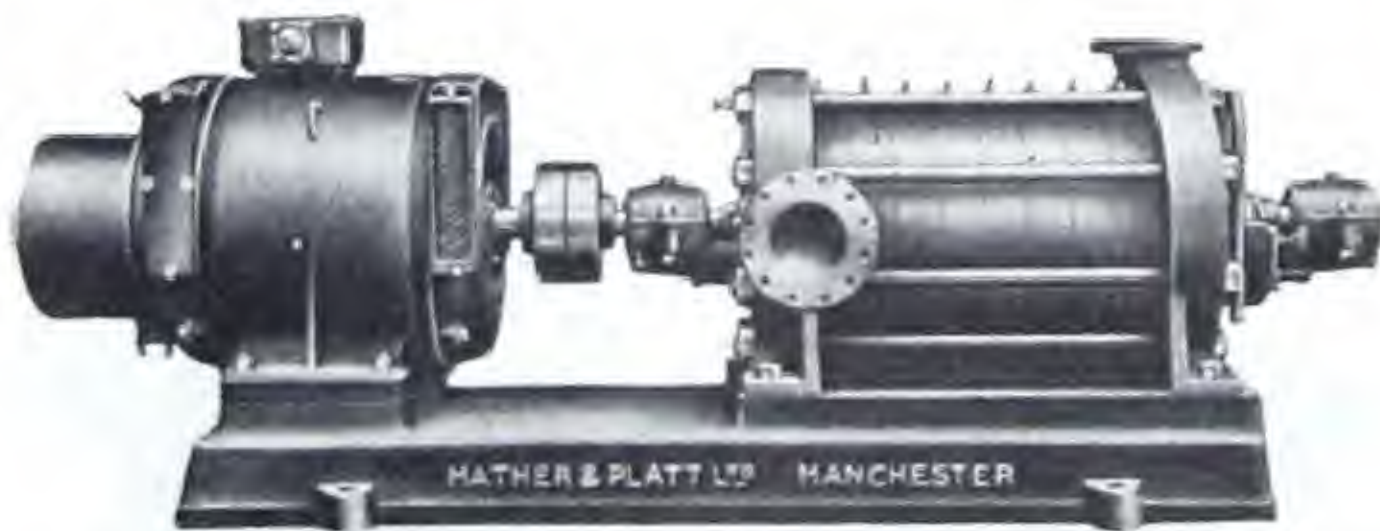
The casing is split horizontally so that the simplicity and accessibility of the single-stage "Medivane" is not sacrificed to obtain the increased head.

See our Pamphlet P217b

The "Lonovane" Pump

The "Lonovane" Pump is constructed and finished with all the excellence of the "Medivane" type and on exactly the same lines, having a horizontally split casing, but it is designed for heads up to 125 feet. They are specially suitable for Condenser Circulating Water Pumps, Dock Pumps, City Waterworks, Irrigation purposes and in fact any duty where extreme reliability and high efficiency are required. Like the "Medivane," we can supply these types for very large outputs for belt or motor drive.

See our Pamphlet P17a.



The "Plurovane" High Lift Pump

We believe there is no pump with such a wide field of application as that enjoyed by the High Lift Multi-stage type originated by Mather & Platt. They have been manufacturing turbine multi-stage pumps for fifty-six years and have applied them to all classes of work—mine drainage, dip working, shaft sinking, hydraulic pressure work, boiler feeding, water supply, dock pumping, chemical works, oil service, etc., in many parts of the world.

MATHER & PLATT CENTRIFUGAL PUMPS

The "Plurovane" High Lift Pump

(Continued)

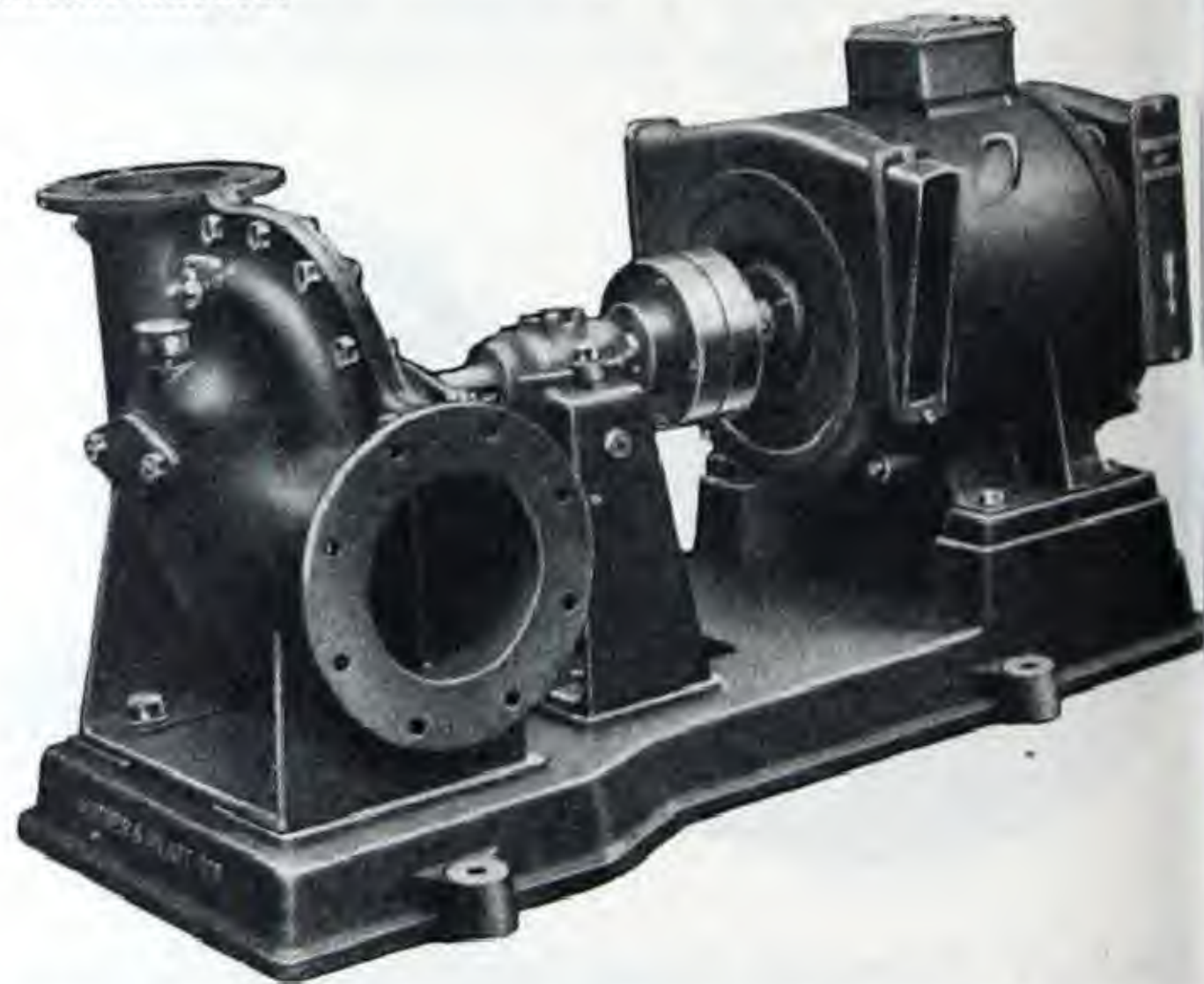


"Plurovane" Mine Sinking Pump.

The latest design of the Mather Platt "Plurovane" High Lift Pump compact, with a short stiff shaft running in two bearings. The pump divided into vertical sections, each representing a pressure stage, which gives the greatest ease of dismantling and allows the addition of an extra stage or stages should it be desired to increase the head at any time. The hydraulic end thrust is taken care of by our patent balance piston device.

These pumps are designed above all to give long service in continuous operation. For the elimination of any possibility of seizure, our introduction of special bronzes for the wearing parts both moving and stationary, has proved to be of the utmost value in pumping practice during recent years. All wearing parts are renewable and can be immediately shipped from stock.

Since we supply an arrangement for any type of drive—belt, motor, steam engine, etc., these pumps are ideal for high lift work, their compactness and light weight affording the very minimum of difficulty in shipping to remote districts inland. The preparations for their reception on site are of the simplest possible nature.

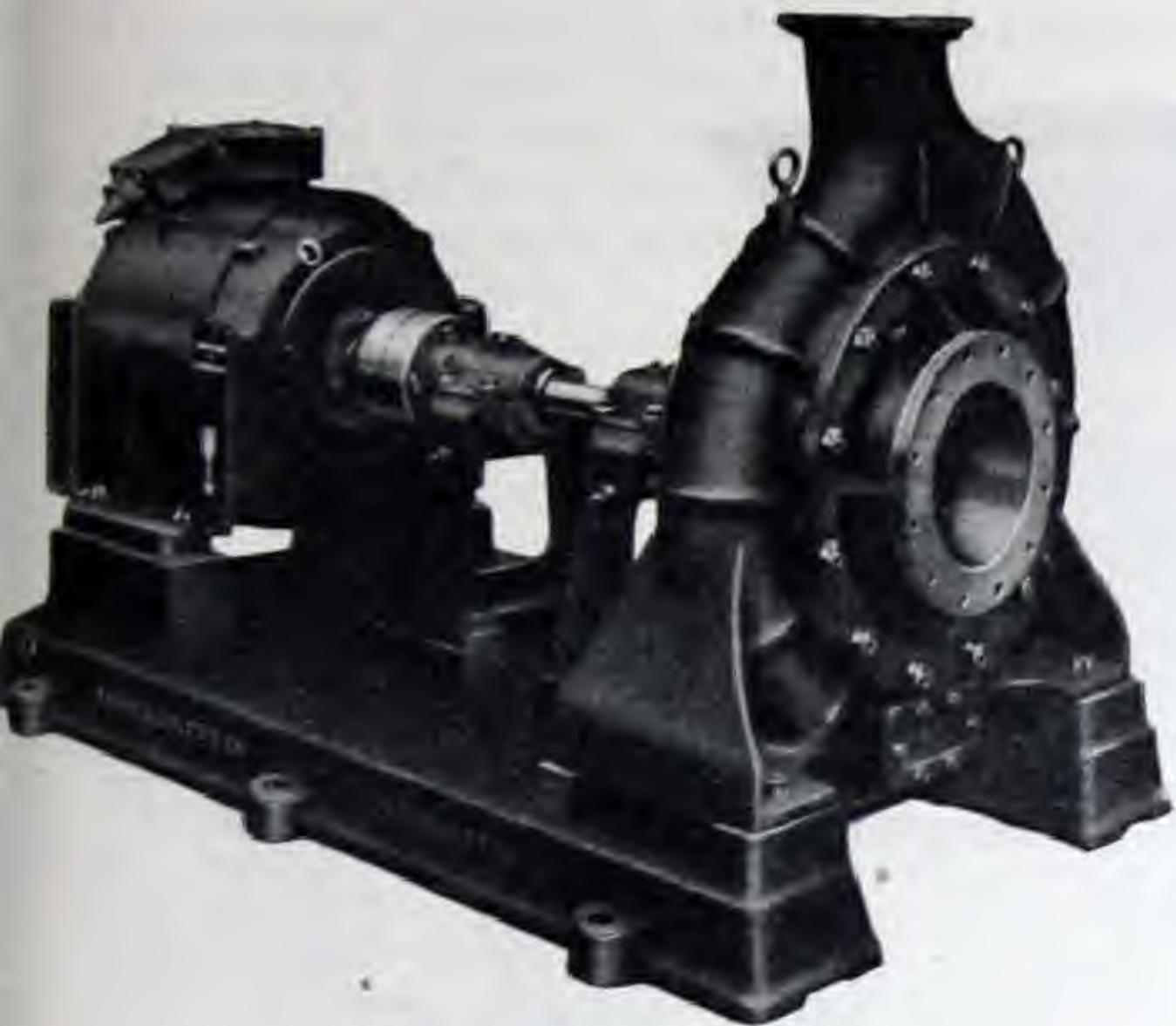


"Elwadi" Pump driven by Mather & Platt A.C. Motor through flexible pin type coupling.

The "Elwadi" Pump, for Irrigation Duty

The "Elwadi" Pump has been developed specially to meet the requirements of the agriculturist where the normal rainfall is insufficient for the growth of crops, but where irrigation is practicable; or conversely, for the drainage of waterlogged land to bring it under cultivation. The Pumps, of very high efficiency, will deal with large quantities at very high suction lifts and are ideal for working on the banks of rivers where the level may vary considerably since the difference in water levels has no appreciable effect on the output. Moreover, the rotative speed is low and the working parts resist to an unusual degree, the wearing action of grit and sand which are generally to be found in rivers particularly in rainy seasons; hence the "Elwadi" Pump is not only low in first cost, but also low in running and upkeep costs.

MATHER & PLATT CENTRIFUGAL PUMPS



An 8/12" "Karntclog" Stuff Pump for handling 6% stuff driven by a Mather & Platt motor. Note that the delivery flange is at the highest point of the casing, a most important feature as otherwise entrained air may collect in the casing and interfere with the working of the pump.

"Karntclog" Pump

We believe the "Karntclog" to be the only pump on the market which can be truly pronounced Unchokeable and retain all the characteristics which are essential in a centrifugal pump for long and satisfactory service.

This pump, which is available suitable for belt or motor drive, will deal with unscreened or semi-scringed sewage, paper pulp stock of all kinds, sugar and dye works effluent, crushed sugar cane, offal, gravel, sand, clinker ashes, coal, sludge, rags and paper, fibrous substances, stones, etc., in fact, all kinds of solids in suspension, semi-solids and sludge.

All the above substances can be pumped without any screening or cutting.

These pumps are made in a wide range of capacities and in two types depending on the material being handled.

One of the most important applications of the "Karntclog" is in Pulp and Paper making and many paper mills throughout the world are equipped with pumps for dealing with Paper stock of high consistency.



The Principal Products of Mather & Platt Ltd. are:—

TEXTILE MACHINERY

Bleaching, Dyeing, Printing and Finishing Machines for Textiles. Warp Stop Motions for Looms. "Vortex" System of Humidification and Ventilation.

PUMPS FOR ALL PURPOSES

Centrifugal Pumps for all Lifts. Turbine Pumps for Boiler Feeding, Colliery and Hydraulic Pressure Work. "Karntclog" Centrifugal Pumps. Borehole Pumps. Centrifugal Pumps for Irrigation Work. Cask Washing Plant for Breweries, etc.

ELECTRICAL MACHINERY

Electrical Plant for all Industrial Purposes, including:—Direct-Current Dynamos. Polyphase and Single-Phase Generators. Direct-Current Motors. Polyphase Motors. Synchronous Motors. Rotary Converters. Motor Generators. Boosters, etc.

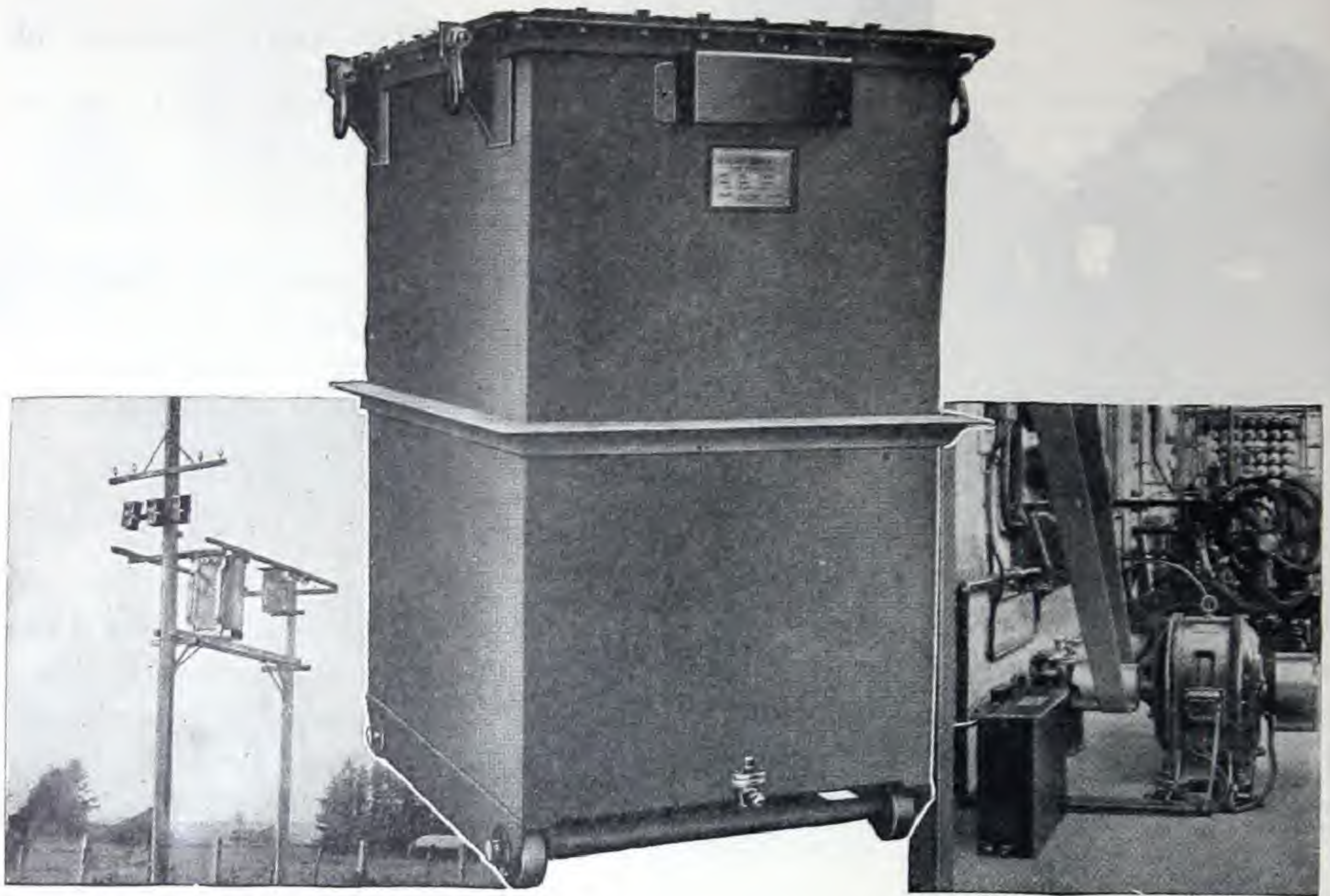
FIRE FIGHTING EQUIPMENT

Automatic Electrical and Petrol-Driven Centrifugal Fire Pumps.



Catalogues describing these products will be forwarded on application.



"T.C.C." STATIC CONDENSERS**For Improvement of Power Factor**

In alternating current supply, the product of volts and amperes, as read on the voltmeter and ammeter, is known as the apparent power of the circuit, and is expressed in KVA (kilovolt amperes), i.e., $\text{amps.} \times \text{volts} \div 1,000$. If the current is in phase with the voltage the apparent power is the equivalent of true power, but if the current lags behind or leads on the voltage (as would be shown by a power factor indicator) the true power is less than 100 per cent of the apparent power, the actual percentage depending upon the angle of lag or lead of the current.

The lagging power factor of a system is due chiefly to the running of a synchronous or induction motor, the inherent features of which demand a magnetising current lagging 90 degrees out of phase with the EMF and which causes the line current carried by the mains to lag behind the EMF. In effect, therefore, of the total current flowing in a circuit with lagging power factor a proportion only (dependent on the power factor) is doing useful work and the rest is idle but nevertheless heats up mains, transformers, switchgear, and alternators and involves proportionately increased capital outlay.

There are also other adverse results to the supply system, such as increased copper losses, voltage drop, and increased excitation of alternators and, where the consumer is charged on KVA demand, a considerable increase in the supply bill.

In many instances, therefore, it has become imperative to improve the power factor in order to reduce the current on the mains and so release valuable plant for more remunerative work (i.e., addition to the load) than can be done by carrying idle current between motor and alternator. This will also enable the supply bill to be reduced.

Power factor correction, which can in almost every instance be most economically effected by the use of static condensers, merits the closest attention on the part of supply undertakings and consumers of power.

Each case needs individual consideration and extended experience in the application of the static condenser is at your service; we shall therefore be pleased at any time to send an expert to advise and draw up a complete scheme for power factor correction.

CONSTRUCTION OF T.C.C. CONDENSERS

The T.C.C. Static Power Condenser consists of rolled paper condenser units assembled in frames arranged in a tank and oil immersed. Each unit of a condenser comprises two plates, separated by the requisite number of insulating papers.

Condensers are constructed for single, two or three-phase

supply, and normally connected to the low tension mains either direct or through an auto transformer stepping up to the most economical voltage for the condenser. T.C.C. Condensers are built for voltages up to 6,600 for direct connection.

"T.C.C." STATIC CONDENSERS

For Improvement of Power Factor

The special features of the T.C.C. Power Condensers are:—

1. A robust construction which will withstand all ordinary usages and shipment abroad.
2. A heavy tank with strong lid, dust-tight and oil-tight.
3. A free circulation of oil around and through the units.
4. A very high insulation resistance combined with a small dielectric loss.
5. A non-ionising type of unit, one of the most important features of T.C.C. construction.
6. Completed condensers are subjected to over voltage tests before leaving works.
7. Behind the construction and design of the T.C.C. condenser is many years' research and experience in the construction of condensers. We are Condenser Specialists.

APPLICATION OF STATIC CONDENSERS

The Static Condenser is chiefly used for the following purposes:—

1. To unload the wattless current of overloaded alternators, often enabling one set to be shut down.
2. To relieve the wattless current of overloaded Static Transformers and Cables, often avoiding the necessity of installing additional transforming plant or feeder cables.
3. To reduce the K.V.A. demand at the end of a long feeder cable, avoiding the necessity of duplicating the cable and giving improved voltage regulation.
4. To improve the power factor of the load of a consumer taking public supply, and so qualify for a substantial bonus for improved power factor, which frequently shows a return of 50 per cent or more per annum on capital outlay.

TYPES OF STATIC POWER CONDENSERS FOR INDUSTRIAL LOADS

Static Power Condensers for industrial loads may be divided into two classes:—

A) The bulk condenser for dealing with the total load. The majority of condenser installations come under this heading, the condenser or condensers being connected either direct across the switchboard or at the ends of feeders of an industrial load to effect the correction of the installation as a whole, i.e., bulk correction. By employing bulk correction it is possible to take full advantage of the diversity factor of the load both as to actual loading and power factor, and to reduce the condenser capacity to a minimum.

B) Small box or tank type condensers for connecting to individual motors.

The T.C.C. oil-immersed box type or small tank type condenser, similar in construction to the large tank type condenser, is suitable for direct connection to the stator terminals of individual motors. A condenser connected in this way will discharge effectively through the motor windings, and be switched on and off with the motor by the motor control switch. Under this system it is possible to correct the power factors of individual motors to any required degree. Fuses connected between the motor and the condenser may be provided but are not essential, as the protective gear on the motor will protect the condenser also.

REGULATION OF CONDENSER CAPACITY

When it is necessary or desirable to regulate the condenser capacity, this is effected by sub-dividing the capacity into a number of condensers connected across motors, which will be switched off with the load automatically. Alternatively, a bulk condenser of reasonable capacity connected across the main switchboard, and the balance of the capacity divided into a convenient number of units connected across some of the motors, which will ensure the necessary automatic regulation of capacity.

This arrangement is safe, foolproof and reliable, and much preferred to sub-switching of units or sectionalising of the tank type condenser.

"T.C.C." STATIC CONDENSERS

For Improvement of Power Factor

CHARACTERISTICS OF STATIC CONDENSER

The Static Condenser has the following characteristics:—

1. No moving parts.
2. The efficiency is not less than 99.7 per cent.
3. Temperature rise under normal conditions does not exceed 30 degrees F.
4. Requires no attendance, and maintenance costs are negligible.
5. Can be placed in any convenient position on an ordinary floor without special foundations, and for all practical purposes can be forgotten.

WHERE TO INSTALL AND HOW TO CONTROL THE CONDENSERS

As the reactive or wattless component is created by the induction motor or other consuming apparatus, it is important to correct the power factor as close as possible to the motor or other apparatus, and so unload the mains, transformers, etc., as far distant as possible from the power station. There are many different places to which a static condenser may be connected in circuit, as follows:—

1. Direct across the stator terminals of an induction motor, in which case the condenser would be discharged through the windings of the motor and switched on or off with the motor switch.
2. To correct the power factor for a group of motors by connecting the condenser to main distribution or sub-distribution fuseboard, in which case a separate switch to control the condenser is necessary.
3. To connect the condenser across the windings of a transformer, the condenser controlled by transformer switch and discharged through transformer windings.
4. To connect the condenser across the terminals of an alternator to unload the reactive current from the alternator itself only, switching the condenser on or off with alternator main switch and discharging through alternator windings.

For the control of condenser equipments of 25 K.V.A. and upwards we invariably recommend an oil break circuit breaker, but for condensers below this output an air break switch with fuses is in many cases quite satisfactory. It is desirable to have overload protection on all phases, and an ammeter.

Low tension condensers are divided into two classes—the direct connected condenser and the auto connected condenser, which are discharged as follows:—

(a) When employing a direct connected condenser, it is necessary to have some means of discharging the condenser, and on all low tension equipments we fit as standard discharge resistances of very high ohmic value permanently connected across the terminals of the condenser inside the tank.

(b) A condenser working in conjunction with a step-up auto transformer will effectively discharge through the auto transformer windings, the condenser being permanently connected across the auto and the switching carried out on the primary.

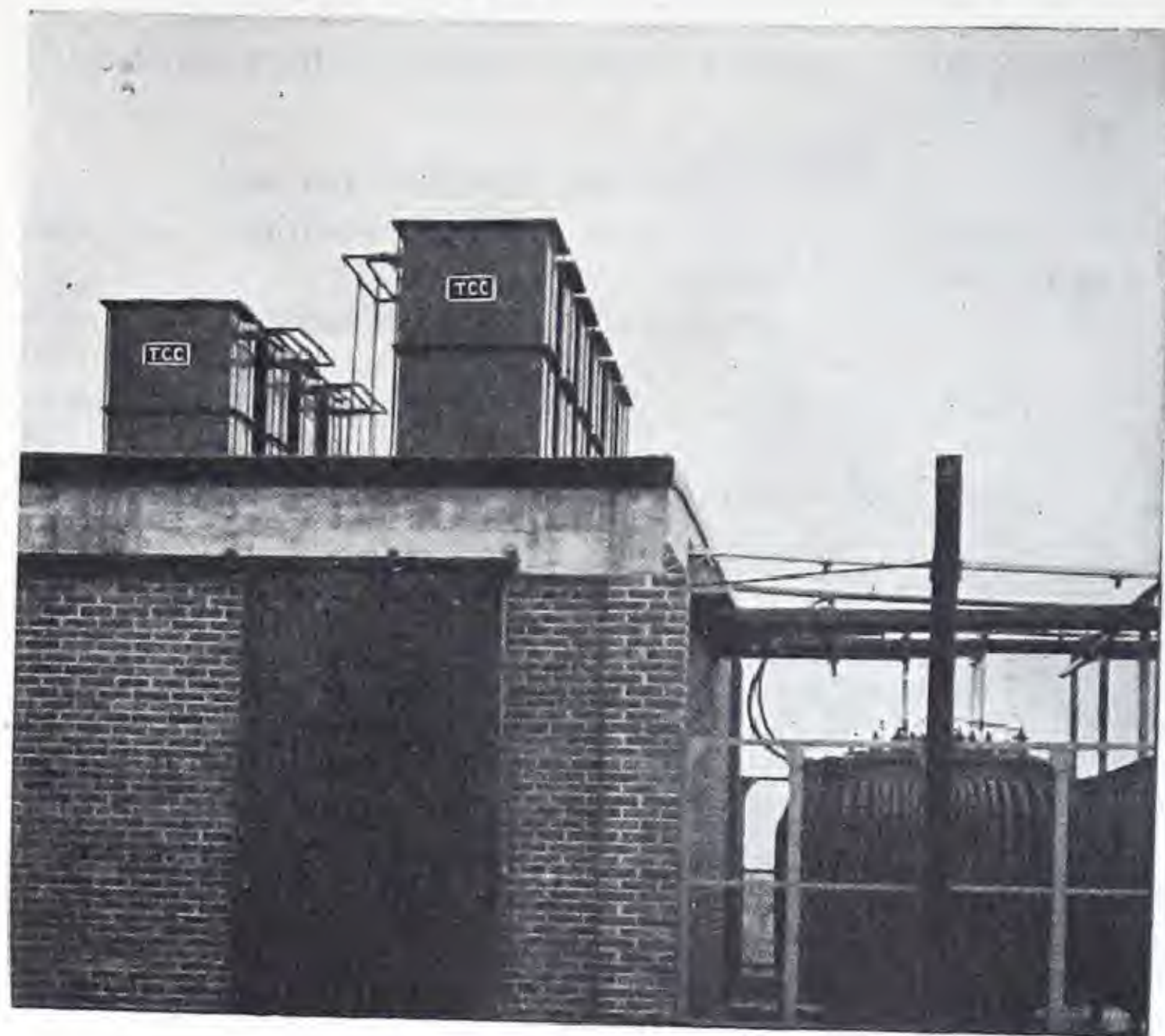
USE IN COAL MINES

The condenser being of the totally enclosed oil-immersed type, is particularly suitable for installing in mines, either on the surface or below ground.

OUTDOOR CONDENSERS

T.C.C. Condensers may be supplied for outdoor use, such condensers being of special design and may be either of the high tension or low tension type. The outdoor type condenser is more particularly used in outdoor sub-stations or on consumers' premises where space is not available for the installation of an indoor type of condenser.

"T.C.C." STATIC CONDENSERS For Improvement of Power Factor



Ten Outdoor Condensers each 100 K.V.A.

POLE TYPE CONDENSERS

T.C.C. standard L.T. condenser are also available for pole mounting and may be connected direct across the secondary winding of a step-down pole type transformer. Condensers connected in this way not only improve the power factor of the system, but increase the available capacity of the transformer.

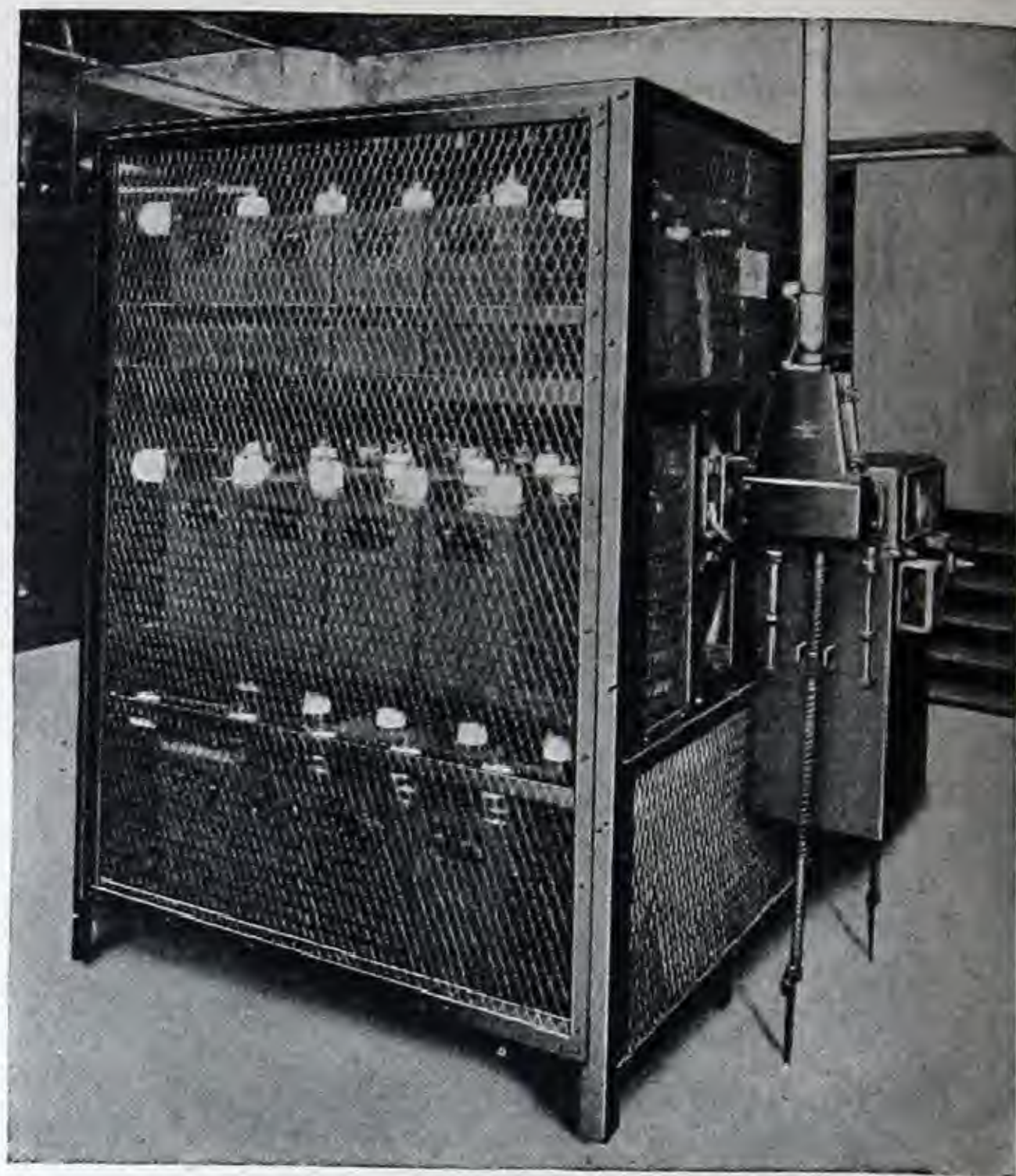
The following table gives the value of the reactive component for different power factors, from which it is easy to calculate the condenser K.V.A. and capacity required for power factor improvement.

TABLE

Giving reactive (wattless) component of load in K.V.A. as a proportion of the total K.W. load.

P.F.	React. K.V.A.	P.F.	React. K.V.A.	P.F.	React. K.V.A.
1.0	.0	.90	.484	.80	.750
.99	.142	.89	.512	.79	.776
.98	.203	.88	.539	.78	.802
.97	.251	.87	.569	.77	.829
.96	.291	.86	.593	.76	.855
.95	.329	.85	.620	.75	.882
.94	.363	.84	.646	.74	.909
.93	.395	.83	.672	.73	.936
.92	.426	.82	.698	.72	.964
.91	.456	.81	.724	.71	.992
.70	1.02	.60	1.333	.50	1.732
.69	1.049	.59	1.369	.49	1.779
.68	1.078	.58	1.404	.48	1.828
.67	1.108	.57	1.441	.47	1.878
.66	1.138	.56	1.480	.46	1.930
.65	1.169	.55	1.518	.45	1.985
.64	1.200	.54	1.560	.44	2.041
.63	1.233	.53	1.600	.43	2.098
.62	1.265	.52	1.642	.42	2.160
.61	1.300	.51	1.686	.41	2.225

"T.C.C." STATIC CONDENSERS For Improvement of Power Factor



Unit Type Condenser.

For special requirements unit type condensers can be furnished. The general principles of the tank type of condensers also apply to this type.

However, since the tank type is the standard product and because of the following reasons we almost invariably recommend tank type.

Confidence in their design and construction is such that T.C.C. unhesitatingly build Tank Type.

Experience favours the Tank design—25 years of condenser experience are behind the T.C.C. products.

Ease of replacement is a minor consideration and of practical advantage, as T.C.C. condensers of all types are built to give years of trouble-free service.

Thousands of T.C.C. Tank installations are in service and have been proved capable of meeting all conditions of load variation. The T.C.C. Tank system of capacity variation is simple, safe and effective.

It is more robust than the Unit Type.

A well designed condenser is best left alone.

The only test possible by the average user is one for breakdown—why laboriously test each unit of a Unit Type condenser when a simple ammeter test in each phase will indicate that the T.C.C. Tank Condenser is operating as it has done for years—Trouble-Free.

Prices on application.

J. P. ELECTRIC TUBULAR HEATERS

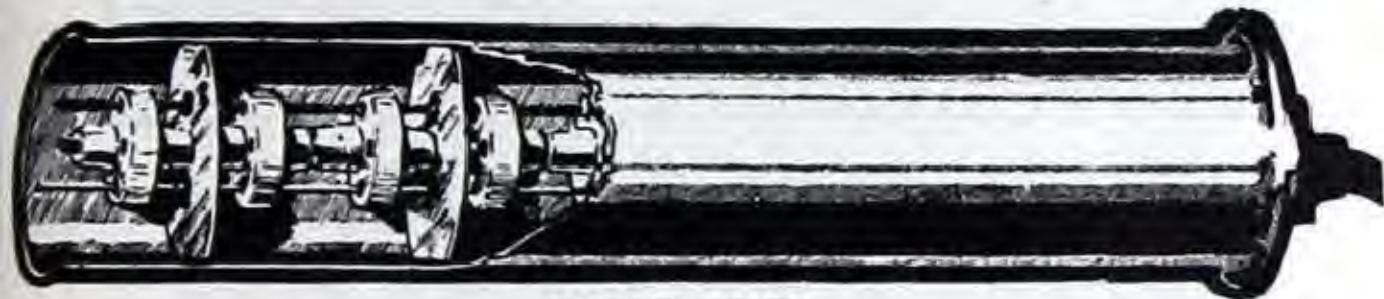
The J. P. Electric Tubular Heating System is replacing other mediums and methods of central heating where conditions permit, due to the many outstanding advantages it possesses. It is now in successful operation throughout the British Isles, Canada and other parts of the world, in all types of buildings, such as Theatres, Movies, Stores, Shops, Churches, Halls, Hospitals, Offices, Homes, Street Cars, Electric Railroads, Steamships, etc.

A few of the special features of the J. P. Electric System are as follows:

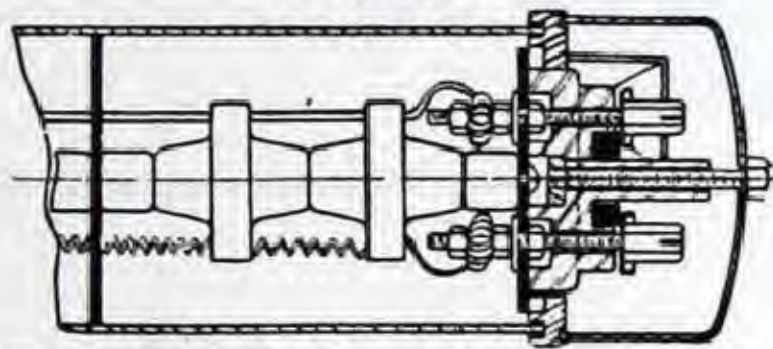
A healthy, uniform heat, maintained within one to two degrees, irrespective of external weather conditions. Clean, safe, no fire risks, no labour costs, indestructible, guaranteed for five years. Capital costs are low. J. P. System eliminates the necessity for boiler houses and smokestacks. In operation it is often competitive with other forms of heating. The heaters are made up in many attractive forms to suit all requirements demanded by modern architectural design.

The J. P. Electric Tubular Heater comprises an electric element encased in a 2-inch steel tube of either a flexible or rigid type. The electric element is supported by a patented insulated structure composed of a rustless steel spring on which is threaded the insulators and mica discs, the latter spaced at adequate intervals. The resistance element (which operates at a black heat) is supported by the insulators and runs the full length of the heater, as seen in the illustration. Suitable end-caps are provided for making wiring connections, with special bus bar arrangement for heaters that are mounted in banks, and are supplied tapped to take all sizes of tubing up to and including 1/2-inch conduit, or with insulating bushing. Ground connections can be made to a terminal provided.

The life of these heaters is practically unlimited, owing to the sound engineering construction, and the fact that they operate at a black heat.



RIGID TYPE



Cross Section View, Tubular Heater



FLEXIBLE TYPE

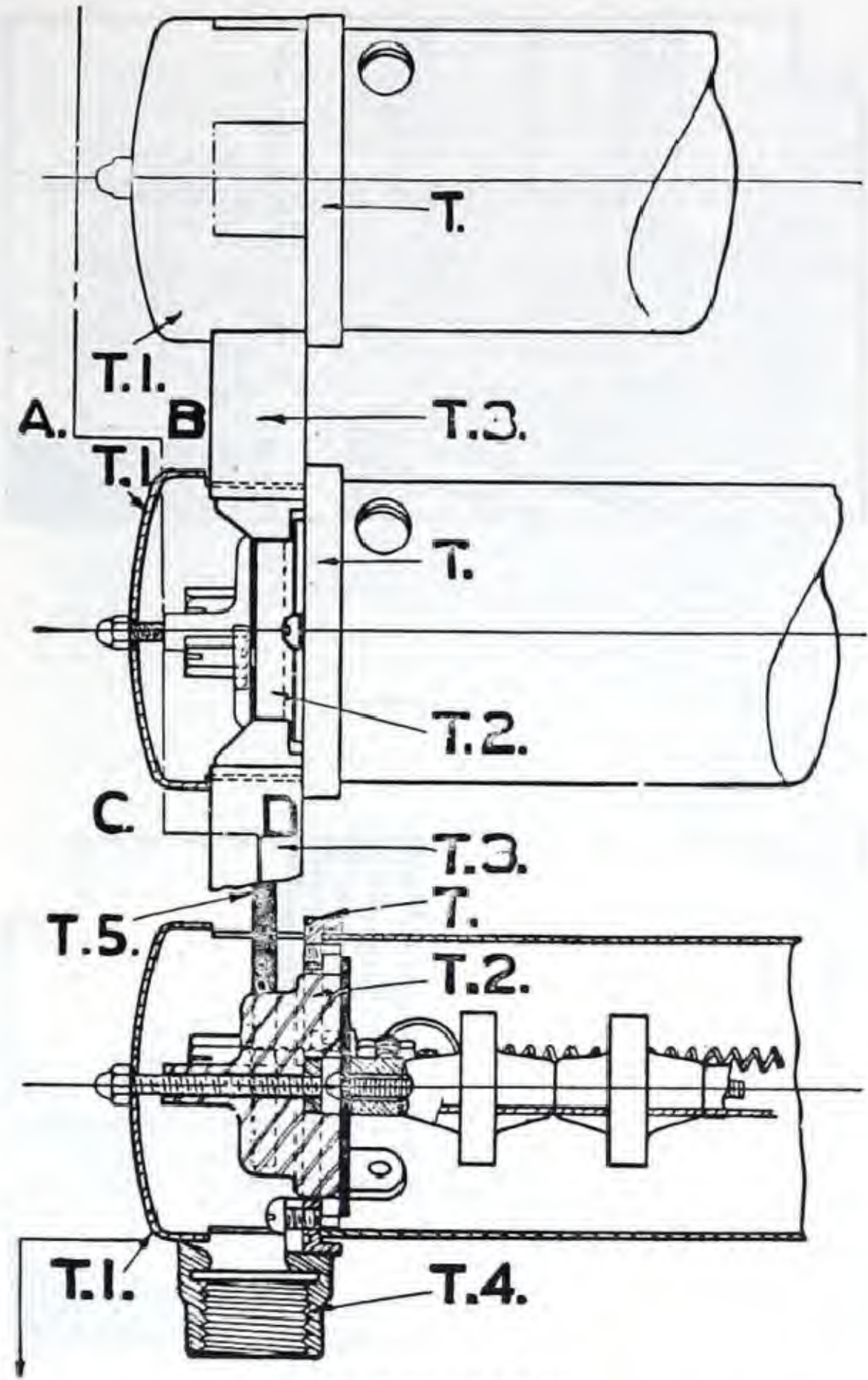
Rigid Type			Flexible Type		
Length	Code		Length	Code	
2 Feet	R- 2		2 Feet	F- 2	
3 "	R- 3		3 "	F- 3	
4 "	R- 4	App. weight per ft.	4 "	F- 4	
5 "	R- 5	1 1/2 lbs.	5 "	F- 5	
6 "	R- 6	Standard loading 70	6 "	F- 6	
7 "	R- 7	watts per ft. 115	7 "	F- 7	
8 "	R- 8	and 220 volts.	8 "	F- 8	
9 "	R- 9	Other loadings from	9 "	F- 9	
10 "	R-10	20 to 100 watts per	10 "	F-10	
11 "	R-11	foot can be sup-	11 "	F-11	
12 "	R-12	plied and in volt-	12 "	F-12	
13 "	R-13	ages from 30 to	13 "	F-13	
14 "	R-14	600 volts.	14 "	F-14	
15 "	R-15	Standard finish:	15 "	F-15	
16 "	R-16	Dark Oak.	16 "	F-16	
17 "	R-17		17 "	F-17	
18 "	R-18		18 "	F-18	
19 "	R-19		19 "	F-19	
20 "	R-20		20 "	F-20	

Watertight, Gas and Flameproof Heaters quoted on application.

J. P. ELECTRIC TUBULAR HEATERS

J.P. Bus Bar

Arrangements for Heaters in Banks

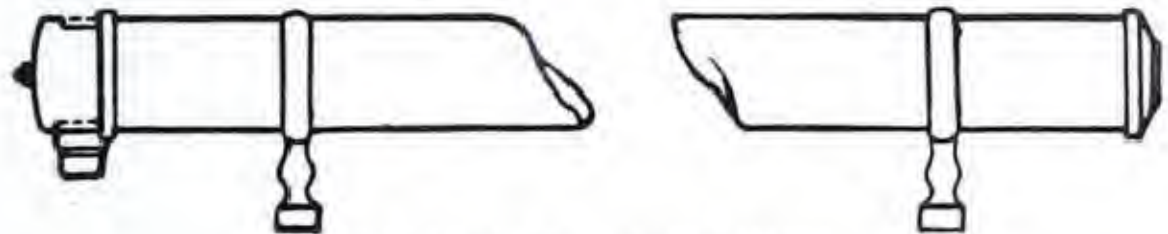


SIDE VIEW

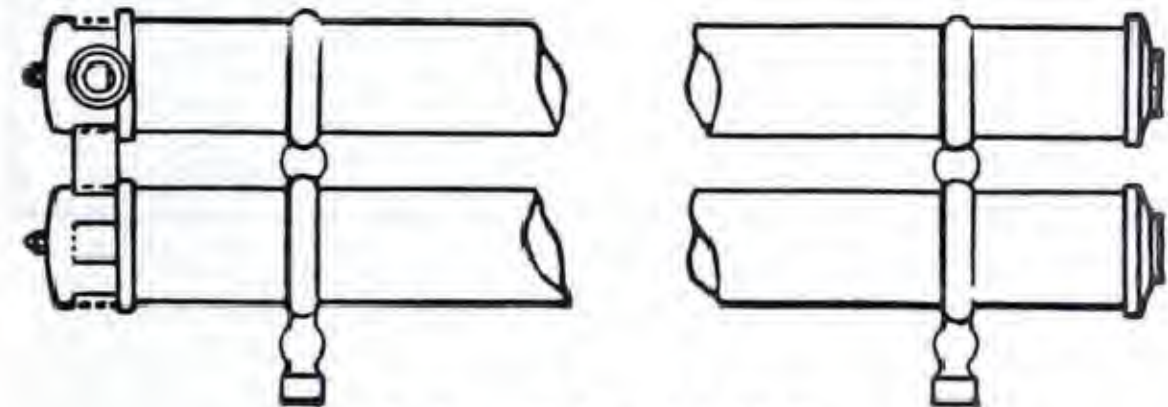
- T. Brass Ring Cap
T.1 Terminal Cover
T.2 Bakelite Insulator
- T.3 Bus Bar
T.4 Conduit Entry
T.5 Copper Bus Bars

Supporting Brackets

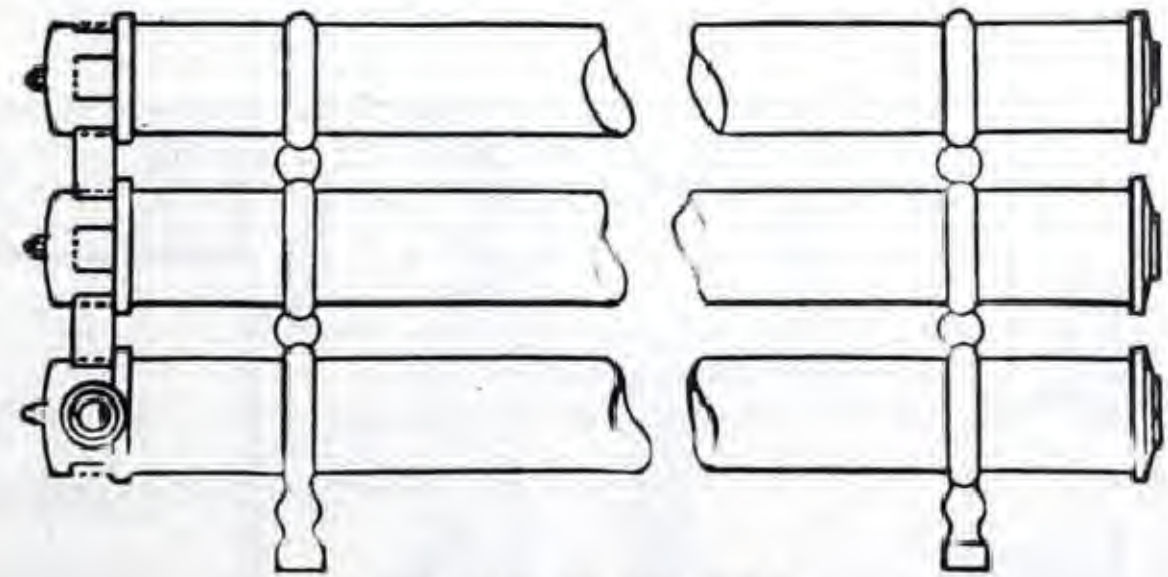
1 Way 3 Way
2 Way 4 Way



SINGLE LENGTH



DOUBLE BANK



TRIPLE BANK

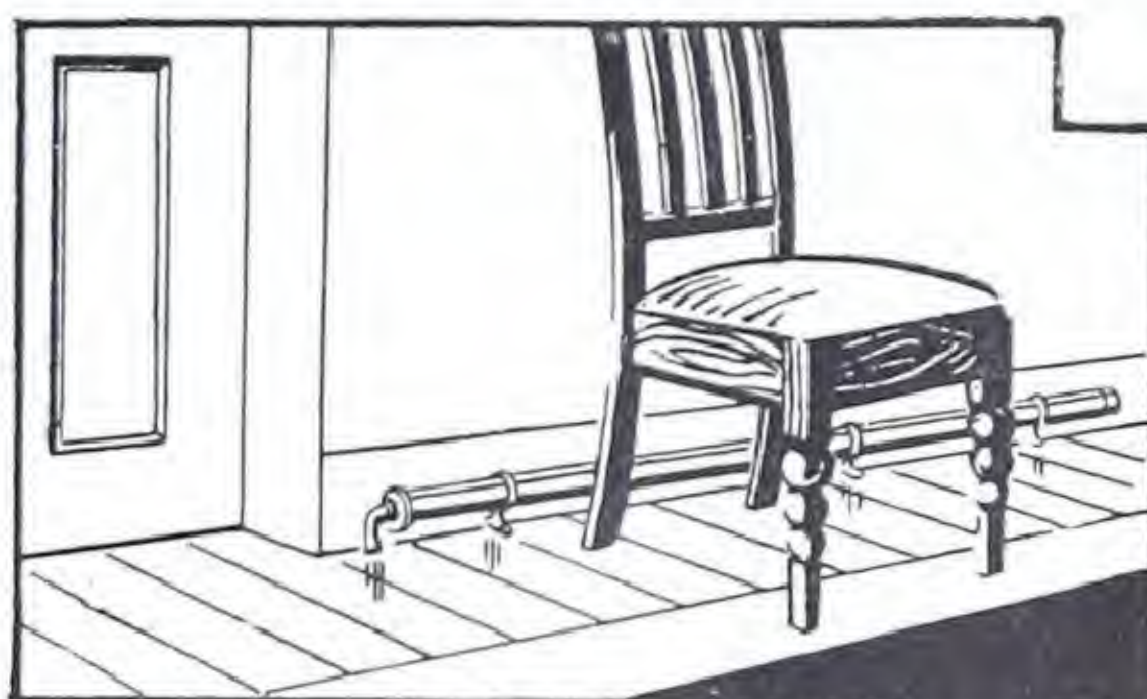
Arrangements of heaters with Floor Type brackets and Bus Bar connections with cable entries.

J. P. ELECTRIC TUBULAR HEATERS

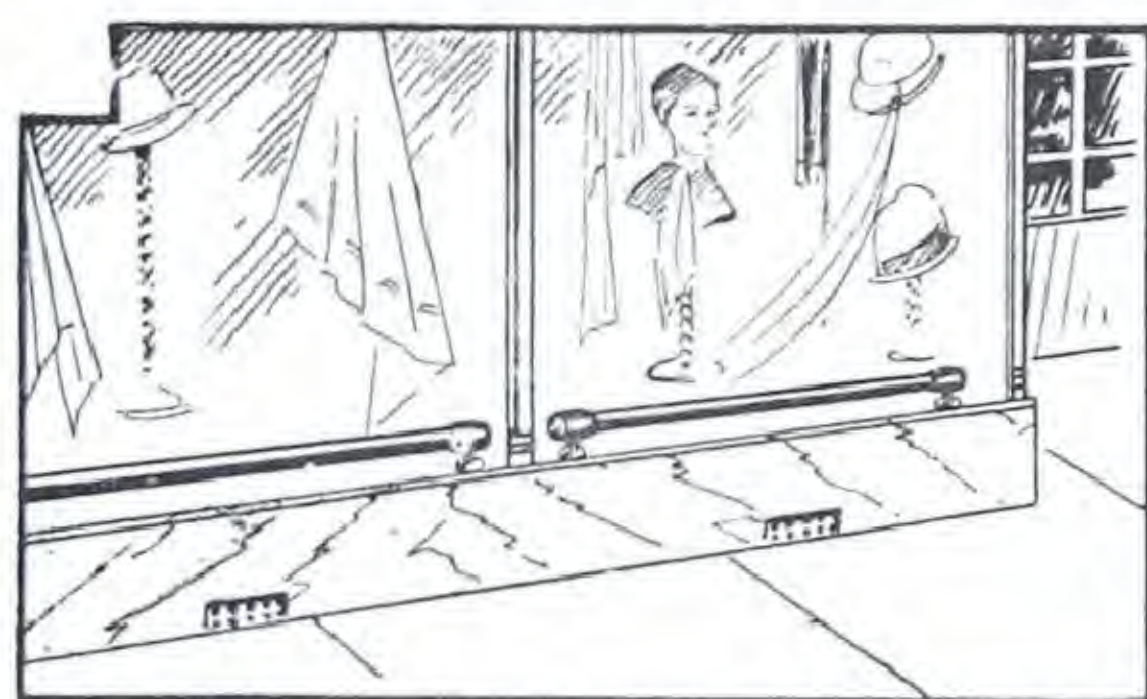
Applications



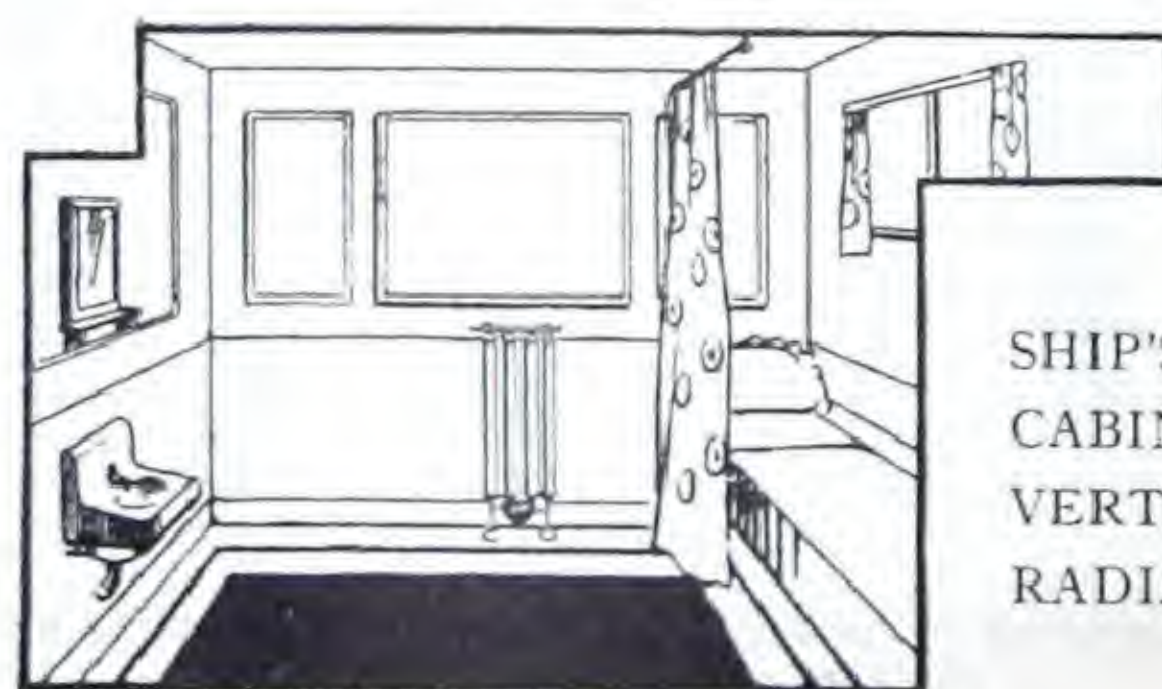
HORIZONTAL RADIATOR



STANDARD RIGID HEATER

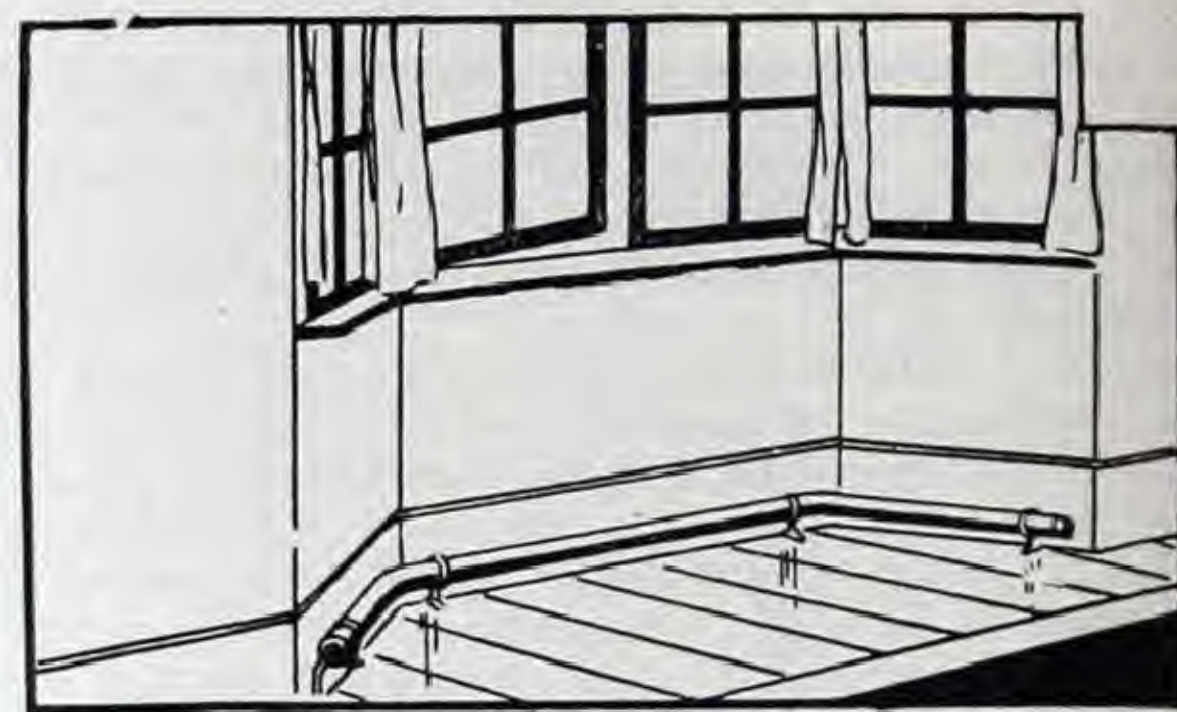


SHOW WINDOW HEATERS

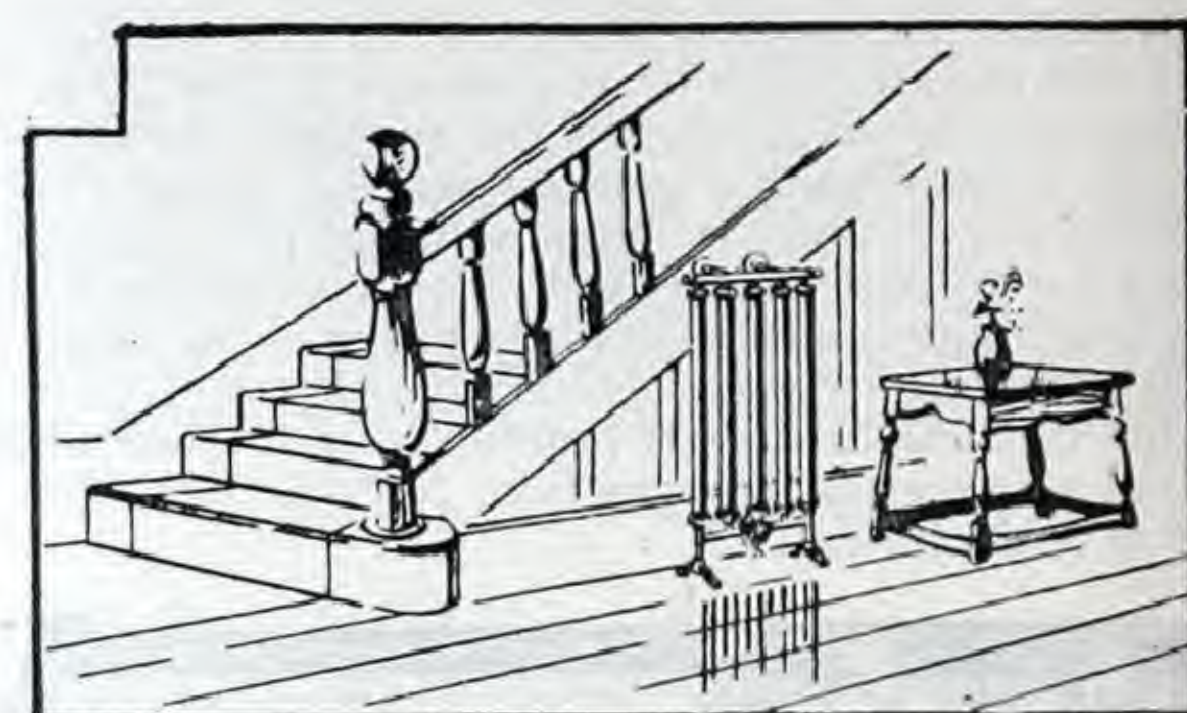
SHIP'S
CABIN
VERTICAL
RADIATOR

J. P. ELECTRIC TUBULAR HEATERS

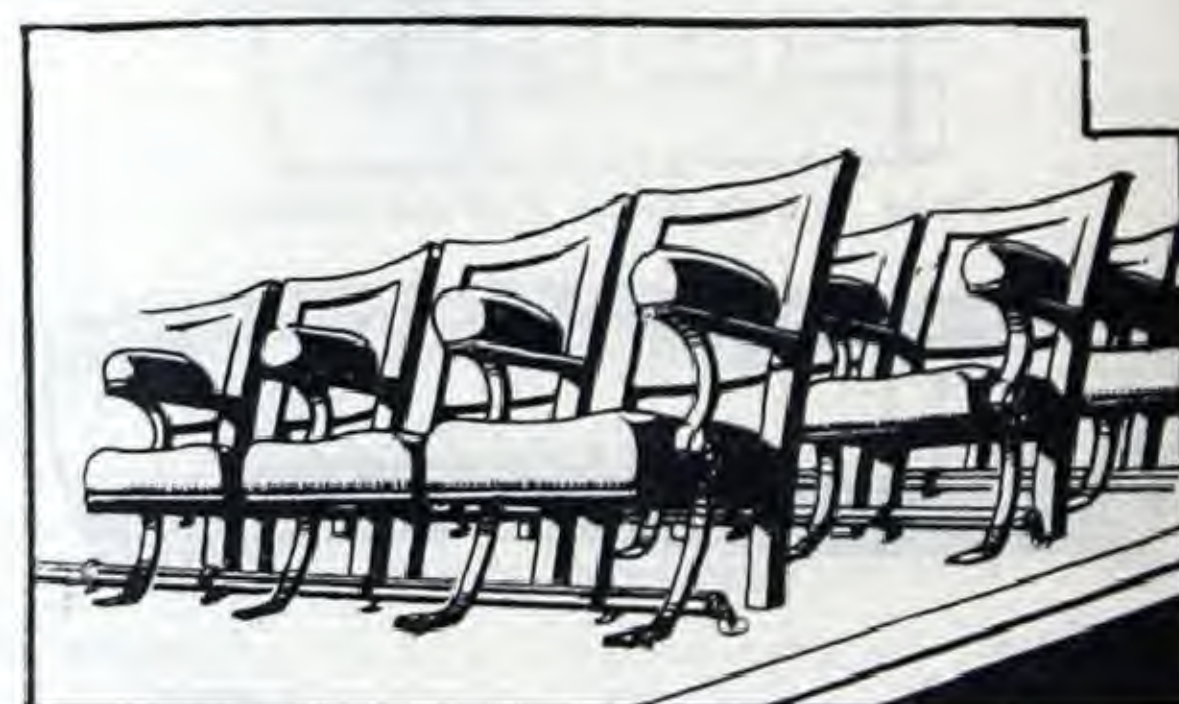
Applications



SHAPED RIGID HEATER



VERTICAL RADIATORS



THEATRE UNDERSEAT HEATER

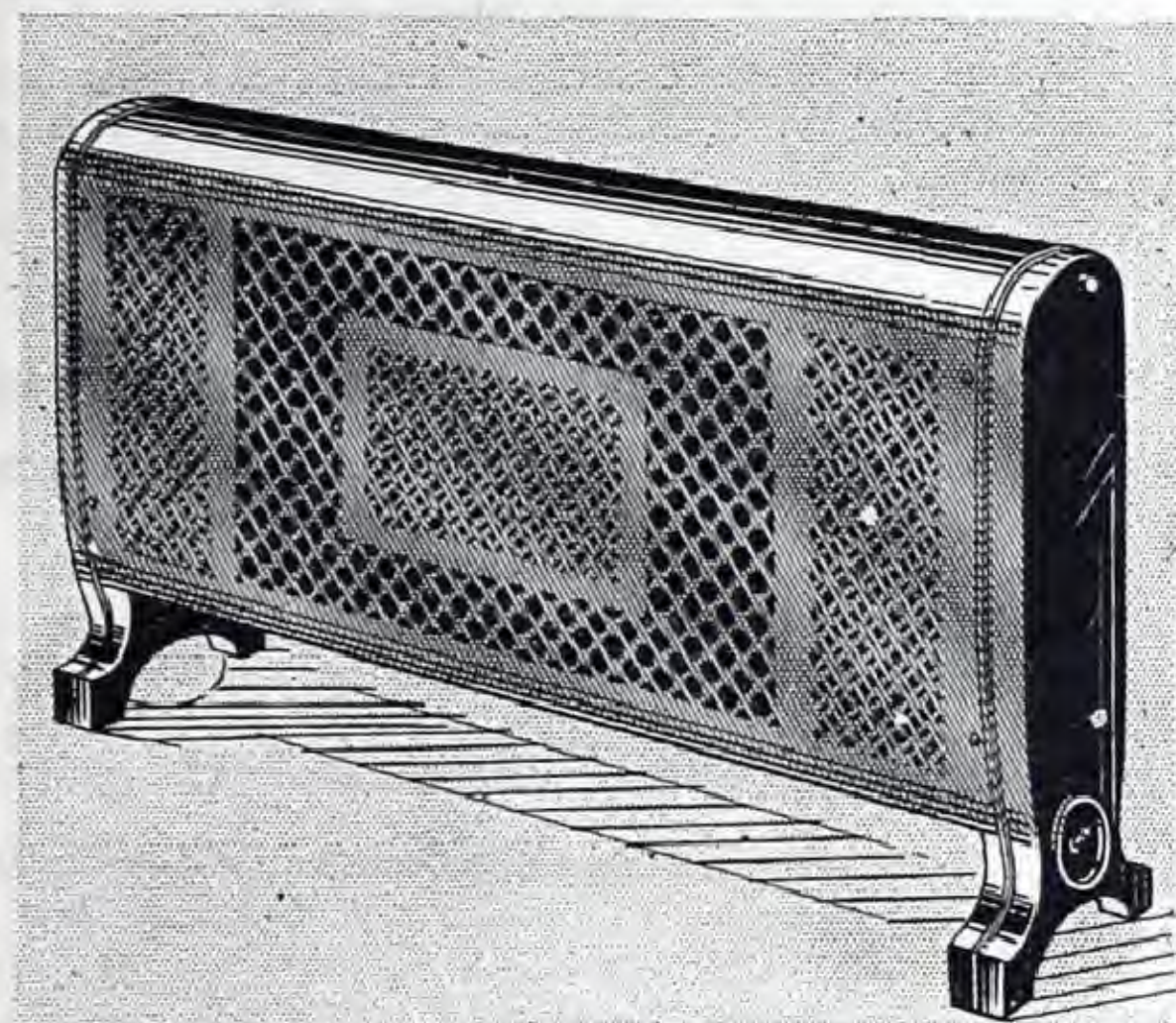
FLEXIBLE
HEATER

J. P. ELECTRIC TUBULAR HEATERS

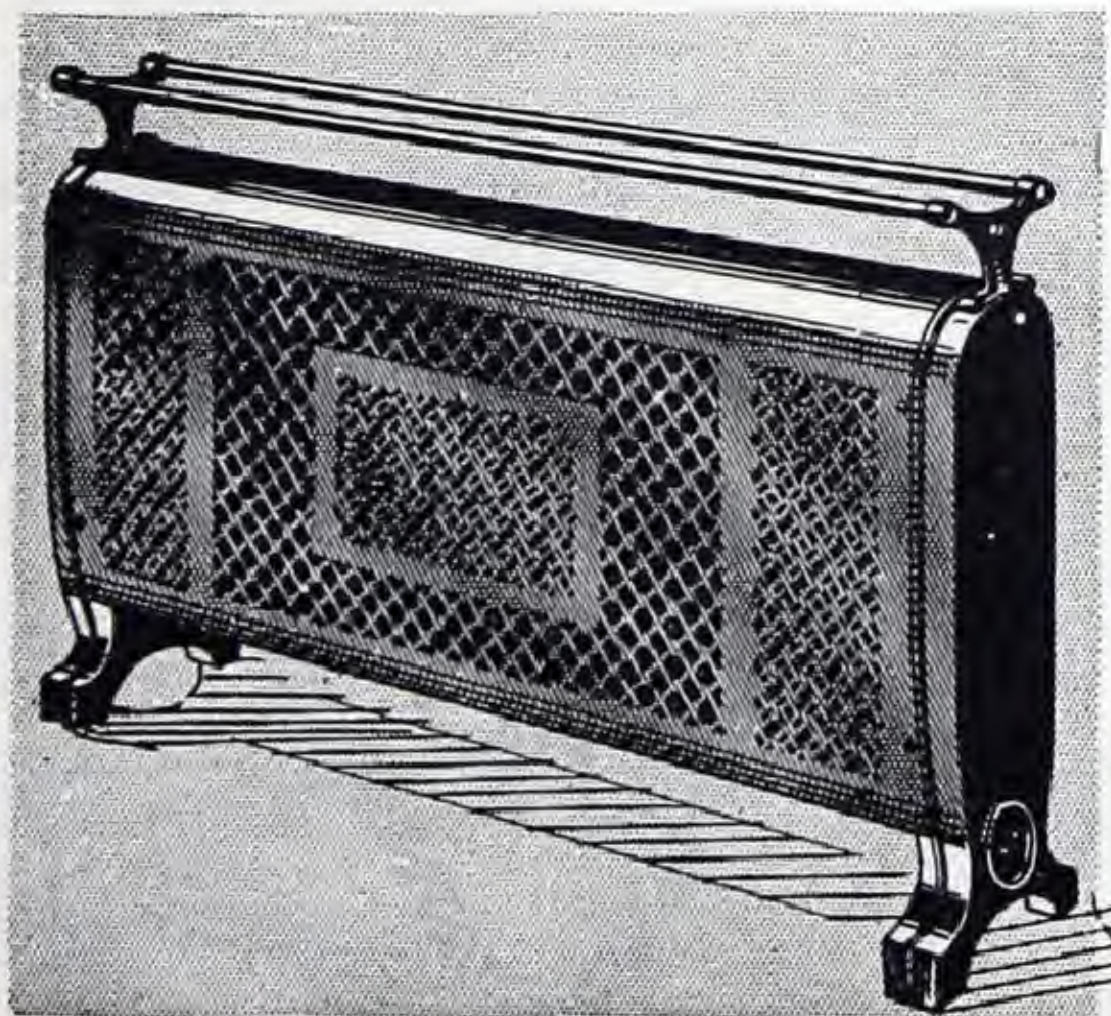
J. P. Protected Type Radiators

Electrical heating has more points of superiority than any other form of heating. We list below the outstanding features of heating by means of Tubular Heaters:

1. Furnace room, chimney, and fuel storage are eliminated.
2. No attendance required—entirely automatic.
3. Fire risk and insurance rates reduced.
4. There is no water in the system—this eliminates level problems, and freezing of pipes.
5. Electric heating is perfectly clean.
6. Individual temperature control is possible for each room or part of a building.
7. Full heating capacity is available in a few minutes.
8. An electric heating system is easily extended without affecting the original scheme.
9. Depreciation and maintenance costs are greatly reduced.
10. Working conditions in an electrically heated building are greatly improved.
11. Electric heating is particularly suited to changing weather conditions, and varying heating requirements.
12. Fuel fired systems decrease in efficiency with age, while electric systems do not.
13. Fuel prices are subject to fluctuations while the trend of electric rates is always downward.
14. Specified temperatures are actually maintained with electric heating.
15. There are many forms of electric heating, which can be applied to suit particular conditions.



J. P. Protected Type Radiator without Towel Rail Attachment



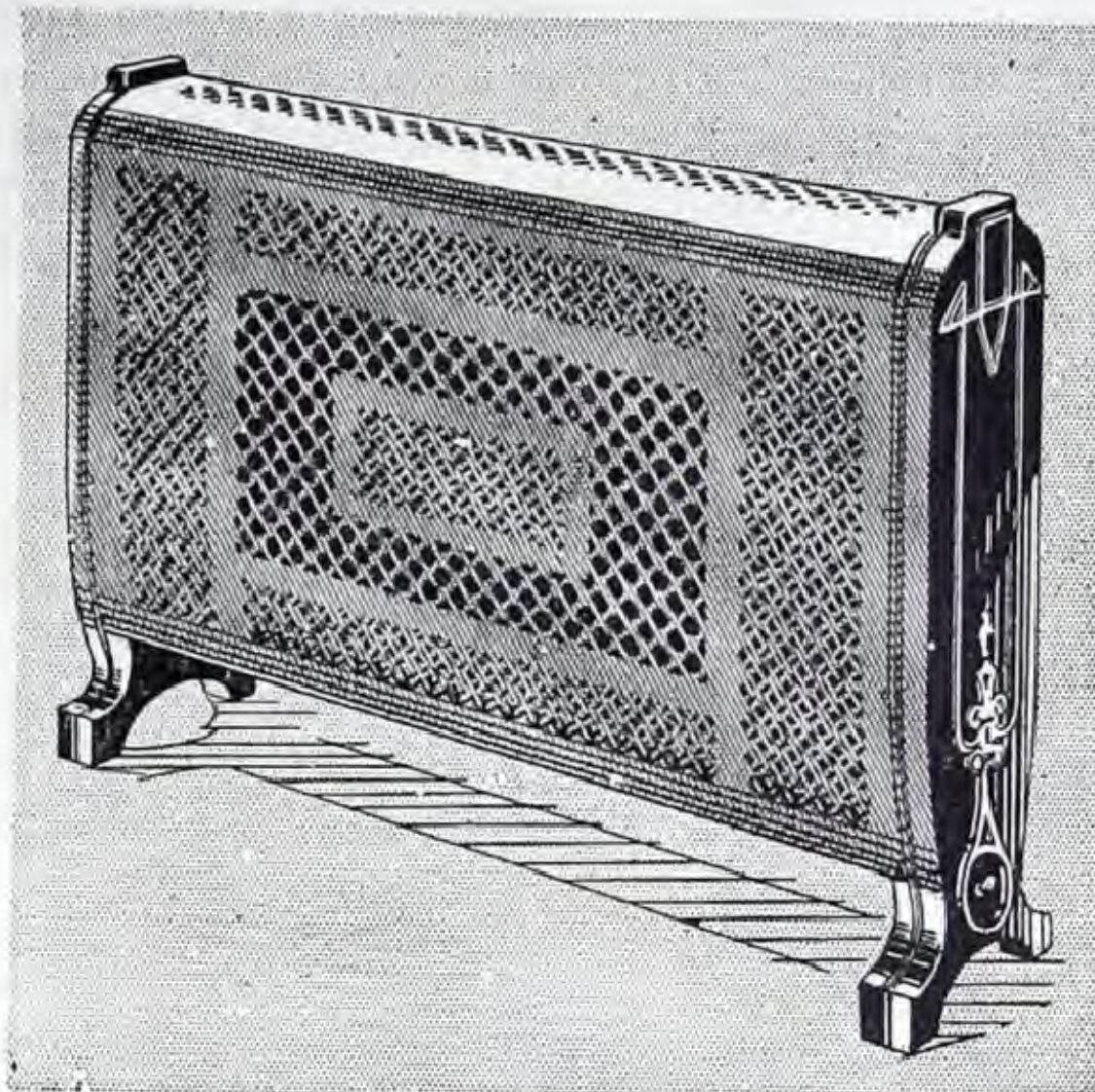
J. P. Protected Type Radiator with Towel Rail Attachment

The J. P. 1½ Protected Type Radiator, complete with Tank Switch, giving half and full heat. Length: 3 feet; height without rail: 1 ft. 9 ins.; height with rail: 2 ft. ¾ ins.; width at feet: 7 ins.; total loading: 1½ Kws.; weight without rail: 59 lbs.; weight with rail: 62½ lbs.

Prices on application. Supplied in any Standard Finish.

J. P. ELECTRIC TUBULAR HEATERS

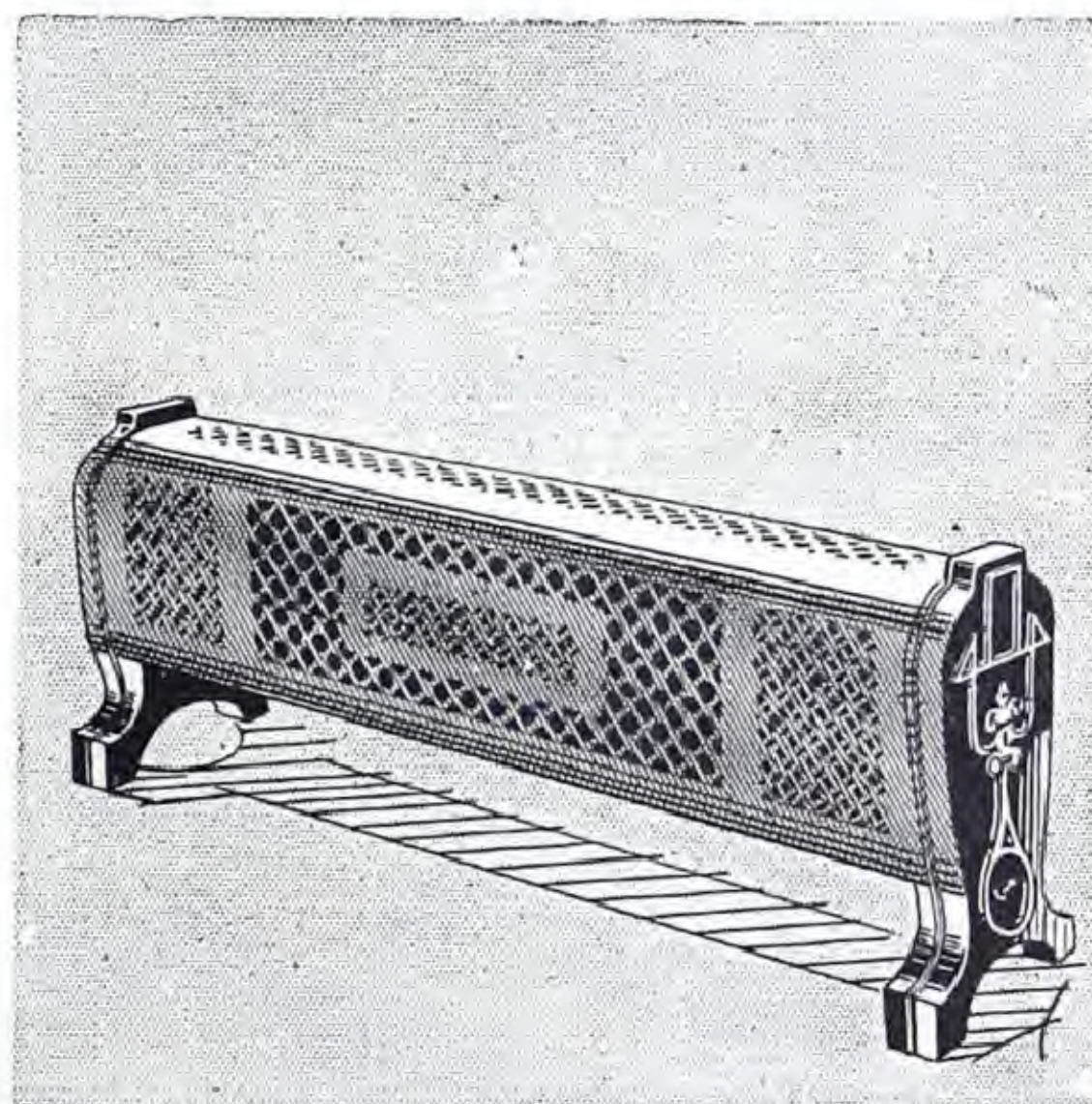
J. P. Protected Type Radiators



The J. P. 3 Kw. Protected Type Radiator

Suitable for entrances of churches, public buildings, theatres, etc., and can be accommodated in existing wall recesses replacing hot water or steam radiators.

Length, 3 feet; width over feet 9"; height, 2 ft., 1⅛". Weight 111 lbs. Total loading, 3 kws.



The J. P. 1½ Kw. Protected Type Radiator

Suitable for window recesses and similar locations. Can be supplied with flexible cable and plug for use as a portable heater with loading of 1320 watts.

Length, 3 feet; width over feet, 9"; height, 11"; weight 61½ lbs. Loading—1½ kw. to 2 kw. as required.

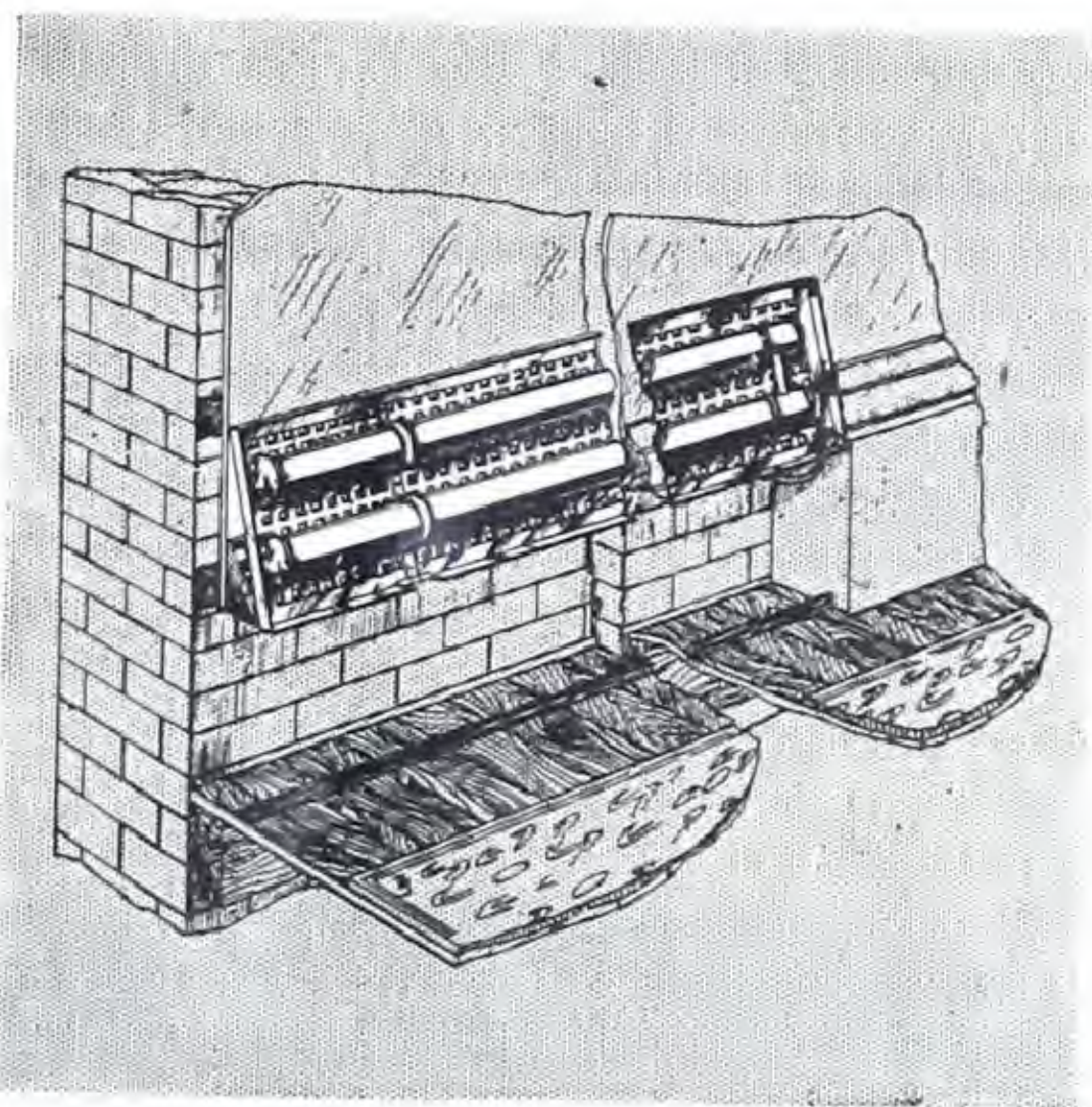
Prices on application.

J. P. ELECTRIC TUBULAR HEATERS

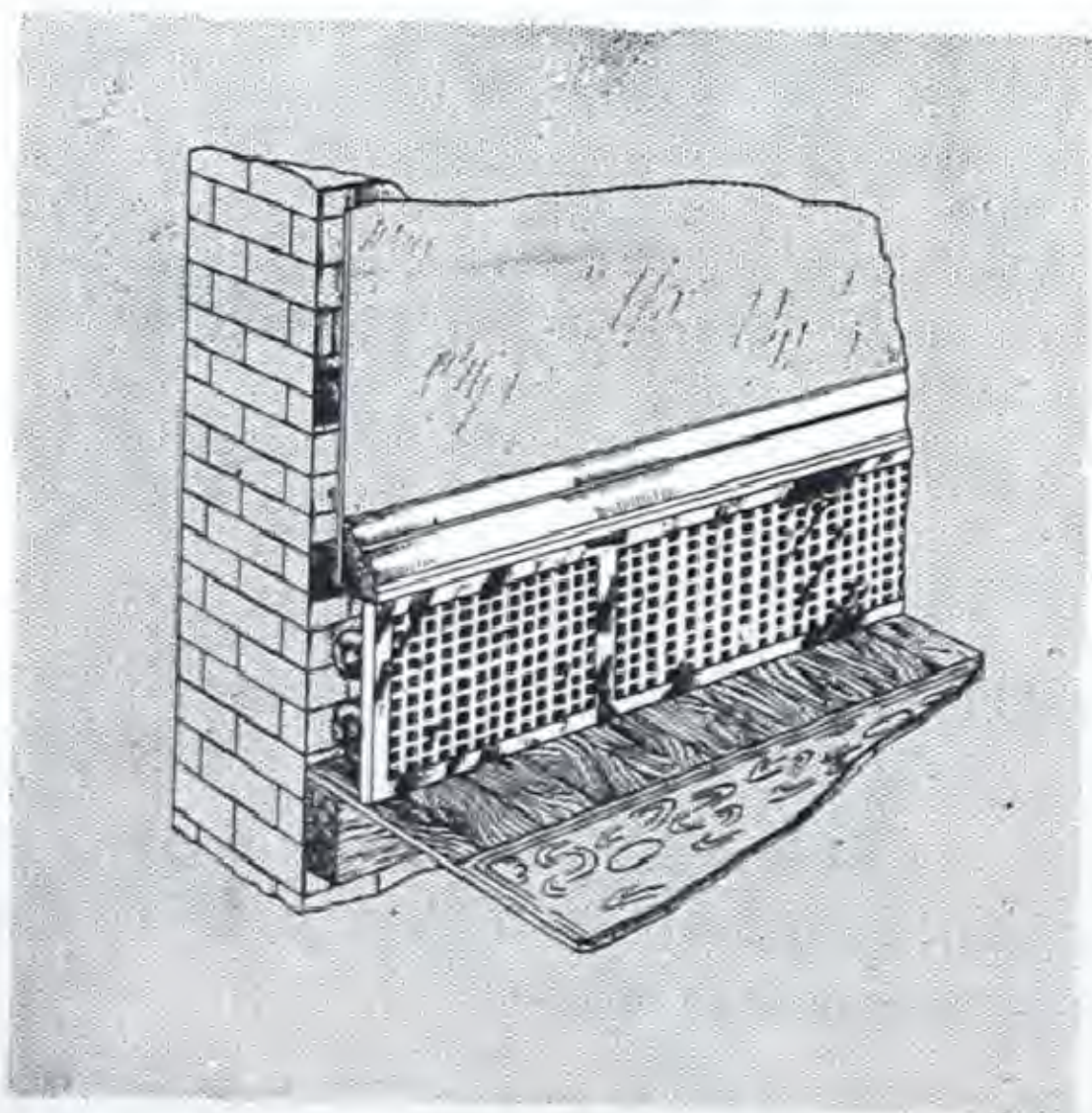
J. P. Concealed Electric Heater

This Heater is designed to enable High Loading Tubes to be used without risk of burns, with a view to providing economy in floor space, and neat arrangement of Heater Units. The Heater comprises two Heating Tubes of suitable Loading fixed direct to a hinged grill covering the face of a recess as shown. Heaters are so arranged that for cleaning purposes both Heaters and Grill can be swung open, leaving the recess entirely clear for sweeping. This arrangement can be provided either with or without Automatic Cut-out to isolate the Heater when opened, a permanent electric connection being provided at all times. The Grill Cover can be supplied in any metal finish or painted any standard colour to harmonize with surrounding decoration. With this arrangement fresh air inlets can be made behind the grill and the air could pass over the tubes and warm on its entry into the room.

Price on application.



Open view
Concealed Electric Heater



Closed view
Concealed Electric Heater

J. P. ELECTRIC TUBULAR HEATERS

Heater Control Thermostat



The "ACM-R" Thermostat is a Single Pole Contract Switch fitted with magnetic blow-out. It has a snap make-and-break magnetic action, and is suitable for use on Alternating Current up to 20 amps. at 250 volts 25/60 cycles, or on Direct Current up to .1 amp. at 250 volts. The dial is graduated 40°F./80°F.

The working limits are plus or minus 1/2°F.

Other ranges on application.

"ACM-R" Pattern

"ACM-R" Thermostats for use on 500 volts can be supplied to control half their Standard Rating at an extra cost.

Advantages

1. Snap make-and-break magnetic section
2. All-metal mechanism, and therefore not liable to damage during transit
3. Can be used at any angle
4. Small space required
5. Dust-proof

For controlling larger capacities than 20 amps. enclose Contactor Switches can be supplied; particulars, prices and sizes on application.



TUBULAR HEATERS

SAFE — CLEAN — RELIABLE
ELECTRIC HEATING
EQUIPMENT

HEWITTIC RECTIFIERS

The need for converting equipment is increasing every day. Alternating current is being used more and more for distribution purposes, whilst at the same time the need for electrical energy in the form of direct current is continuously growing. Merely to cite some of the purposes for which Rectifiers are more generally employed, viz.: charging of batteries, the operating of automatic lifts, the feeding of theatre arcs, the feeding of D.C. motors as frequently employed in some factories specially where speed regulation is of importance, will at once give the reader evidence of this fact.

As the demand for converting plant has increased, in just the same way the manufacture and design of the Rectifier has developed to meet it; and Rectifiers are now being used throughout the country for all purposes wherever it is desirable to convert A.C. to D.C.

For rectification is indeed the obvious means of conversion, in fact, the Rectifier merely does directly and in one step what it sets out to do. Its method is indeed an exact interpretation of the object in view. From alternating current is desired to convert into uni-directional current, probably so at a different voltage. The alternating current is stepped down through a transformer, and passed through a one-way valve (the Rectifier Bulb) whence it issues in the continuous form required. Nothing could be simpler than this way of achieving the object in question and consequently no other converting equipment can approach the Rectifier in simplicity of principle, construction, operation and control.

The demand for direct current, as it will be at once realized, varies very considerably according to various requirements—the matter of quantity, in the matter of voltage, in the matter of voltage regulation, etc., making Rectifiers of particular value as they can be made in efficient and economic units, whether from the point of view of initial outlay, maintenance and running costs, in small or large capacities.

Rectifiers have been in use extensively now for over twenty years, during which time enormous developments have taken place. From being used for only comparatively small capacities, in fact, up to only about 40 amperes, as was the case for a good many years, they are now being used for capacities totalling hundreds and thousands of kilowatts for feeding D.C. systems, in factories and on public supply.

Alongside this development towards larger and larger sets, the Hewittic Company has also worked towards developing the Rectifier at a cheap figure for smaller and smaller capacities to meet the growing demand for quite small sets, and in the following pages it is proposed to deal with the more general type of Rectifiers as now manufactured.

GENERAL ADVANTAGES OF THE HEWITTIC RECTIFIER FOR CONVERTING PURPOSES

STATIC

The Rectifier is a stationary piece of apparatus just like a transformer; in fact, a transformer and coils of a similar nature make up the large proportion of a Rectifier equipment, the remainder consisting of the Rectifier Bulb which acts as a valve. The Rectifier is, therefore, almost like a transformer with regard to its operation, and demands little, if any, more care.

This absence of moving parts is at the root of most of the advantages which the Rectifier offers as compared with other types of converters.

SIMPLICITY OF CONSTRUCTION

There is nothing complicated in the construction of the Rectifier any more than in its method of functioning. Rectifiers are built in compact cubicles containing all the operating and protective control gear as well as the rectifying equipment proper, so that they form completely self-contained units. Every part of the gear is easily accessible. The various connections are easily followed.

HEWITTIC RECTIFIERS

SIMPLICITY OF CONTROL

Equally simple is the control of the Rectifier. In the majority of cases automatic starting is provided so that to put the Rectifier equipment into operation necessitates merely the closing of the main switch controlling the incoming supply. Even in the cases when, for the sake of cutting down the initial cost, hand tilting is provided, the starting of the Rectifier entails merely the closing of a switch and rocking of the bulb by means of a hand wheel provided for the purpose.

NO SKILLED ATTENDANCE

Anyone becomes at once conversant with the method of operation of the Rectifier, and there is no need, therefore, for any skilled attendance in connection with it.

MINIMUM OF ATTENDANCE

Not only is no skilled attendance required for Rectifiers, but a very minimum of attendance of any sort is at all necessary. In most cases, in fact, the only human control necessary is to close and open the switch to start or stop the Rectifier respectively at the beginning or end of its operating period; and for the rest of the time no notice need be taken of it.

In some cases, as for instance in automatic lift installations, not even this amount of attention need be necessary: for, as explained in the separate section concerning these, they are often fitted with an automatic switch controlling the incoming supply controlled by on-and-off push buttons from the various landing stages.

Again Rectifiers can be arranged when desired so that they start and stop automatically when the D.C. load is closed, by means of an interlock in the control gear of the latter. Attendance is thus entirely eliminated and only a very minimum of inspection is demanded.

INHERENTLY AUTOMATIC

As stated above, the need for attendance can be cut down completely with a Rectifier equipment—even for starting and stopping. In this connection it is of interest to note that, owing to the fact that the Rectifier is itself inherently automatic, the control gear necessary to make it function entirely automatically in accordance with any definite requirements is of the simplest kind, due to the nature of the simple function which it has to achieve. It is, therefore, definite in character and correspondingly reliable, and further, is quite inexpensive.

FLEXIBILITY

Alternating current scores heavily over direct current owing to its flexibility. But Rectifiers enable one to achieve just as high a degree of flexibility with direct current as is possible with alternating current, so that the user can enjoy the advantages of both. With the Rectifier one regulates the D.C. voltage by regulating on the A.C. supply, and can, therefore, obtain any desired range of voltage regulation as economically and as effectively as with alternating current.

RELIABILITY

The plant, being static and extremely simple in its details and method of functioning, is inherently highly reliable; being almost trouble-proof under normal circumstances and being fitted with all the necessary protection against abnormal contingencies.

EFFICIENCY

The efficiency of the Rectifier is high both in small and large sets. It remains high at low loads just as at high loads; in fact, there is seldom more than three to four per cent between the full load and quarter load value. A high overall efficiency is therefore obtained with highly fluctuating loads: whilst here, again, the Rectifier once more scores as, being static, it is not at all affected by sudden variations of load.

UNIT CONSTRUCTION

As stated above, with Rectifiers a high efficiency is maintained in small sets as well as in large ones, so that small Rectifier units prove economical from a running point of view. They are also quite economical from the initial cost point of view. Rectifiers are, therefore, particularly suitable for installing to deal with existing requirements likely to grow: as further units can be progressively added to meet increasing demands without detriment to the overall efficiency of the complete plant when made up of a number of components.

HEWITTIC RECTIFIERS

CHANGE OF PERIODICITY

Hewittic Rectifiers are generally built to conform with frequency of the system on which they are to operate. Rectifier equipments, designed for a particular frequency will operate equally well on any higher periodicity, only minor adjustments being required on the change over, and full utility of the plant being retained on the new supply.

Generally, Hewittic Rectifiers for operating on supplies above 60 cycles are designed for the standard frequency. If Rectifier is arranged for a twenty-five cycle supply then, of course, it will operate on 60 should the supply be changed over.

NATURE OF SUPPLY

In some cases not only is the periodicity of the supply liable to be changed, but also the supplies are changed from single to 3-phase. In such cases, if the Rectifiers are of small capacity, they can be retained in their original single-phase form, operating across phases or between phase and neutral of the new 3-phase supply.

Where the capacity is too large to allow this, if the change is envisaged in the first place, the Rectifier can be designed suitable to operate as a single phase and again as a 3-phase

unit later, only very minor modifications being necessary on the change over.

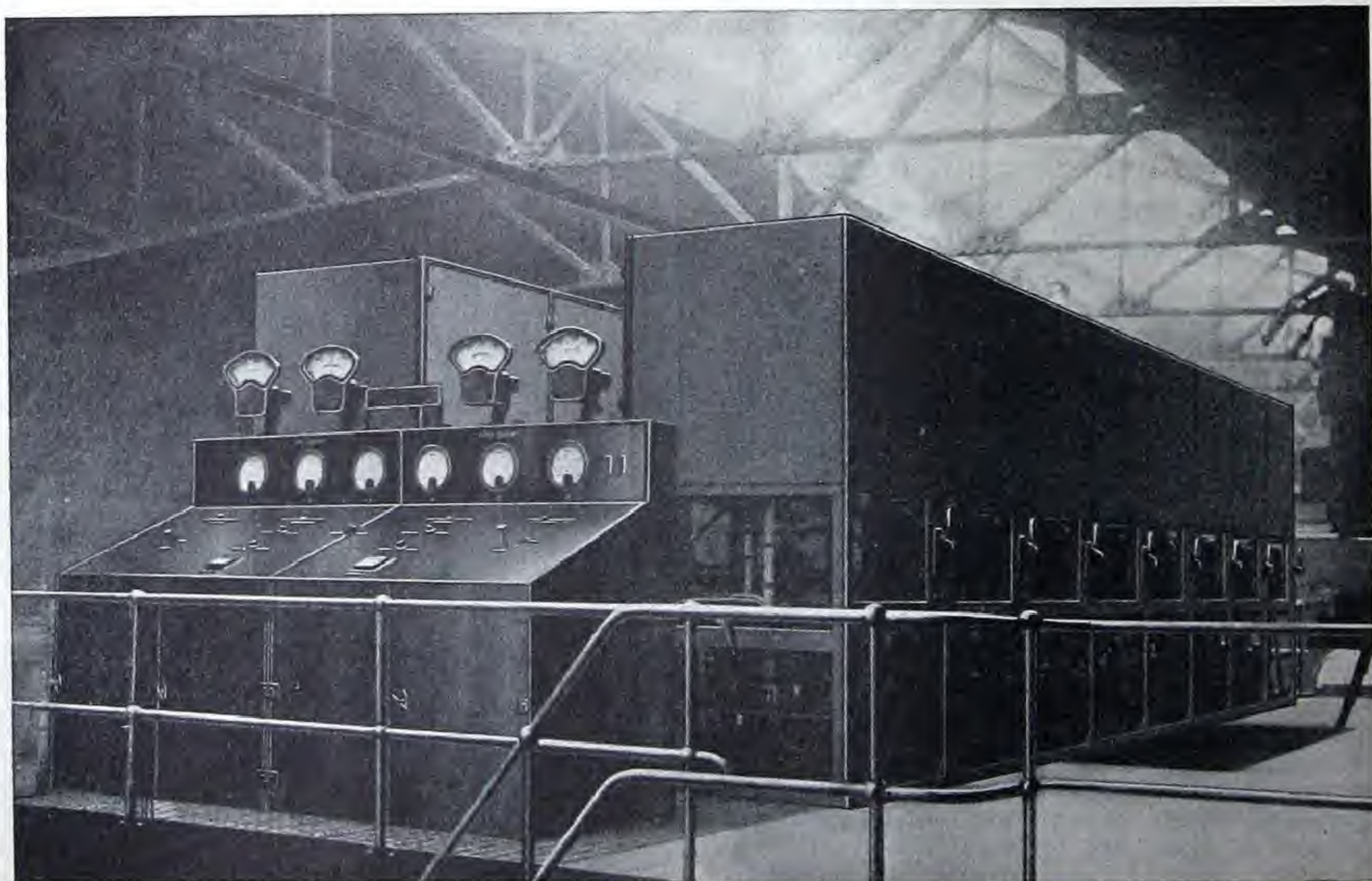
SILENCE

Noise is often a very serious consideration when determining where to install a Converter; and here again the Hewittic Rectifier shows to considerable advantage as, being static it is free from the objectionable note obtained from moving machinery.

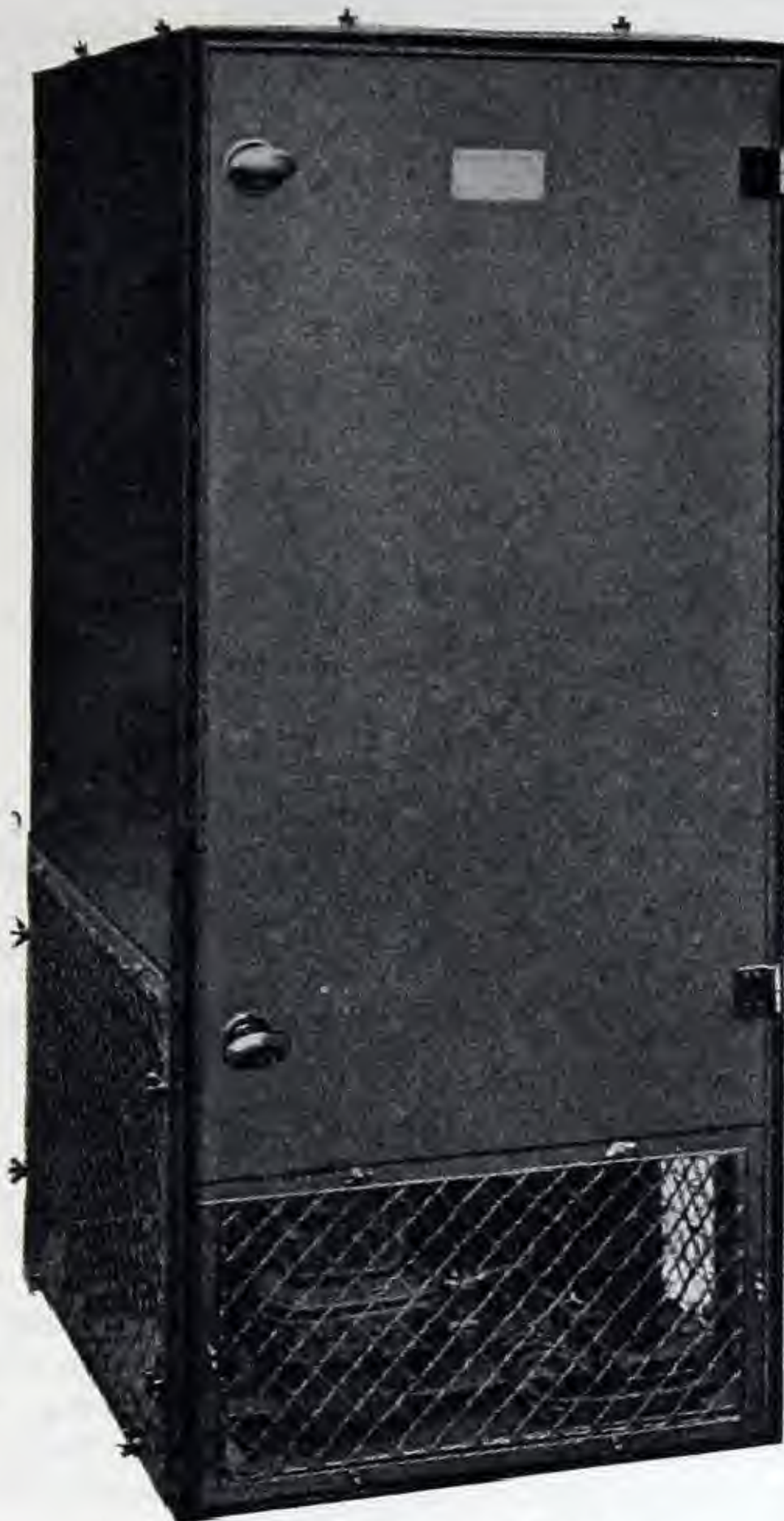
FOUNDATIONS

Rectifiers require no special foundations. They are built in comparatively light and compact sheet steel cubicles which can be laid directly on the floor. In the case of large capacities, where the transformer is mounted separately the latter is mounted on rollers. The equipments can therefore be installed in any convenient place without the necessity for any heavy lifting tackle. Some of the smaller sets as used for charging batteries, operating magnets, etc. can actually be placed on a table or shelf.

The above are the chief advantages which the Rectifier presents generally as a Converter, but according as it is considered from particular points of view, further advantages arise which make it particularly adaptable for certain requirements.



HEWITTIC RECTIFIERS For Elevator Installations



Typical Elevator Rectifier
(Closed)

One of the most general uses for the small type of Rectifier is in automatic elevator installations. In this connection it is probably true to say that the Rectifier offers the only type of converting equipment suitable, and the choice lies only between the use of a Rectifier and D.C. motor and control gear or alternatively A.C. gear throughout.

ADVANTAGES

Its silent operation is an important requisite in most elevator installations, the use of Rectifiers in those places where only A.C. supply is available has become almost general. The use of the Rectifier also avoids the high starting current of D.C. motors. Moreover, it enables standard elevator gear to be employed on all supplies, D.C. and A.C., the Rectifier simply being added in the latter case.

CONSTRUCTION

Rectifiers for this work are mounted in totally enclosed sheet steel and wire mesh cubicles, as shown in the accompanying illustration, the transformer, Rectifier coils, A.C. and D.C. switchgear being all mounted within it. The cabinet is always fitted with an automatic starting device, so that all that is necessary to operate the Rectifier is to make it start.

OPERATION

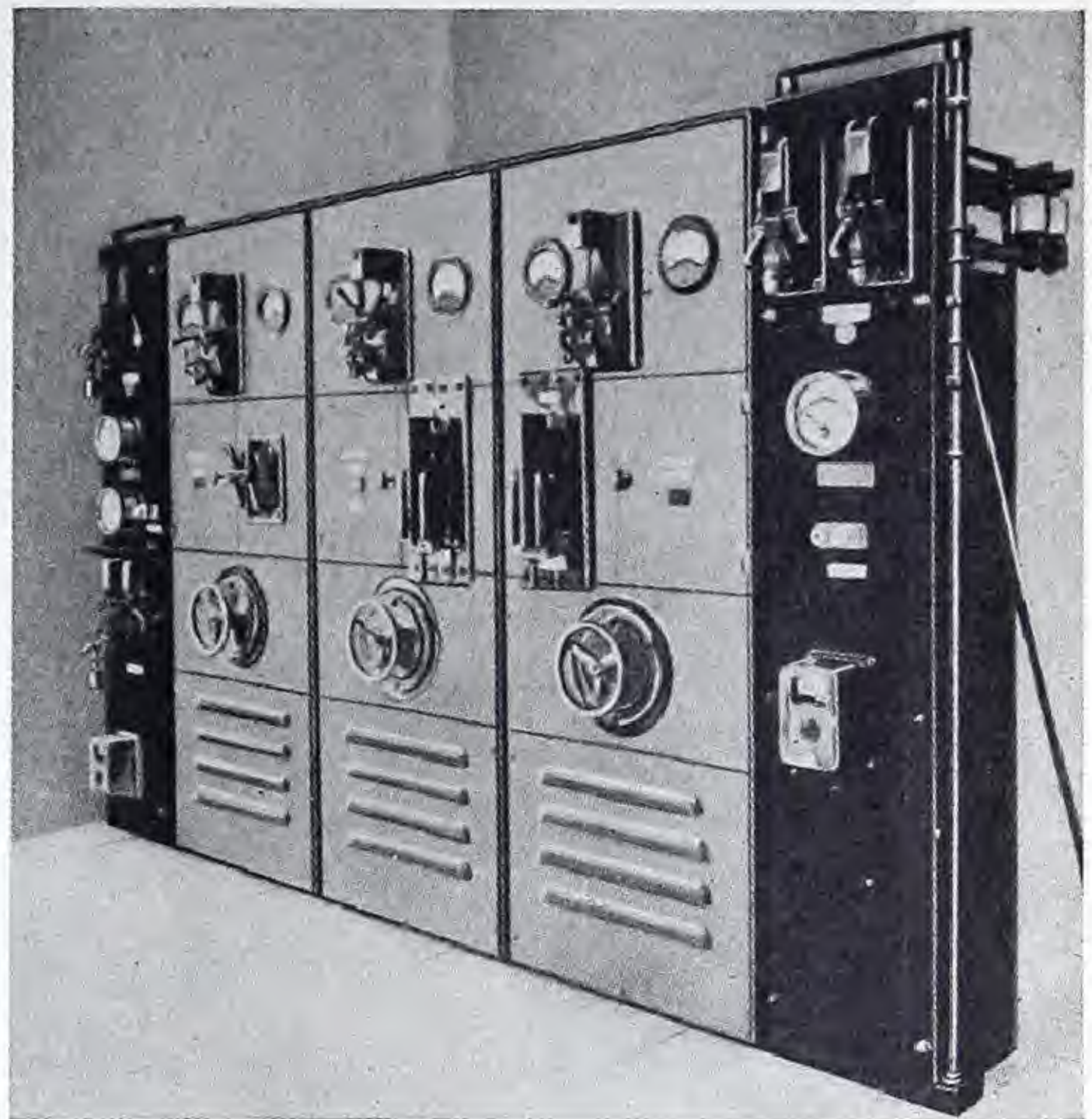
A switch-fuse is provided on the incoming side, and if this is closed the Rectifier will strike up and operate, maintaining at no load on its exciter circuit, and dealing with whatever load is switched on. This is the method generally adopted in case of elevator installations in fairly frequent use, specially as the no-load losses on the Rectifier are low.

STARTING CURRENT

The Rectifiers are rated for the requisite continuous output, and are suitable to withstand 100 per cent momentary overloads as required to cope with the starting current of the motor or motors.

HEWITTIC RECTIFIERS

For Cranes, Hoists, Railway Signals, etc.



Rectifier Substation Feeding Cranes and Railway Signals

The most casual consideration of the general operating conditions of hoists, cranes, etc., at once points to the eminent suitability of Rectifiers for this particular type of work.

The load is of an exceptional fluctuating nature—the load factor is generally extremely low. With its characteristic almost flat efficiency curve, coupled with the fact that the equipment is static and therefore is entirely unaffected by sudden load fluctuations from zero right up to well over normal full load: the Rectifier answers the stringent requirements of this particular type of work in a way that no other converting plant can approach.

Further, not only does the load vary, but often for long periods there is no load at all on the converter feeding such an equipment. It is therefore of importance that the no-load losses of the converting plant should be as low as possible, and this is again the case with Rectifiers.

What is more, the Rectifier can be controlled from any particular point with a minimum amount of extra gear, and with a maximum of simplicity, and it responds to such control almost instantaneously. It can therefore be arranged to be switched on and off to operate only just as and when it is required.

The start and stop push buttons themselves can in fact be replaced by interlocks on the operating mechanism of the cranes.

The equipments for this type of work are not in any way special, being similar to the elevator Rectifiers for small sizes and to the industrial Rectifiers for larger sizes. It is, however, often considered advisable for this type of work to add an auto-reclose circuit breaker controlling the D.C. output which opens on faults or abnormal overload conditions and recloses automatically as soon as normal conditions are restored.

HEWITTIC RECTIFIERS For Battery Charging



Typical battery charging rectifier.

The charging of batteries was one of the first functions for which the Hewittic Rectifier was used; and there is no doubt that the Rectifier shows to very great advantage in this particular field.

ADVANTAGES IN CONSTRUCTION

Quite apart from its general characteristic as compared with other types of converters, such as that it takes less space, has less weight, is noiseless and free from vibration, claims little or no attention, needs no foundations nor requires any lubrication, the Rectifier still shows further advantages from the point of view of performance.

CHARGING METHODS

The more usual methods employed for charging batteries are:—

The constant current charge which, as its name implies, is effected at a steady current rate (the intensity depending on the types of cell) and is continued at that rate until the pressure has risen to a definite value (2.3 volts per element in the case of a lead battery), after which the current is reduced to the "finishing" rate and kept at that figure until the completion of the charge.

The constant potential charge which is effected by feeding the battery at a definite D.C. pressure (not greater than 2.3 volts per element in the case of lead cells): maintaining the pressure at that value until the current has fallen to the finishing rate of charge. The current may then be maintained constant at this latter value until the charge is completed.

This method lends itself also to the rapid partial re-charge known as a boosting charge, of use, for instance, in the case of vehicle batteries which by receiving a short supplementary charge, say, during the dinner hour, will enable the vehicle to accomplish a much longer run than would otherwise be possible.

In the case of lead accumulators charged on the above lines, another method of charge is also required about once a week, the equalizing charge, which consists in charging the battery at a very low current until the specific gravity and voltage of a cell chosen as a pilot cell has remained constant for four successive hourly readings.

HEWITTIC RECTIFIERS For Battery Charging

ADVANTAGES IN PERFORMANCE

All the foregoing methods of charge can be realized with Rectifier exactly as with other types of plant, and even in these the performance of the Rectifier will show to considerable advantage: for its over-all efficiency is generally higher, and as also the Rectifier D.C. pressure can be regulated by means of an induction regulator or by means of tapping on the transformer, in this manner one has the advantage of never wasting any energy in ohmic resistance.

ADVANTAGES IN OPERATION

However, a still greater advantage accrues from the fact that with Rectifiers, the charging of batteries can be accomplished entirely automatically. This, as will at once be realized, is a point of the greatest import; as, for instance, in garages where the charge has to be effected in the evening or night, it allows the suppression of otherwise expensive labour.

AUTOMATIC CHARGE FOR ALL CHARACTERISTICS

The various makes of batteries require different charging characteristics, but the Rectifier can be arranged to follow automatically the various instructions of the different manufacturers.

One method of automatic charge is obtained with Rectifier as follows:—

The Rectifier is designed to give a large drop in voltage from no-load to full load by the addition of inductance coils in the anode circuits. These are so designed that one or two minutes after the commencement of the charge, with a e.m.f. per cell of say, approximately 2.1 volts per element in the case of lead batteries, the maximum charging current is reached. The Rectifier voltage increases as the current falls to the extent of this current decrease depending on the inclination from the horizontal of the falling characteristic of the Rectifier or, in other words, on the amount of its inherent regulation.

The Rectifier can be designed for any required value in this respect to suit the requirements of any particular battery and further, if desired, by means of tapings on the anode inductances, the same Rectifier can be designed to operate with various characteristics.

Arranged with such a voltage characteristic the Rectifier will charge a battery automatically, a time switch or current relay cutting the Rectifier out of operation when the charge is completed.

In some cases a different charging schedule is desired. For instance, with some batteries the charging of the battery is due to take place up to, say, 2.4 volts per element at practically full current strength, and then the charging current is reduced to one-third of the normal value.

In such cases the desired sequence is achieved by means of a booster choke-coil which is automatically inserted in circuit by means of a clapper switch, controlled by a pressure relay or time switch, according to the charging instructions. The Rectifier is finally shut down completely when the charge is completed as indicated by a time switch, an ampere-hour or watt-hour meter.

CONSTRUCTION

In common with all Rectifiers, battery charging sets are provided with all the necessary operating and protective switch-gear on the A.C. and D.C. sides. On the very smallest sets fuses are used instead of circuit breakers on the D.C. side.

Instruments of a moving coil type are generally all mounted on the Rectifier panel.

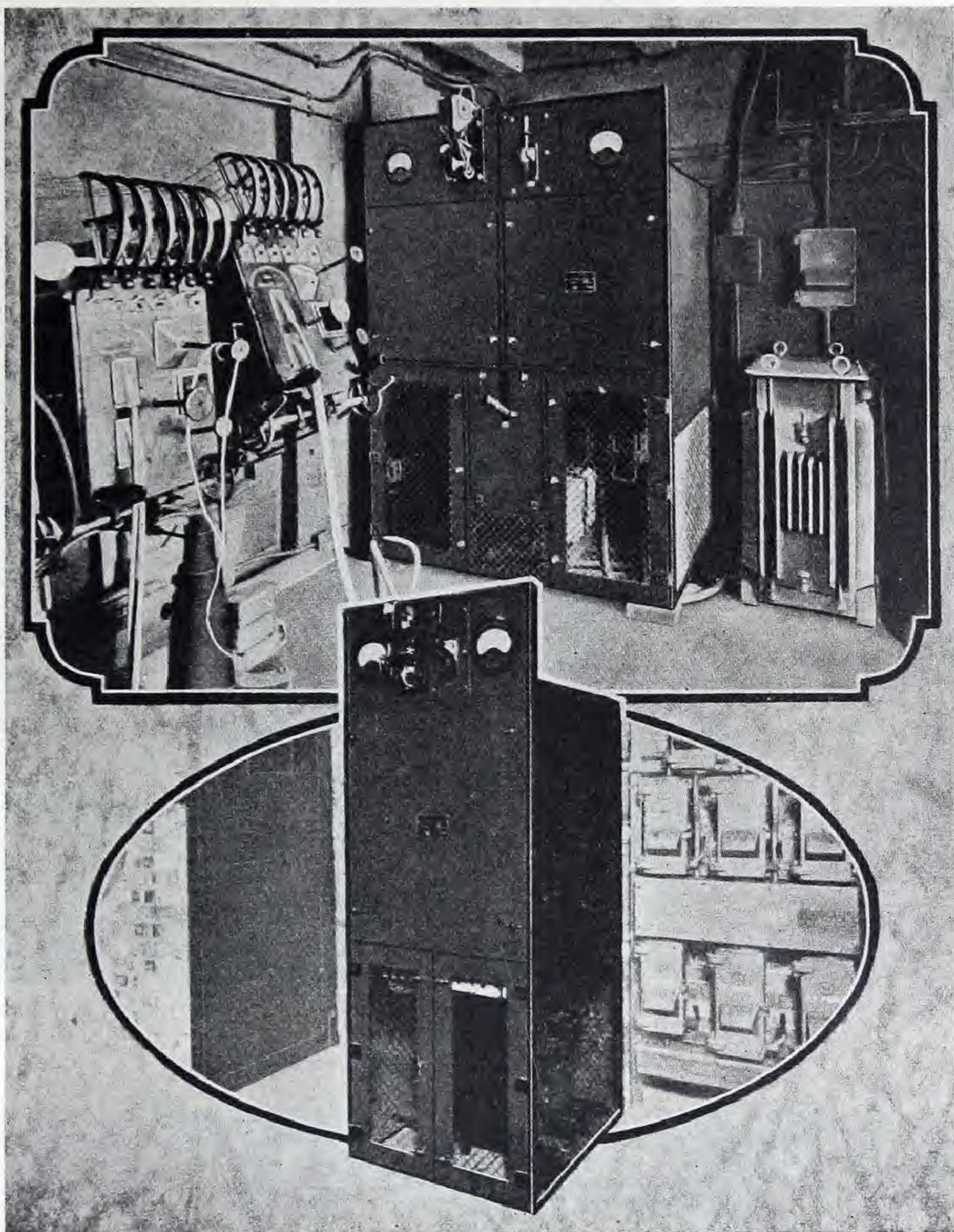
Voltage regulation is obtained by regulating the A.C. pressure into the bulb.

When the capacity of the equipment is large, say above 40 amperes, an induction regulator would be used.

Below this, regulation is obtained by taps on the transformer feeding the bulb controlled by regulator switches either of the drum type or face plate type, according to the capacity of the set. Where a very large voltage range is desired at the capacity of the set does not warrant the use of an induction regulator, smooth regulation is achieved without an undue number of tapings by a combination of two tapping switches.

Prices on application.

HEWITTIC RECTIFIER — For Feeding Projection Arcs



Typical Theatre Rectifier.

D.C. BEST FOR PROJECTION ARCS

The best results with projection arcs can only be obtained with direct current.

The Rectifier offers many considerable advantages for this type of work, quite apart from the general advantages which it enjoys as a converter.

INSTALLATION

It does not require any special installation nor foundations and occupies small ground space. It can be placed either in the operator's cabin or in the immediate proximity of it.

OPERATION

At most it requires merely to be switched on and off, or it can be arranged automatically to come into operation when the carbons of the arc are brought into contact. It has no revolving parts, needs no oil, makes no noise. It does not require any attention from the operator.

ECONOMY

Above all, however, it allows of realizing an enormous economy of electrical energy, particularly in the case of arcs of great intensity. As is well known, for an arc requiring

a pressure across the arc terminals of 45 to 50 volts, a no-load voltage varying from 70 to 90 volts according to the intensity of the arc between 30 and 100 amperes is necessary in order to render the arc stable; and where the arc is being fed from a rotary machine, this difference in pressure is absorbed when the arc is operating by means of an ohmic resistance.

In the case of a Hewittic Rectifier, however, the same result is obtained by placing an induction coil in the anode circuit so that, whilst the Rectifier has the higher no-load pressure necessary, the excess voltage is absorbed by reactance without expenditure of energy, at the same time ensuring to the arc a stability greater than the resistance in the previous case.

The heavy series resistance losses are therefore eliminated.

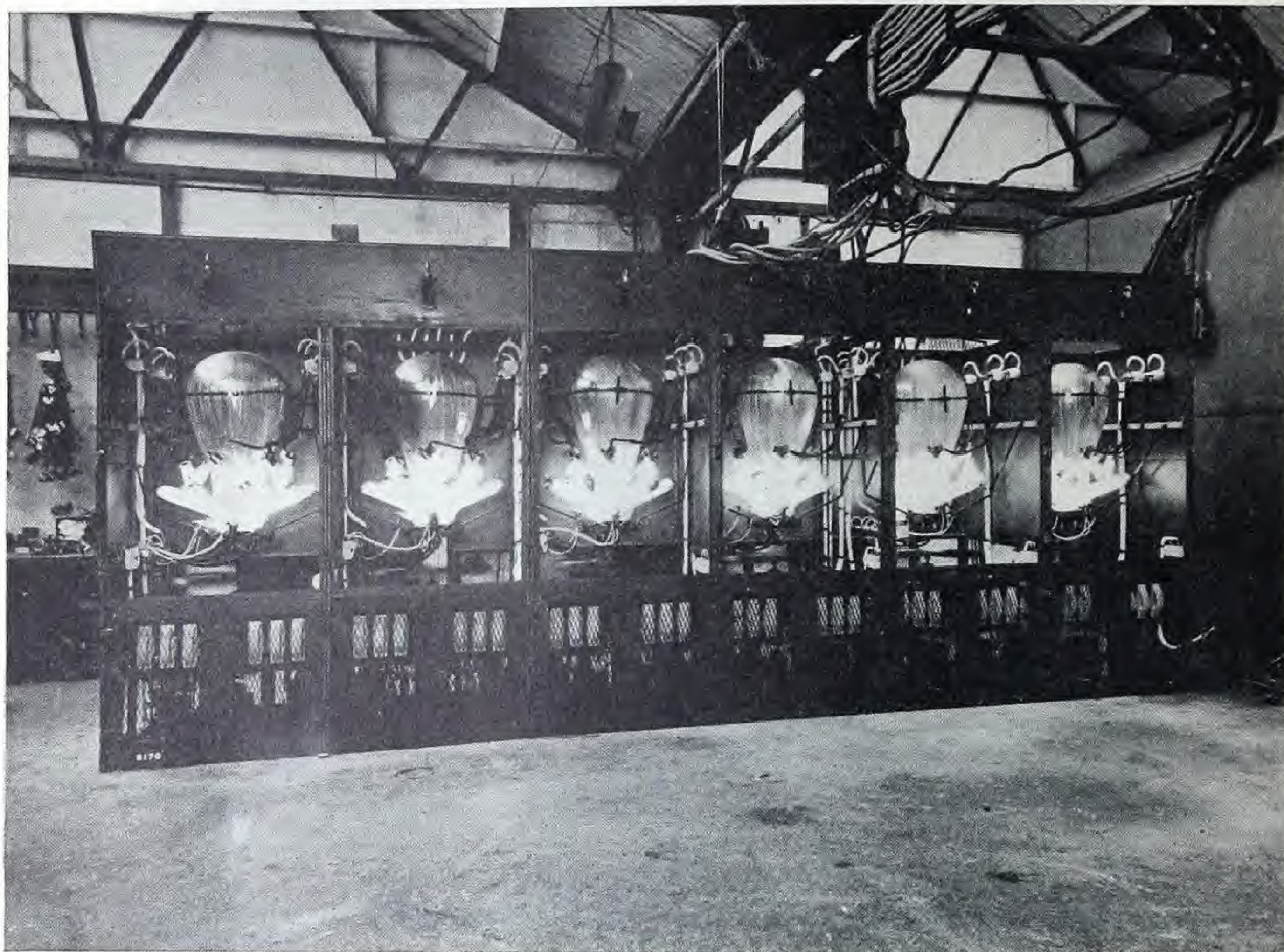
CONSTRUCTION

Rectifiers for cinema work are mounted in self-contained cubicles in accordance with the standard arrangement. Anode inductances are generally provided in order to give the required inherent regulation. The incoming A.C. supply is generally controlled by an iron clad switch fuse, whilst a single pole circuit breaker controls the D.C. side.

Instruments are generally provided on the front panel.

HEWITTIC RECTIFIERS

For Feeding D. C. Current in Factories, etc.



Unit for Dublin United Railways
Capacity of Plant—900 k.w., made up of six bulb units.

D.C. motors offer many advantages for certain types of work, specially where speed regulation is of importance, as, for instance, in printing presses. Sometimes, therefore, the retaining of D.C. motors is an absolute necessity to a works or factory; sometimes the retaining of D.C. offers certain operating advantages; whilst at other times the problem is merely one of cost—that is, in factories possessing already D.C. motors.

It is therefore often advantageous and sometimes necessary to install a converting equipment at a works or factory, and Hewittic Rectifiers offer a most satisfactory solution in such cases.

NO ATTENDANCE

The plant is static, demands no supervision, and gives a high over-all all-day efficiency even if the load is of a highly fluctuating nature. The only attendance required is to switch it on and off at the beginning and end of its operating periods respectively, and this demands merely the closing or opening of the primary switch.

UNIT CONSTRUCTION

Its unit construction allows of only sufficient capacity being installed to deal with actual requirements, further units being added to meet growing demands. In a similar way various existing units can be cut out or operated to suit load requirements.

NO STAND BY

And, further, this unit construction considerably enhances the reliability of the works converting sub-station, as even in case of accidental damage only a fraction of the equipment would probably be put out of commission thereby.

When the continuity of service is of the utmost importance, as is the case in the majority of works, Rectifiers offer the most economical proposition, as the need for spare stand-by plant is eliminated. This is due to the fact that the Rectifier equipment can be economically built into a number of separate units working in parallel without detriment to the efficiency of the whole plant and without complicating it in any way.

CONSTRUCTION

Rectifier equipments, as used for works sub-stations, are similar to those used on public supply sub-stations.

They are built in single or multiple bulb sheet steel cubicles according to the capacity of the equipment. These cubicles contain the rectifying gear proper as well as protective and isolating switchgear on the D.C. and L.T.A.C. sides.

The transformers, when the equipment is over 30 kw., are of the oil immersed type mounted separately, arranged to feed one or a number of Rectifier cubicles.

VOLTAGE REGULATION

Where the load is only a motor load it is often not considered necessary to provide means for voltage regulation. The Rectifier equipment would, in such cases, have a shunt characteristic with an inherent voltage regulation of from 6 to 7 per cent. If, however, voltage regulation is desired, this would be obtained by means of tapped auto transformers mounted at the base of the various Rectifier cubicles and controlled by 11 stud tapping switches or alternatively by means of an induction regulator controlling the primary supply.

HEWITTIC RECTIFIER

For Feeding D. C. Current in Factories, etc.

AUTOMATIC VOLTAGE CONTROL

Either of the above methods of voltage regulation can be arranged for automatic voltage control, the induction regulator or tapping switches being operated by a motor governed by a pressure relay which will tend to keep the D.C. pressure constant at all loads and despite normal fluctuations in the incoming A.C. supply. Alternatively, if it is preferred the control regulation can be arranged to give the plant an over-compounding characteristic.

AUTOMATIC LOAD SHARING DEVICE

It often happens that Rectifiers are installed in places where other types of converting plant already exist with which it is necessary that the Rectifiers will operate satisfactorily in parallel. At other times the converting plant may be required to operate in parallel on the same busbars with existing D.C. generating plant driven by steam, Diesel engines or otherwise.

In any of these cases the Rectifier can be arranged to operate satisfactorily in any required ratio by means of an adjustable Master Current Relay controlling the Rectifier Voltage Regulator. This relay is a meter-like instrument, and can be readily set for any value so that the ratio of the load taken by the Rectifier and by the remaining plant respectively can be adjusted at will.

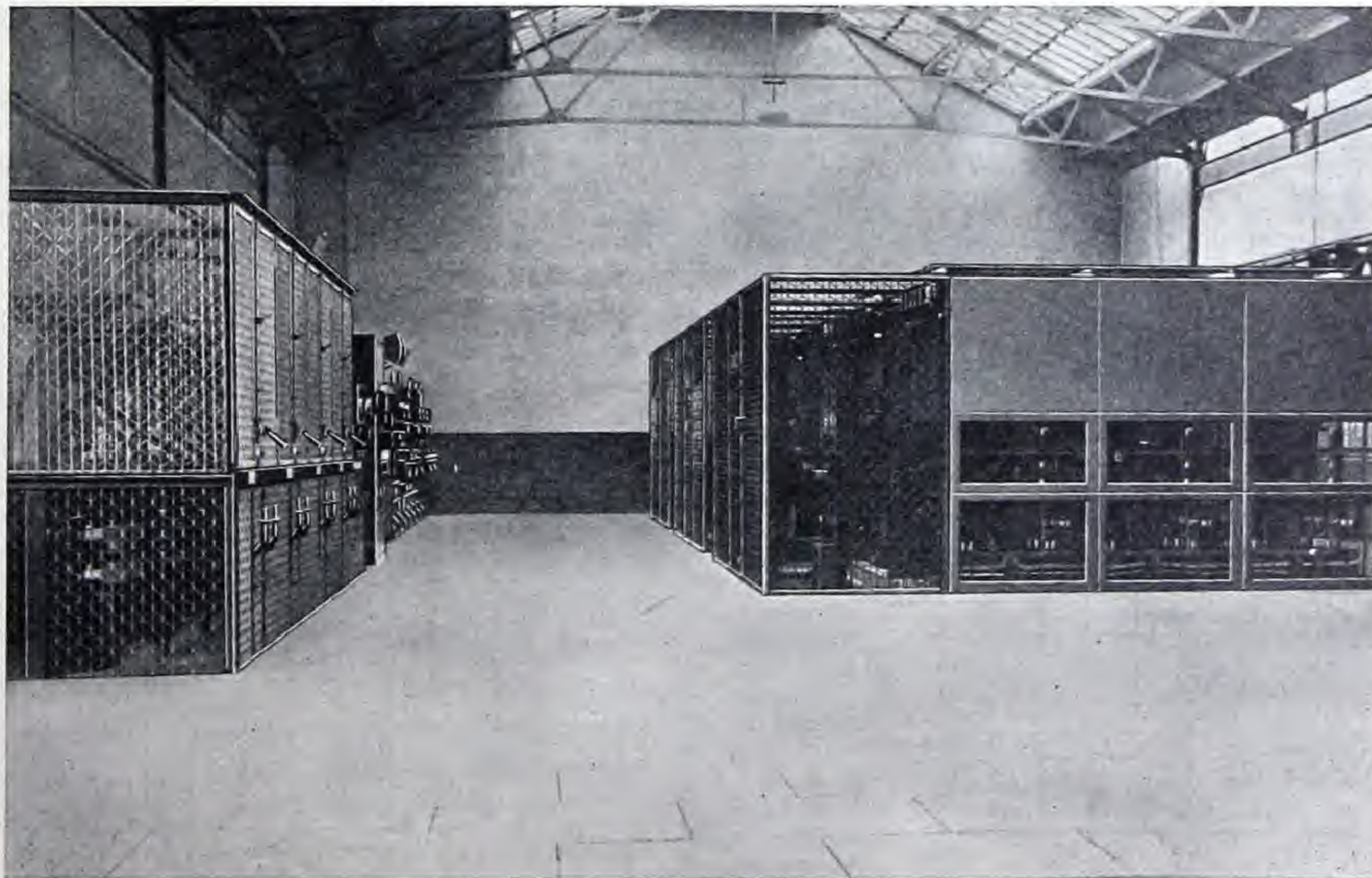
It is of interest to note here that this Load-Sharing Device is equally effective, no matter what the relative inherent characteristics of the two plants, that is to say, no matter whether they are the same or different; also in spite of the fact that the generating plant is of course unaffected by variations on the supply feeding the Converter.

Quite apart, however, from the Load-Sharing Device which insures the proper dividing of the load, it may be here noted that the Rectifier is of particular value to install in works where the converter has to run in parallel with D.C. generating plant because it is inherently unable to reverse as might happen with other plant under certain conditions of supply fluctuations which would affect the Converter, but not of course the generating equipment.

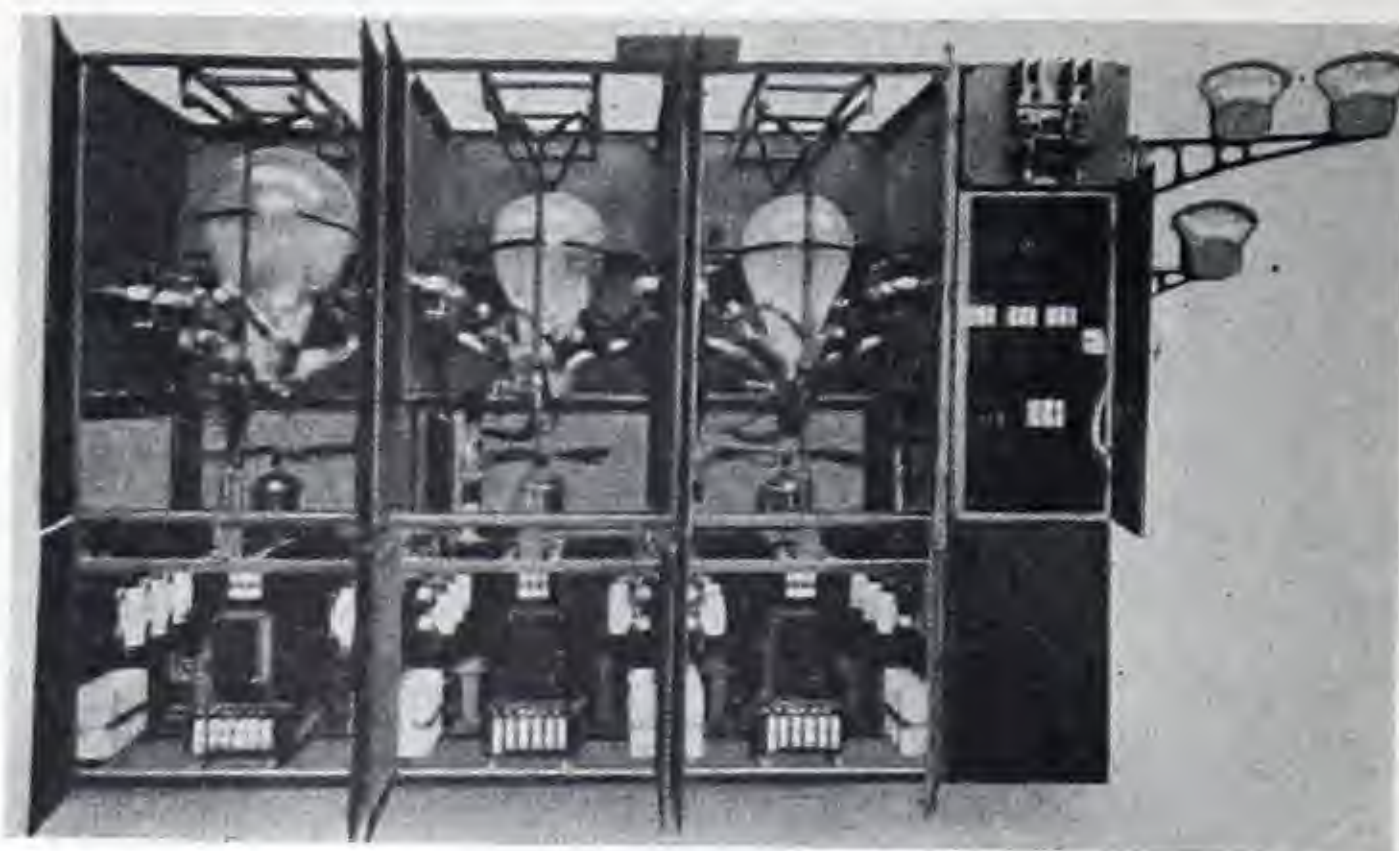
Depending on how the generating costs compare with the bulk supply costs, the Rectifier can be arranged to take the peak loads, leaving the generating plant to deal with the normal load, or vice versa, according as which works out the more economical arrangement.

EFFICIENCY

In this connection it is of interest to note that the efficiency of the Rectifier is, almost as high at low loads as at full loads.



GRID CONTROLLED HEWITTIC RECTIFIERS



One of the 250 kw. Dar-es-Salaam Hewittic rectifier banks arranged for voltage regulation and switching by grid control. The Dar-es-Salaam equipment is the first grid controlled rectifier equipment that has been shipped abroad and also the first grid controlled plant to be manufactured, of the line and balancer type.

Supplied to
Dar-Es-Salaam, East Africa

GRID CONTROL

This method of voltage control is a late development and it is not possible to deal with the full theory of the system in these notes. Briefly, however, it consists of fitting control grids immediately below the anodes of each Rectifier Bulb, and by applying suitable voltage control to these grids the output of the anodes can be regulated.

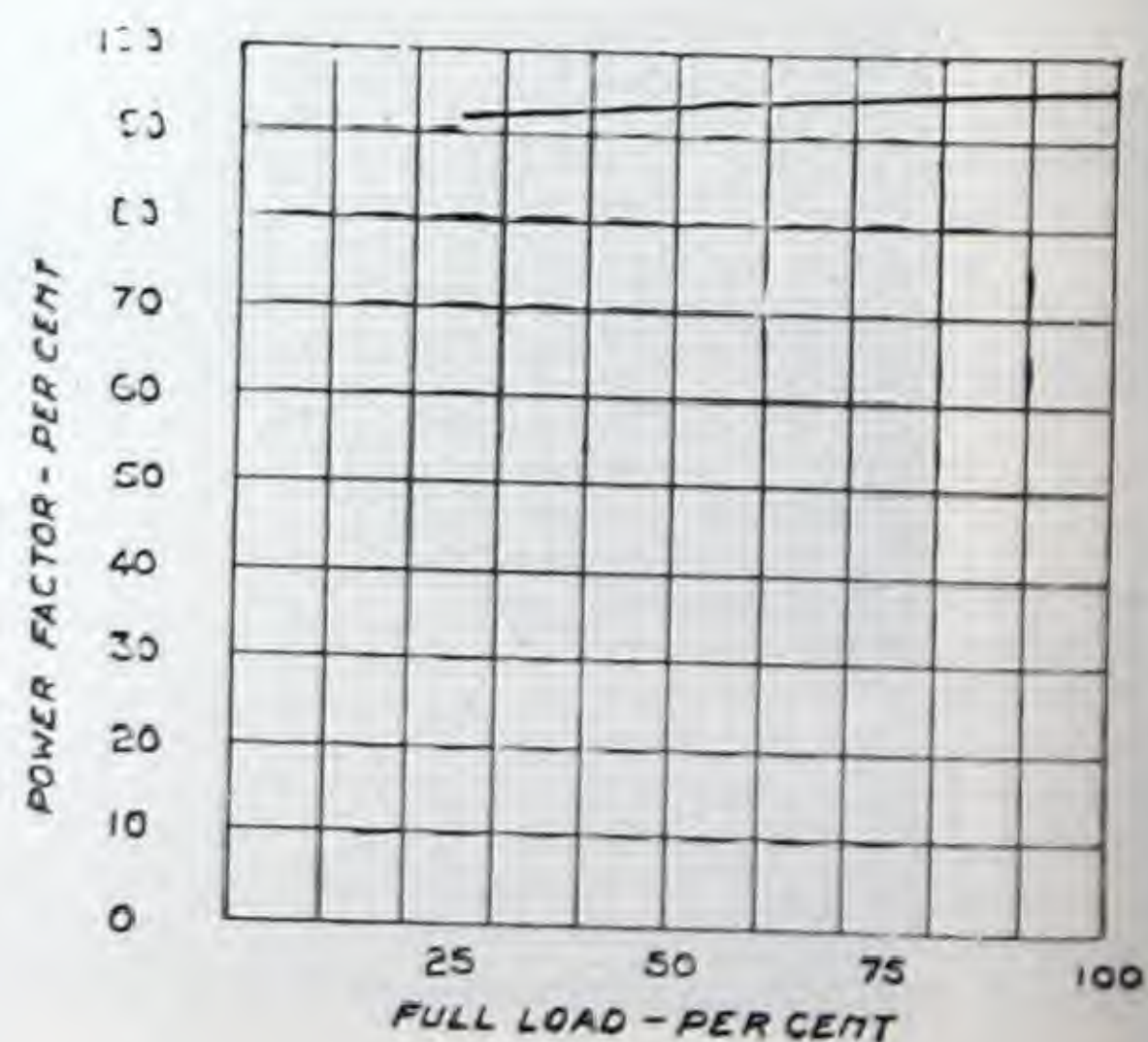
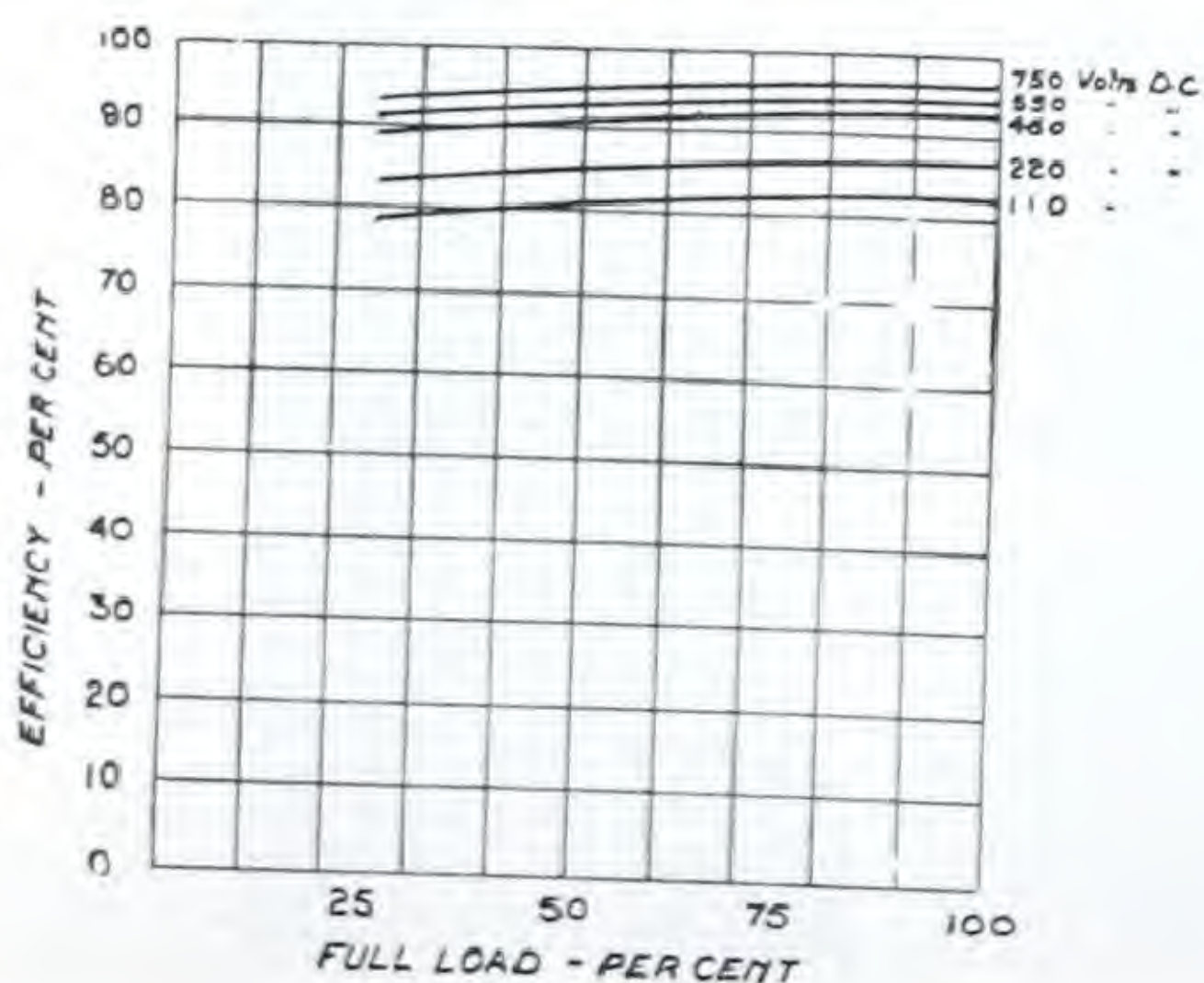
It should be noted that once any anode has started on its cycle of load, no further control by the grid is possible. In other words, the functions of the grids is confined entirely to controlling the actual starting time of each anode, and by delaying the starting time the effective value of the anode is reduced and the average D.C. voltage lowered.

This form of control has advantages over any other system in so far as it lends itself to a very wide range of variations. In fact control can be obtained from full volts down to zero. Also a very rapid control can be given by using suitable apparatus to regulate the grid supply.

In some instances also, this form of control is more economical, but apart from its advantages, the other voltage regulating systems can be used to give equally good results.

EFFICIENCY AND POWER FACTOR

The accompanying diagrams show some typical curves showing power factor and efficiency of Rectifier Equipment.



Due to the fact that a constant voltage drop is obtained in the Rectifier Bulb, the efficiency of a Rectifier Equipment is higher the higher the D.C. pressure.

The efficiency is little affected by the size of the equipment, also it will be noted it is little affected by the load on the equipment, so that a considerably higher overall efficiency day in and day out is generally obtained with Rectifiers than is attained with any other type of converting plant.

The power factor curve shown is for hexaphase operation, which is the arrangement more generally used. Actually the power factor is somewhat improved by the use of twelve phase connections. The figures shown were taken off equipments without an induction regulator. Wherever the latter is used, it is arranged to operate on the leading side and as the Transformer and Rectifiers have a lagging power factor, the addition of the induction regulator again slightly improves the figures shown.

It should also be borne in mind that the power factor is affected by the use of grid control for voltage variations, and in this connection a rough estimate of the power factor can be made by taking the appropriate figure from the curve and reducing it approximately in proportion to the amount of voltage suppression obtained by the grid control. In other words, if the D.C. voltage has been reduced by means of grid control, then the power factor will be roughly 10% lower than that given on the curve.

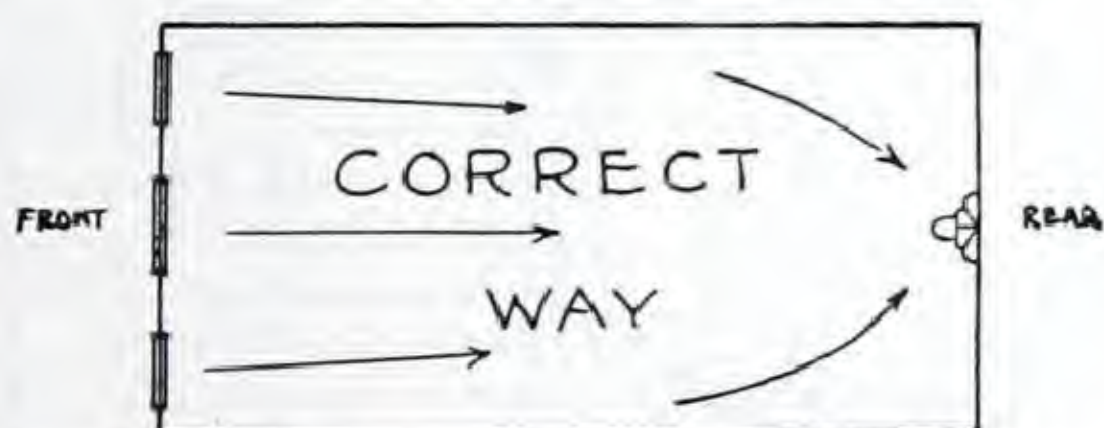
ILG ELECTRIC VENTILATION Propeller Fans



SELECTING THE CORRECT SIZE OF ILG SELF-COOLED MOTOR PROPELLER FAN

The air change required in a room differs with the conditions found therein. The worse the air conditions, the faster the air should be changed; restaurants for instance need a more rapid air change than do offices. Air conditions in a given type of building are fairly uniform and it is possible to generalize on the rate of air change advocated for various classes of buildings. Note listing below.

If it is desired to change the air in a room once each 5 minutes as an example, figure cubical contents of room by multiplying length, width and height. Divide this figure by 5, the rate of air change, giving the amount of air the fan should handle per minute. They are rated in this manner.

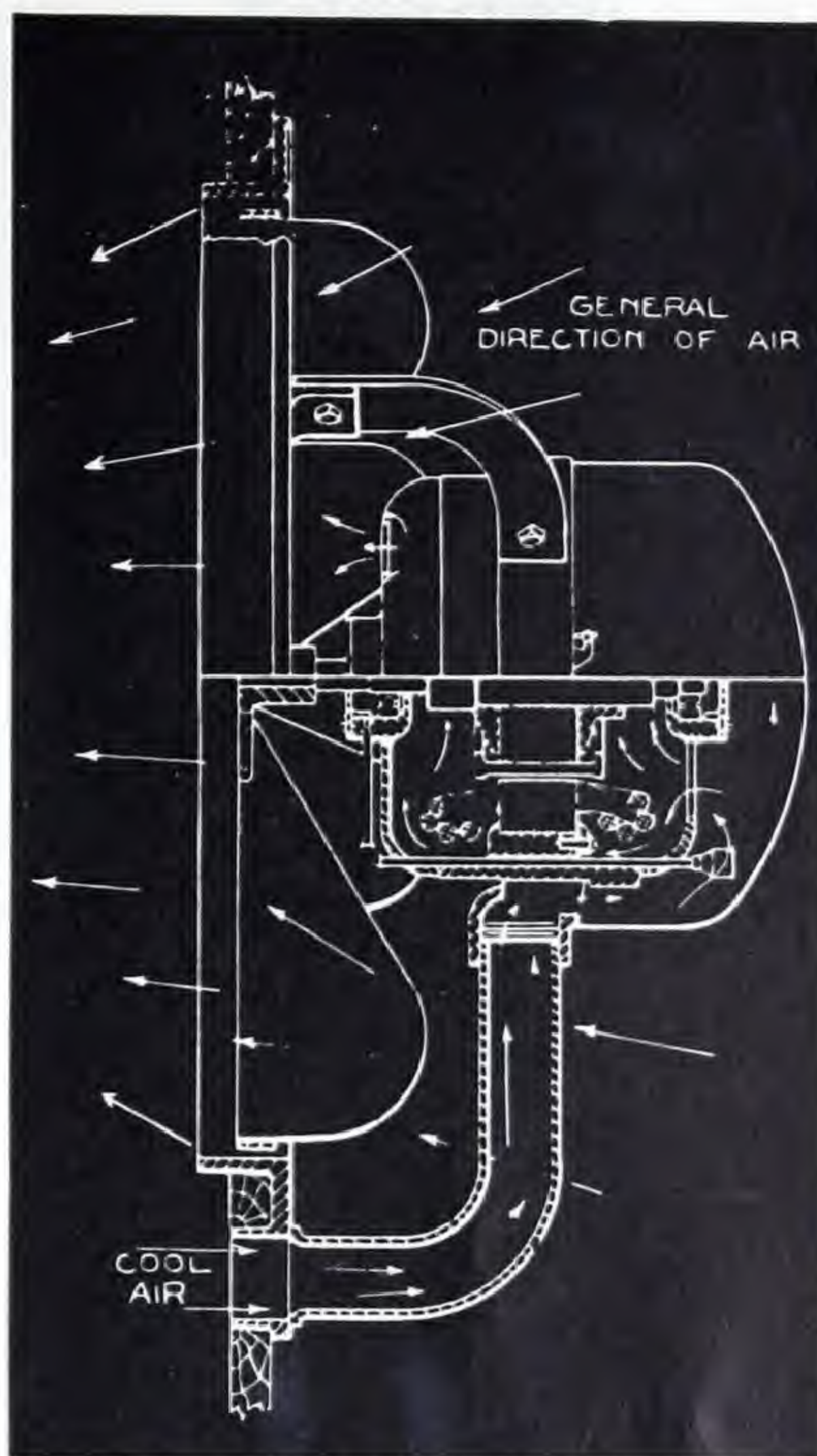


The figure shows the right way to install an exhaust fan. Complete circulation throughout the room is obtained by placing the fan as far as possible from the air intake.

AIR CHANGES

Class of Buildings	Air should be changed
Restaurant and hotel kitchens. . . .	Every one to two minutes
Offices and stores, depending on climate.	Every two to five minutes
Workrooms and factories.	Every five to ten minutes
Residence kitchens.	Every one to two minutes
Garages.	Every five to ten minutes
Theatres.	Every two to five minutes
Halls.	Every five minutes
Laundries.	Every two to five minutes
Stable barns.	Every ten minutes.

ILG ELECTRIC VENTILATION Propeller Fans



SELF-COOLED MOTOR

The ingenious, exclusive self-cooling features of the ILG ventilating fan motor combines the low operating cost of the open motor with the protection of the fully enclosed motor. The black square tells the story.

The ILG Self-Cooled motor is an open motor, protected and enclosed by a metal hood. The fan action draws clean air through the vent-pipe from the outside, circulates it through the motor (follow the arrows) and exhausts it. The ILG Self-Cooled motor stays clean, stays cool; no foul air reaches it.

The value of the ILG self-cooling feature is reflected in lower operating costs, quieter operation and longer service life.

SLOW SPEED—QUIETNESS—LONG LIFE

ILG Self-Cooled Motor Propeller Fans are made to operate efficiently at low speeds, from the 12" Ilgair running at 1140 rpm, to the 72" ILG Fan at 315 rpm; slow speeds characterize the ILG line. Slow speeds permit quiet operation, smoother, effortless running, less vibration and bearing wear. Many an ILG Self-Cooled Motor Propeller Fan is as good as new after years of service. Slow speed is the answer.

TWO FANS IN ONE

ILG Self-Cooled Motor Propeller Fans for single phase operation are equipped with two speed controllers. In effect, this gives the user two fans for the price of one; at top speed a reasonably quiet ventilator for peak loads, and for hot weather duty; at low speed, a fan which is noiseless, ready for cold weather ventilation duty. Here is year round use, top capacity, silent operation, and flexibility of performance, all in one fan.

IMPROVED, BALANCED WHEEL

Slow speeds are possible because of the improved ILG bucket type fan wheel. The deeply cupped blades scoop up the air, working efficiently at low speeds. Dynamic balancing on a costly machine makes the ILG fan wheel quiet, vibration-free for life.

ILG ELECTRIC VENTILATION

Propeller Fans

Capacities, Specifications

ILG fan ratings are guaranteed to be in accordance with the test code of the American Society of Heating and Ventilating Engineers.

ALTERNATING CURRENT

Two Speed—60 Cycle—Single Phase
110 volt.

Size	Speed RPM	CFM	Watts Input	Motor Frame	Shpg. Wt.
12" Ilgair*	1140	750	70	13	35
16" Ilgair*	855	1000	100	15	65
16" S. H.*	1140	1400	100	15	65
16" S.	855	1000	80		
	1140	1400	100	15	65
18" S.	855	1750	80		
	1140	2300	170	D- 87	90
20" S.	855	2400	110		
	1140	3200	250	D- 87	130
24" S.	600	2880	170		
	855	4100	275	D-102	190
30" S.	500	5420	345		
	685	7300	450	D-101	265
36" S.	400	6900	250		
	570	9650	500	D-104	500
42" S.	380	9800	500		
	490	12300	800	D-104	675

*Single speed only.

Prefix letter "T" for 220 volt.

ALTERNATING CURRENT

60 Cycle—Two or Three Phase
220 volt.

Size	Speed RPM	CFM	Watts Input	Motor Frame	Shpg. Wt.
18M	1140	2300	120	87	100
20M	1140	3200	200	87	150
24M	855	4100	250	102	225
30M	685	7300	400	101	325
36ML	490	8300	460	104	450
36M	570	9650	460	104	460
42M	490	12300	800	104	630
48M	490	18400	1300	105	780
54M	425	23200	1950	107	900
60M	380	28400	2000	108	1150
72M	315	40500	2100	109	1600

Prefix letter "K" for 440 volt. Prefix letter "Q" for 550 volt.

ALTERNATING CURRENT

Two Speed—25 Cycle—Single Phase
110 volt.

Size	Speed RPM	CFM	Watts Input	Motor Frame	Shpg. Wt.
16S	1000	1200			
	1420	1700	130	15	65
18S	1000	1980			
	1420	2780	220	87	90
20S	1000	2840			
	1420	3980	300	87	130
24S	500	2470			
	710	3460	290	102	190
30S	500	5420			
	710	7600	490	101	265
36S	350	6000			
	475	8300	520	104	500
42S	350	9000			
	475	12300	800	104	575*

*220 volts only.

Prefix letter "T" for 220 volts.

VARIABLE SPEED CONTROLLERS

60 Cycle—Two and Three Phase

Two and three phase fan controllers are available. The two speed type gives full speed and 40 per cent reduction. The variable speed type gives variable adjustment down to 50 per cent. reduction. Shipping weights: two speed: 18"—22 lbs.; 20"—24 lbs.; 24"—31 lbs.; 30"—31 lbs.; 36"—31 lbs. Variable speed: 42"—55 lbs.; 48"—74 lbs.; 54"—94 lbs.; 60"—94 lbs.; 72"—94 lbs.

Prices on application.

ILG ELECTRIC VENTILATION

Propeller Fans

ALTERNATING CURRENT

25 Cycle—Two or Three Phase—220 Volts.

Size	Speed RPM	CFM	Watts Input	Motor Frame	Shpg. Wt.
18M	1420	2780	160	87S	100
20M	1420	3980	200	87S	150
24M	720	3460	290	102	225
30M	790	7600	490	101S	325
36M	490	8300	520	104	460
42M	490	12300	800	104	630
48M	490	18400	1300	105	780
54M	360	19700	1600	107	900
60M	360	26800	2000	108	1150

Prefix letter "K" for 440 volts.

Prefix letter "Q" for 550 volts.

DIRECT CURRENT—110 Volts

Size	Speed RPM	CFM	Watts Input	Motor Frame	Shpg. Wt.
12 Ilgair	1140	750	70	100	35
16B	1140	1400	100	1/8	65
18B	1140	2300	150	1/6	90
24A	855	4100	300	1197	235
30A	690	7300	440	1199	345
36A	570	9650	600	1207	450
42B	490	12300	800	1207	625
48B	490	18400	1300	1211	890
54B	425	23200	1800	1213	1025
60B	380	28420	2270	1215	1520
72B	315	40500	2300	1217	1980

Enclosed Speed Controllers furnished with all Direct Current Fans except 12" size.

Prefix Letter "T" for 220 volts. Prefix Letter "K" for 500 volts.

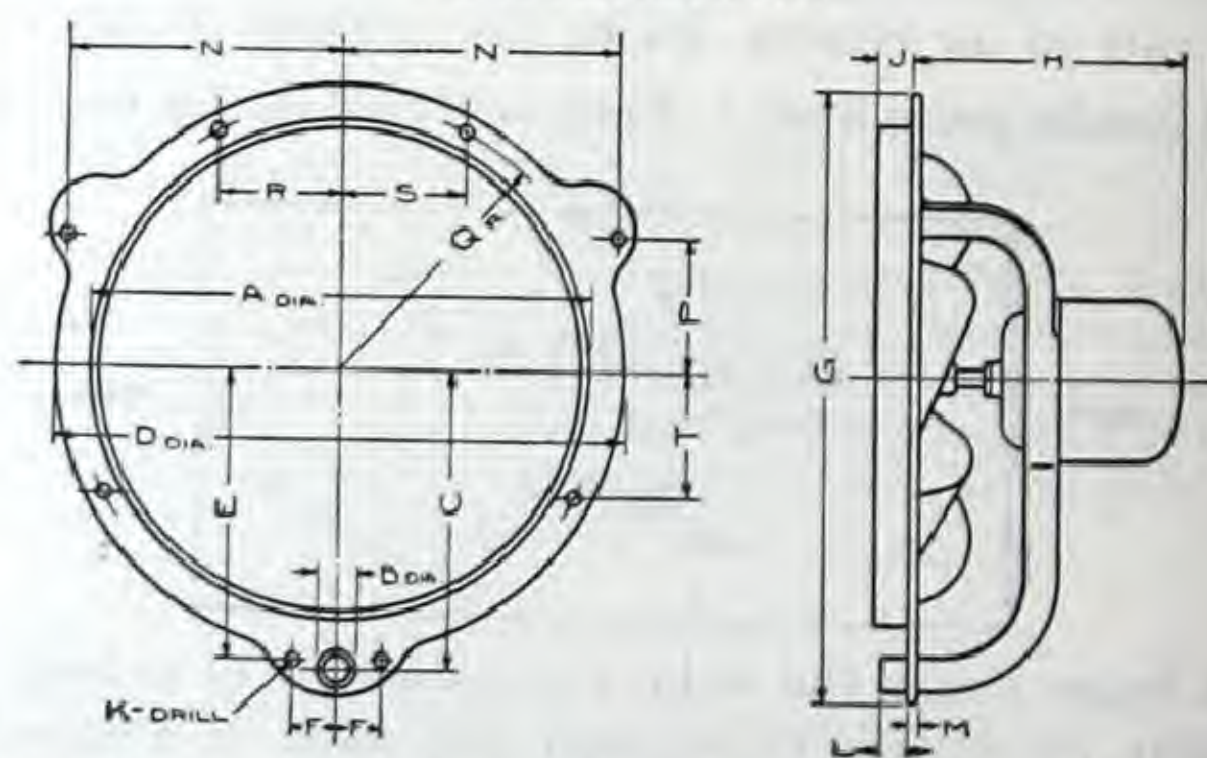
FANS FOR SPECIAL CONDITIONS

Hazardous locations.—ILG Fans can be supplied with explosion proof motors and non-ferrous construction as may be required by local or state laws.

Chemical processes. ILG Fans can be supplied with a variety of finishes to withstand the effects of various chemicals. These include acid resisting paint and special motor, impregnation, rubber or lead coating and construction of corrosion resisting alloy metals.

Other conditions. Whatever the conditions may be, ILG Fans can be adapted to meet them. Such problems should be presented to your nearest ILG Dealer or ILG Office. Detailed recommendations are given without any obligation to you.

DIMENSIONS



Measurements A and B are diameter of opening to be cut for installation

Dimensions in Inches

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P
12	12 1/4	1 1/8	7 1/8	13 1/2	7 1/8	1	14 3/4	8 1/8	3/4	3/8	1/2	1/4	6 1/8	3 1/4
16	16 1/4	1 1/4	9 3/4	18	9 3/8	1 1/8	19 1/8	9 1/4	1	3/8	5/8	1/4	8 1/8	4
18	18 1/2	1 1/4	11 1/8	21	10 1/8	1 1/8	22 1/8	10 1/4	1 1/8	3/8	1 1/4	3/8	10 1/8	4 3/4
20	20 3/4	1 3/4	12 1/8	23 1/8	12 1/8	2 1/8	26 3/8	10 3/8	1	1 1/8	1 1/4	1/2	11 3/8	5 1/4
24	24 3/4	2 1/8	15	28 1/8	14 1/8	2 1/8	30 1/2	16	1 1/8	1 1/8	1	1/2	13 3/8	6 1/4
30	30 3/4	3	18 1/2	34 1/2	17 3/4	3 1/4	37 3/4	17	2 1/8	1 3/8	1 1/2	3/8	16 1/8	7 1/4
36	36 3/4	3 5/8	21 5/8	40 1/8	20 1/2	3 1/4	44 1/2	20 1/2	2 1/8	1 3/8	1 3/4	3/8	19 1/8	8 1/4
42	42 7/8	4 1/8	25 1/8	46 3/4	24 1/8	3 1/4	51 1/8	20 1/2	2 1/8	1 3/8	1 3/4	3/8	22 1/8	10 1/4
48	49 1/8	4 7/8	29 1/8	54 3/4	28 1/4	4	60	24 3/4	2 1/8	1 3/8	1 3/4	3/8	25 1/8	11 1/4
54	55 3/4	5	33 1/8	60 3/4	31 1/8	4 5/8	67 1/2	25 1/2	2 1/8	1 3/8	1 3/4	3/8	28 3/8	13 1/4
60	61 1/8	6	36 1/8	66 3/4	34	4 5/8	72 1/8	30	2 1/8	1 3/8	1 3/4	3/8	29 3/8	17 1/4
72	73 3/4	5 1/2	44 1/8	79 1/4	40 1/8	6 3/8	88 1/4	32 1/2	3	1 3/8	2	1/2	35 3/4	20 3/4

Dimensions "H" varies on different types but maximum is shown. Dimensions Q, R, S, T apply only to sizes over 36" and are available on request.

Prices on application.

ILG ELECTRIC VENTILATION

Propeller Fans

ILG PROPELLER FAN GUARDS

Wherever Propeller Fans are installed within 7 feet or less from the floor it is well to protect them with guards.

ILG woven wire guards are strong and durable and do not obstruct flow of air to the fan. Guards can be furnished in one, two or three sections, and can be attached to any ILG fan in service at any time. All sections are interchangeable.



Propeller Fan with 3-Section Guard

Size	Weight complete
12"	2 lbs.
16"	2½ lbs.
18"	3½ lbs.
20"	4 lbs.
24"	5 lbs.
30"	8 lbs.
36"	11 lbs.
42"	15 lbs.
48"	24 lbs.
54"	38 lbs.
60"	50 lbs.
72"	75 lbs.

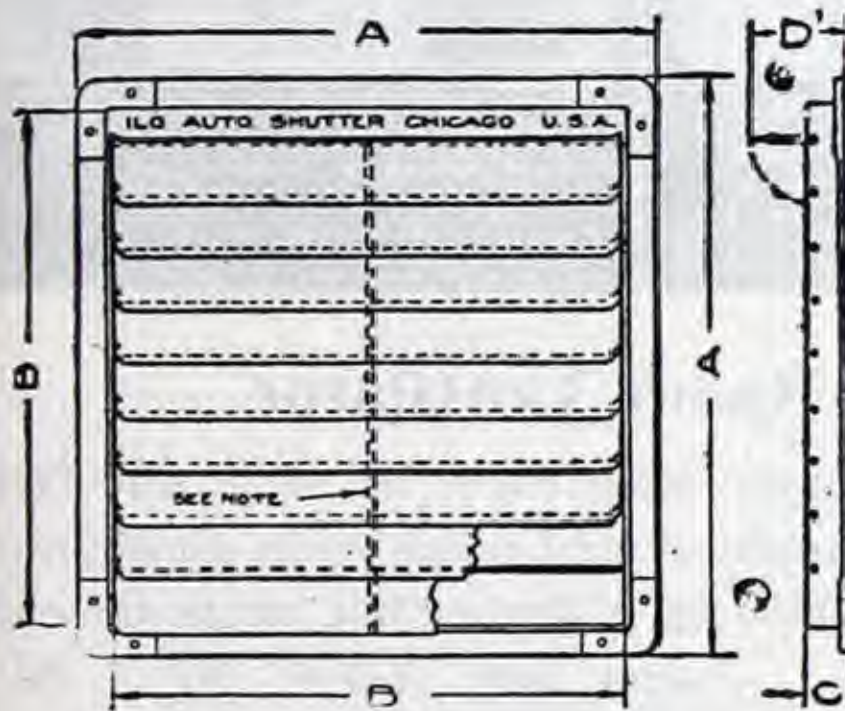
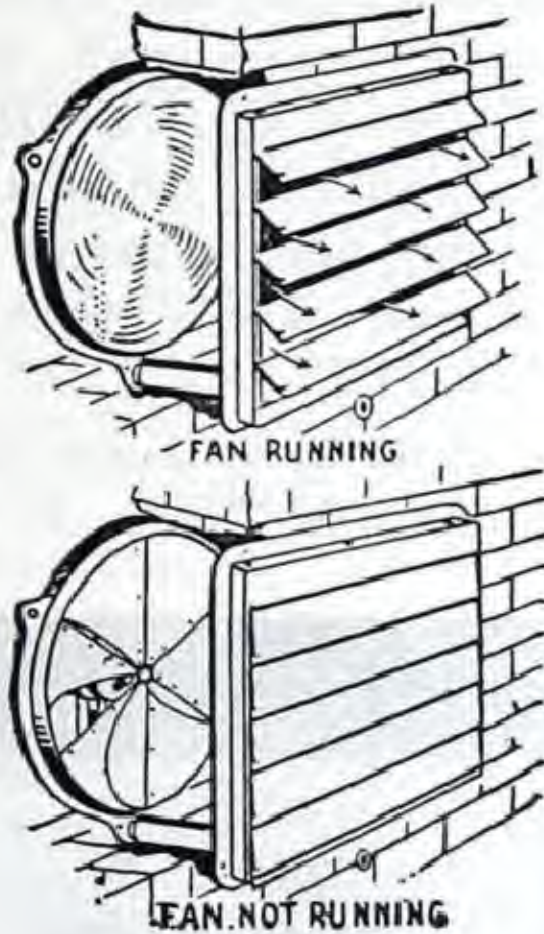
AUTOMATIC SHUTTERS

ILG Automatic Shutters are used on the outside of propeller fans to protect fan when not running and to keep out rain and snow.

Shutters are built of special hard rolled aluminum leaves pressed on Whiting alloy copper coated rods supported in cast iron frame.

When fan is running, shutter is held open by the force of the air current. When fan is shut off, shutter closes automatically by gravity.

Shutters are moisture-proof and need no attention after they are installed.



Size	A	B	C	D
12	14 ¼	12 ¾	1 ¾	3 ¾
16	18 ¼	16 ¾	2 ¼	4 ¾
18	21 ¾	19	2 ¾	5 ¾
20	24	21	2 ¾	6 ¾
24	28 ¼	25	2 ¾	6
30	33 ½	30	2 ¾	5 ¾
36	41 ¾	38	2 ¾	6
42	48	44	3	6 ¾
48	54 ¾	49 ¾	2 ½	7
54	60 ¾	56 ¾	2 ½	7 ¼
60	66 ¾	62 ¾	2 ½	7 ¾
72	79 ¾	74 ¾	2 ½	7 ¾

Size	Approx. Shipping Weight
12"	10 lbs.
16"	19 lbs.
18"	30 lbs.
20"	43 lbs.
24"	67 lbs.
30"	80 lbs.
36"	112 lbs.
42"	152 lbs.
48"	188 lbs.
54"	195 lbs.
60"	210 lbs.
72"	314 lbs.

Note—Size of shutter corresponds to size of fan—for example, 18-inch takes 18-inch shutter.

48-inch and larger sizes are built in two sections.

Prices on application.

ILG ELECTRIC VENTILATION

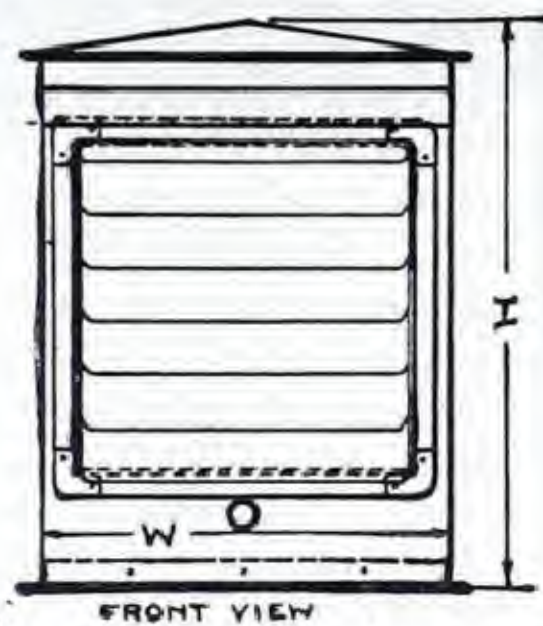
Power Roof Ventilators

The ILG Power Roof Ventilator is the most efficient and economical unit available for ventilation of buildings, through the roof.

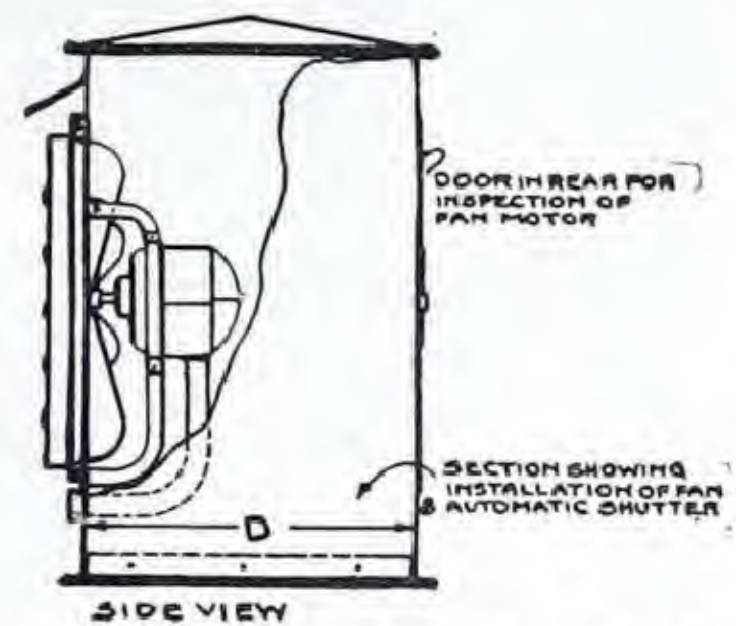
It replaces the natural gravity ventilator which is dependent on the velocity and direction of the wind.

Since vertical running fans are usually inaccessible they don't receive proper maintenance; they're likely to drip oil and wear out bearings prematurely. The ILG Power Roof Ventilator, accessible and horizontal running is therefore more satisfactory.

The ILG Power Roof Ventilator consists of a standard ILG Self-Cooled Motor Propeller Fan mounted in a steel penthouse fitted with standard automatic shutter. The penthouse is thoroughly water tight and can be furnished with insulation for the prevention of condensation where necessary.



Penthouse with Automatic Shutter



Section Showing Installation of Fan. Automatic Shutter and Duct Leading Through Roof

Power Roof Ventilator Size	Shutter Size	Fan Size	D	W	H	Gauge Metal	Approx. Shpg. Weight
12	12	12	16	20	30	20	90
16	16	16	16	20	30	20	95
18	18	18	18	24	36	18	105
20	20	20	18	26	36	18	135
24	24	24	21 ½	30	42	18	170
30	30	30	25 ¼	36	49	18	235
36	36	36	27 ¼	44	58	18	400
42	42	42	32	50	62	18	580
48	48	48	36	56	72	18	740
54	54	54	40	63	82	16	820
60	60	60	44	69	98	16	910
72	72	72	48	82	102	16	1070

Prefix letter "I" for Insulated Penthouse.

Type "B" Ilgair Furnace Fan

The Type "B" Ilgair Furnace Fan will improve the results obtained from any warm air furnace. It promotes and maintains positive heat distribution to every corner of the house. It is quickly installed in the cold air duct of any furnace, old or new. Equipped with the exclusive ILG Self-Cooled Motor, the fan runs quietly and smoothly.

The opening in the duct which must be made for insertion and oiling of the fan can be left ajar to circulate cool

basement air throughout the house in summer. The fan does not interfere with natural air circulation. Adjustment can be made at any angle.



Size	Cu. Ft. Free Air per Min.	Speed of Motor	Approx. Shpg. Weight
12"	800	1140	40
16"	1050	850	75
18"	1800	850	95
20"	2500	850	135

Prices on application.

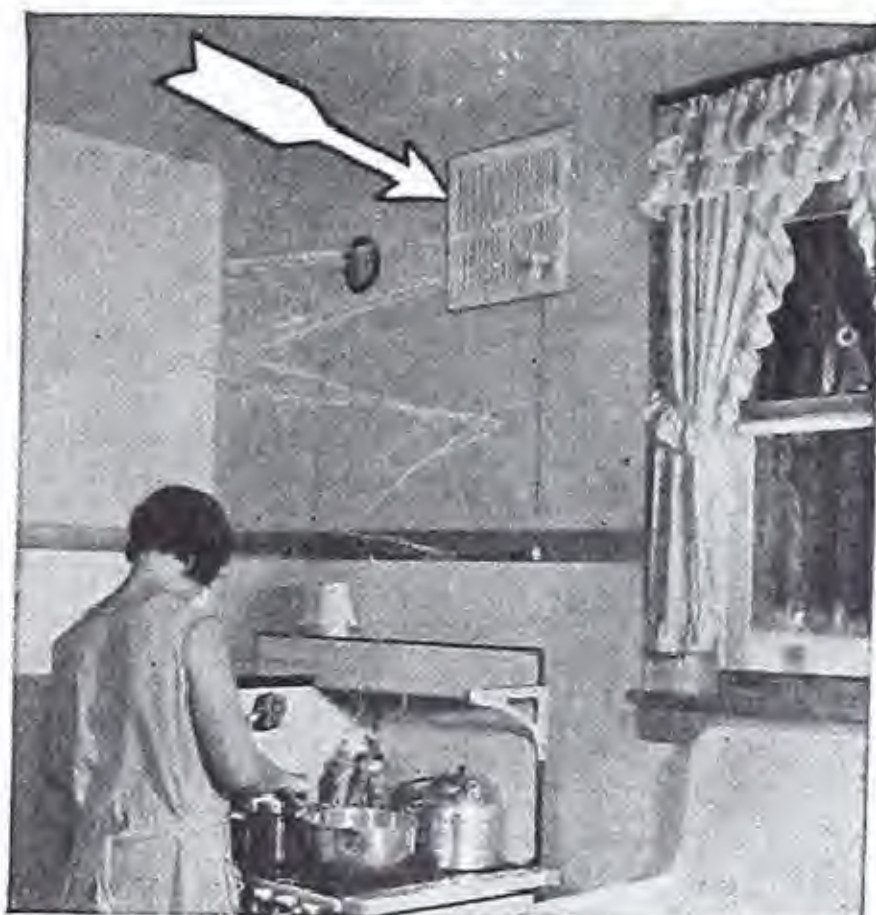
ILG ELECTRIC VENTILATION

Ilgair Kitchen Ventilators

An Ilgair Kitchen Ventilator is one of the modern housewife's best servants. It sweeps out cooking odors as fast as they arise and keeps the kitchen cool and comfortable. Never a trace of cookery can pass the kitchen door to leave its greasy coating on everything it touches. Cooking becomes a pleasure and cleaning ceases to be a drudgery.

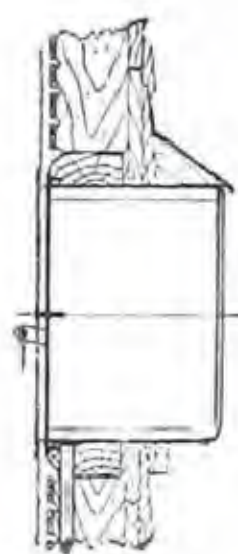
Built-in Ilgair

Installed in the wall, this Built-in-the-wall type Ventilator is a joy to the spic and span housekeeper. The quiet, efficient Ilgair is quite inconspicuous behind the gleaming white grill front. A nickel silver pull chain starts and stops the ventilator, opening and closing the outer weather-tight door at the same time.



This is a full sized Kitchen Ventilator with 12" diameter fan running at 1140 rpm and a capacity of 750 cubic feet of air per minute.* It is the only kitchen ventilator with the patented ILG enclosed self-cooled motor. Positively no radio interference. Consumes only 70 watts per hour—no more than an ordinary light bulb. Shipping weight 42 pounds. Cabinet dimensions, 8 $\frac{5}{8}$ " deep, 12 $\frac{3}{4}$ " high, 13 $\frac{5}{8}$ " wide. 110 Volts A.C. and D.C.

*Tests have shown that good kitchen ventilation requires removal of 750 cu. ft. of air per minute.



Frame Wall



12" Brick Wall



Utility Fan

The No. 17 ILG Utility Fan is very effective for creating air disturbance and circulation in stores, factories, bank vaults, refrigeration storage rooms, etc., as an adjunct to the ventilating system. Floor, ceiling and wall mounting types are available. The fan wheel has four blades, is 17 inches in diameter. The unit is finished in cream enamel and equipped with guards. Weight 125 pounds.



Type	R.P.M.	C.F.M.
1 speed.....	1750	2000
2 speed.....	1000/1750	1150/2000

Prices on application.

ILG ELECTRIC VENTILATION

Portable Ilgairs

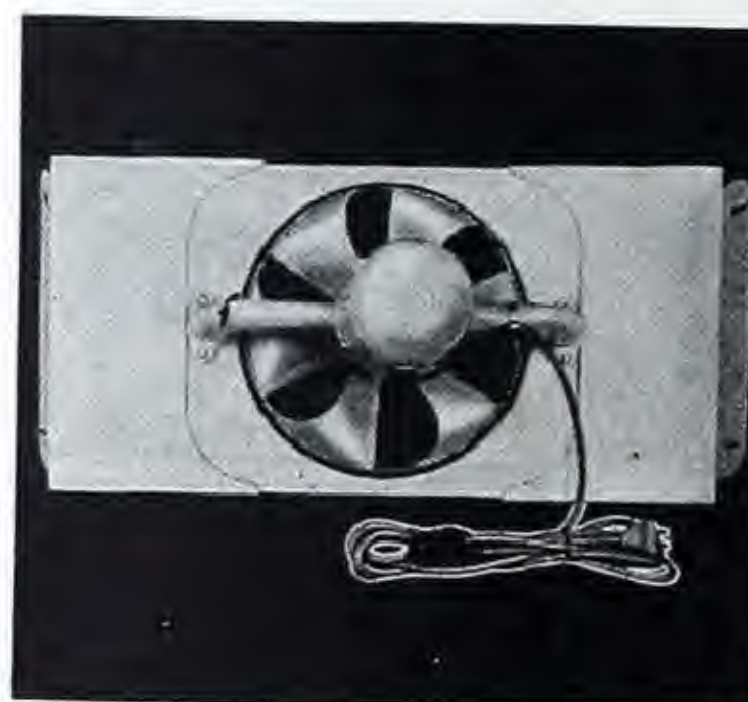
Here is an Ilgair Kitchen Ventilator that anyone can install in ten minutes time... just the thing for those living in rented property or home owners who want a quick, economical installation of a full sized ventilator.

This adjustable panel portable Ilgair fits any ordinary window... requires only eight screws for installation... does not interfere with opening and closing of the window. Comes complete with 10 feet of rubber covered cord, switch and plug and metal sash lifting handles.

There are two models... the all-steel panel Ilgair finished in ivory with two panel widths 26" x 36" and 36" to 46"... and the clear vision glass panel white Ilgair in three widths, 30" to 36", 36" to 42" and 42" to 48".

Each has the full 12" diameter Ilgair Self-Cooled Motor Propeller Fan, quiet at 1140 rpm, with a capacity of 750 cubic feet of air per minute. Each is made, tested, sold and guaranteed under the ILG nameplate. Shipping weight approximately 40 pounds. 110 Volts A.C. and D.C.

Tests have shown that good kitchen ventilation requires removal of 750 cu. ft. of air per minute.



Dark Room Ventilator

The ILG Dark Room Ventilator is very effective in exhausting foul air, dampness and odors from photographers' dark rooms. Can be used for X ray rooms, photo developing

rooms, rest rooms, etc. With a capacity of 750 cubic feet of air per minute the 12" size changes the air in the average dark room once each two minutes. No light can enter whether fan is running or not.



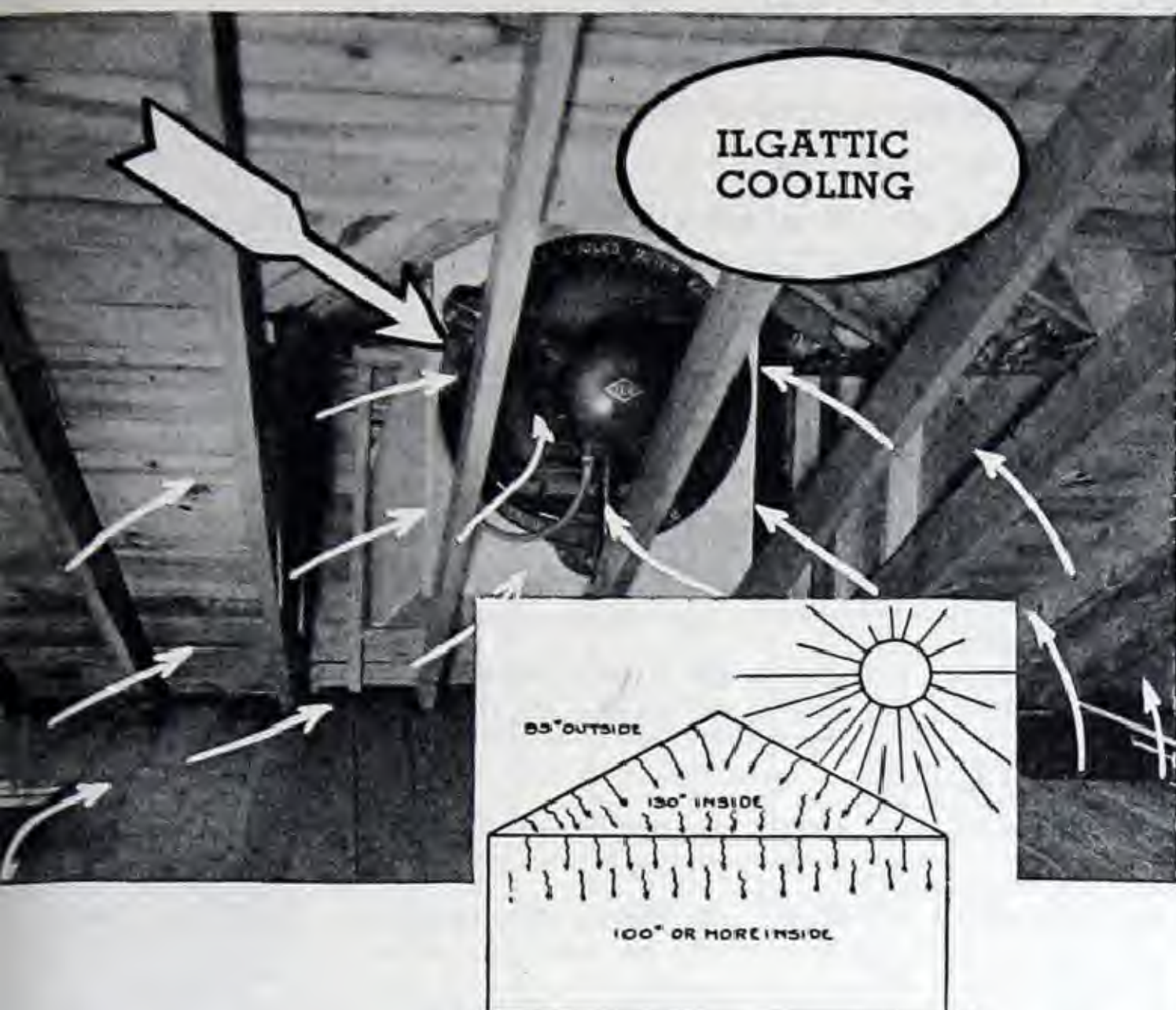
The Dark Room Ventilator should be placed in an inner wall near the ceiling opposite the door if possible. Operates from ordinary light circuit. Current consumption 70 watts per

hour. Shipping weight 69 pounds. Motor speed 1140 rpm. Furnished in 110 volts, 60 cycle and 25 cycle A.C. and D.C. Also available in 16" size 1000 CFM capacity; current consumption 100 watts; motor speed 855 rpm; weight 80 pounds—for larger dark rooms.

Prices on application.

ILG ELECTRIC VENTILATION

ILG Attic Cooling

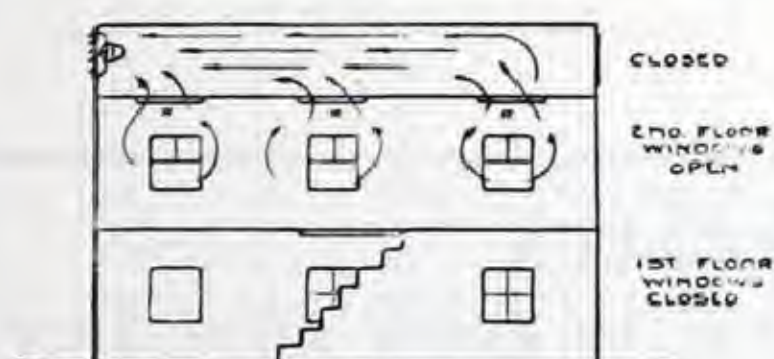


If you have an attic, you can cool and ventilate the whole building with an Ilgattic Cooling and Ventilating System. Just draw off the heat of the day from your attic and from the rooms below and immediately you'll feel the difference.

The attic space, sun baked for hours during the day, acts as a huge radiator that keeps the bedrooms and other rooms below overheated for many hours after sundown.

Turn on the Ilgattic System in the evening. In a few moments the cool night air will purge the whole building of its accumulated sunheat. The temperature will drop and an invigorating breeze come through each opened window.

The installation is simple, its cost reasonable. The average five and six room homes use a 24" ILG Self-Cooled Motor Propeller Fan; seven and eight room homes, a 30" fan,—on the basis of a two minute air change for the floor immediately below the attic. In the southern states a larger size fan for a minute air change should be used. Fans are listed on pages 7 and 8.



Portable Floor Fans

The ILG Portable Floor Fan is widely used as an industrial "man cooler." Its 90 foot blast of cooling, refreshing air affords quick relief in "hot spots." This big man-cooling fan can be placed anywhere. It is portable and completely equipped with starter—ready to attack any heat problem.

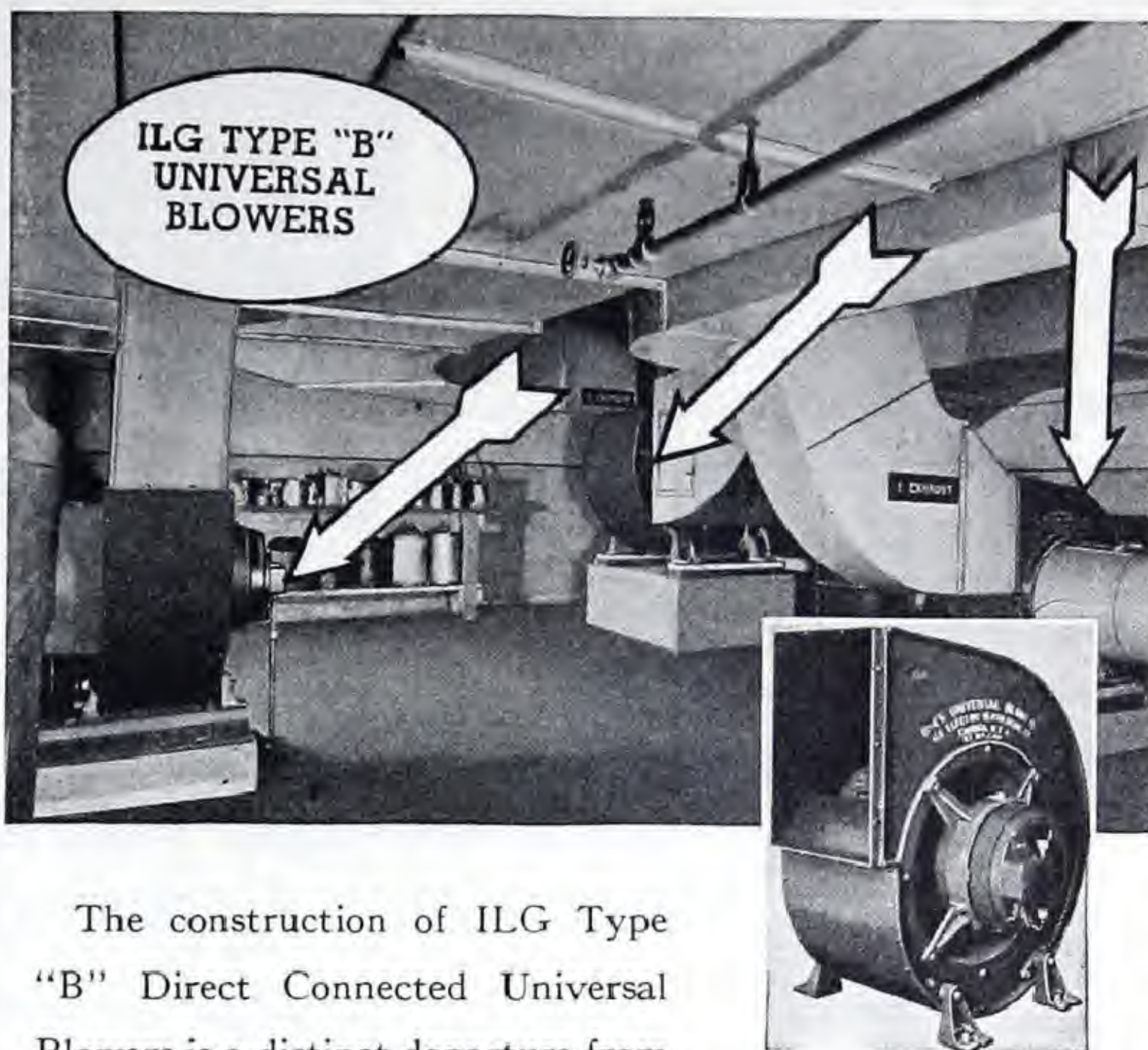
Three sizes are available, each with steel guards, heavy base and upright. The motor is enclosed and self-cooled—an exclusive ILG feature.

Size Inches	C.F.M.	R.P.M.	Watts Input	Weight
12"	2000	3400	230	140
30"	10000	1140	750	400
36"	15000	1140	1200	550



ILG ELECTRIC VENTILATION

ILG Universal Blowers



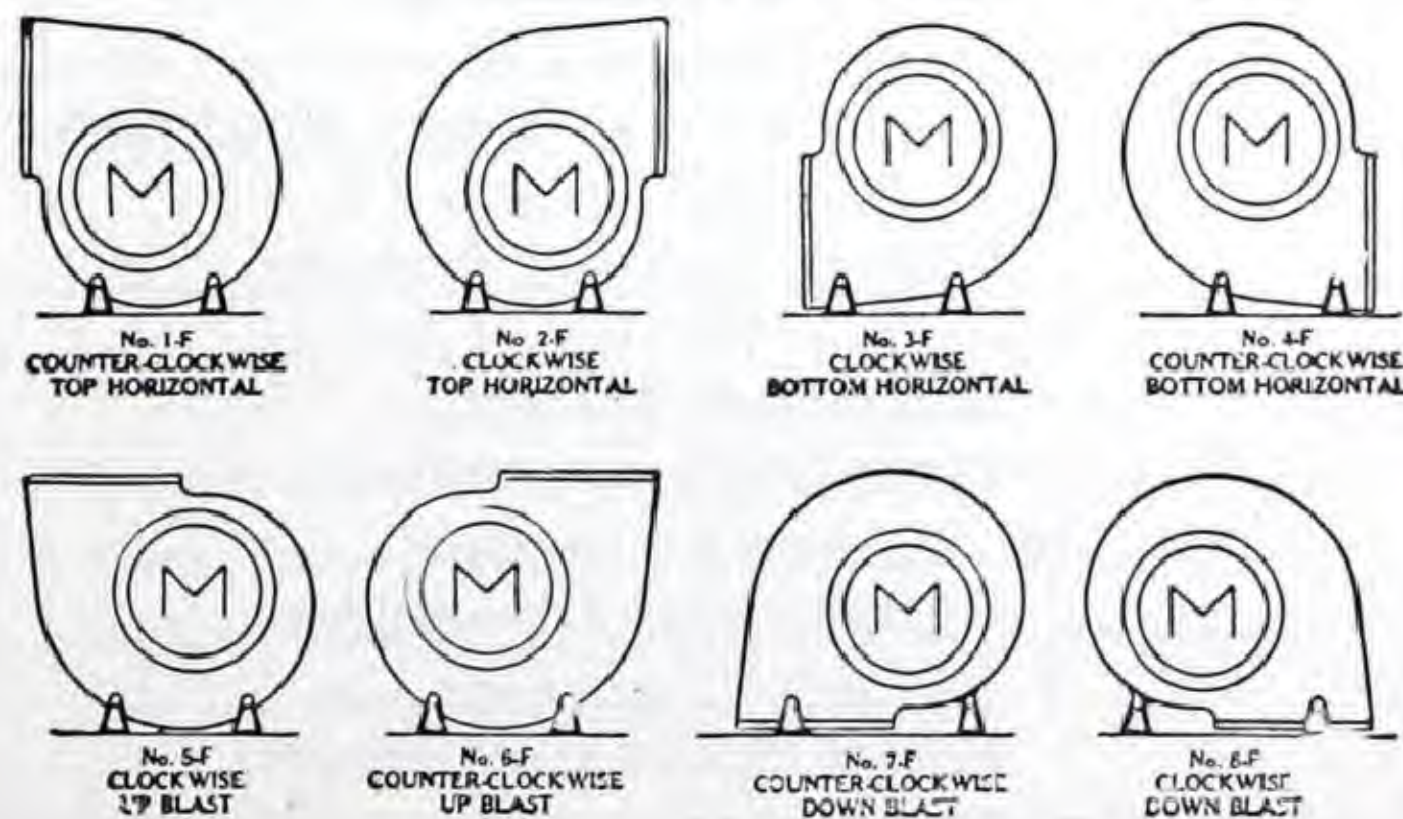
The construction of ILG Type "B" Direct Connected Universal Blowers is a distinct departure from the ordinary. The motor is machined circular and held in a cast iron ring and recessed within the cast iron side of the blower in a sheet steel bowl. The multiblade wheel is mounted directly in the motor shaft. There is little overhang because the motor is recessed. This construction eliminates the inlet bearing, independent motor base and alignment of motor and wheel. Mounted on four legs, the ILG Blower is quickly installed, the universal discharge is possible by relocation of the legs as shown at the bottom of page.

ILG Blowers, like all ILG products, are ILG built throughout. Motor, wheel, housing, are all by ILG. This makes possible balanced, precision operation. All the advantages of direct motor drive apply to ILG direct connected blowers. The drive is simple, more compact, maintenance costs are reduced and efficiency increased.



BLOWER DISCHARGE ARRANGEMENTS

Standard-Floor Type



ILG ELECTRIC VENTILATION

ILG Universal Blowers

ILG TYPE "B" DIRECT CONNECTED

Speed, Capacity and Brake Horse Power at Various Pressures—For 60 Cycle and Direct Current

Size	RPM	Wheel Diam.	1/8"		1/4"		3/8"		1/2"		5/8"		3/4"		7/8"		1"		1 1/8"		1 1/4"		*1 1/2"	
			CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP
B25.....	685	12 3/4	1750	.29	1580	.26	1400	.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	855		2265	.58	2135	.54	2000	.51	1860	.47	1715	.44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	1140		.....	.....	.....	.....	.....	.....	.....	.....	2700	1.23	2600	1.18	2490	1.13	2390	1.09	2280	1.04	2160	.98	1830	.8
B30.....	685	15 1/2	3310	.80	3110	.75	2910	.71	2690	.65	2455	.60	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	855		.....	.....	.....	.....	.....	.....	.....	.....	3550	1.32	3380	1.26	3200	1.19	3000	1.12	2795	1.04	2500	.93	.....	.....
	1140		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4340	2.8	
B35.....	570	18 1/4	3744	.71	3440	.66	3130	.60	2770	.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	685		4640	1.28	4395	1.20	4140	1.14	3880	1.06	3600	1.00	3285	.91	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	855		.....	.....	.....	.....	.....	.....	.....	.....	5090	2.16	4880	2.07	4665	2.00	4440	1.90	4190	1.79	3930	1.68	4787	2.4
B40.....	570	21	5890	1.49	5530	1.40	5180	1.32	4800	1.22	4432	1.13	3970	1.02	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	685		.....	.....	.....	.....	.....	.....	.....	.....	6340	2.33	6030	2.22	5720	2.15	5370	1.98	5000	1.85	4560	1.69	.....	.....
	855		8200	4.65	7920	4.51	7740	4.40	7470	4.25	7200	4.10	6950	3.98	8370	5.5
B45.....	490	23 3/4	7330	1.72	6875	1.60	6400	1.51	5900	1.40	5070	1.21	4660	1.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	570		8720	2.75	8340	2.64	7940	2.52	7530	2.40	7080	2.25	6620	2.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	685		.....	.....	.....	.....	.....	.....	.....	.....	9300	4.40	8950	4.25	8620	4.09	8250	3.92	7850	3.74	7450	3.55	9020	5.0
B50.....	490	26 1/2	10420	3.05	9900	2.90	9380	2.75	8850	2.60	8300	2.45	7680	2.26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	570		.....	.....	.....	.....	.....	.....	.....	.....	10450	4.18	10000	4.00	9520	3.83	9000	3.50	8400	3.41	7750	3.15	9500	4.4

B55.....	425	29 1/4	12180	3.32	11550	3.15	10850	2.99	10150	2.79	9370	2.58	8550	2.35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	570		.....	.....	.....	.....	.....	.....	.....	.....	14680	7.15	14150	6.91	13620	6.66	13100	6.40	12520	6.14	11920	5.85	14400	7.0

B60.....	380	32	14200	3.60	13400	3.40	12550	3.20	11700	3.00	10720	2.76	9600	2.49	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	490		.....	.....	.....	.....	.....	.....	.....	.....	16100	6.82	15450	6.55	14770	6.30	14070	6.00	13300	5.70	12480	5.35	15200	7.6

B70.....	340	37 1/2	20720	5.80	19700	5.52	18550	5.21	17430	4.52	16230	4.60	14970	4.23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	380		.....	.....	.....	.....	.....	.....	20400	7.18	19410	6.82	18400	6.48	17220	6.10	16000	5.68	14500	5.17	.....	.....	.....	.....
	425		.....	.....	.....	.....	.....	.....	.....	.....	23080	10.1	22200	9.75	21280	9.32	20250	8.91	19230	8.50	18100	8.00	21850	11.3
B80.....	285	43	26100	6.70	24600	6.31	23050	5.92	21480	5.52	19800	5.10	17880	4.63	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	340		.....	.....	.....	.....	.....	.....	.....	.....	26820	9.90	25500	9.40	24130	8.90	22600	8.38	20790	7.70	18500	7.00	23000	9.9

B90.....	245	48 1/2	32100	7.70	30150	7.25	28100	6.80	26000	6.30	23750	5.78	21000	5.12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	285		.....	.....	.....	.....	.....	.....	33000	10.7	31250	10.2	29420	9.66	27250	8.95	24800	8.17	.....	.....	.....	.....	.....	.....
	310		.....	.....	.....	.....	.....	.....	.....	.....	35500	13.9	33900	13.2	32150	12.6	30350	11.9	28300	11.2	25850	10.2	31900	14.5

*These capacities are for Blowers with Whiting Wheels.
These weights are approximate depending upon the speed.

SHIPPING WEIGHTS IN POUNDS

Current	B25	B30	B35	B40	B45	B50	B55	B60	B70	B80	B90
2-3 phase.....	225	360	470	700	800	950	1200	1400	2050	2850	3325
1 phase.....	250	405	550	725	850	1040	.....	.....	.....	.....	.....
D. C.....	360	410	600	850	1020	1200	1600	1900	2500	3400	4100

Prices on application.

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.

Motor Controls.

Condit Electrical Mfg. Corp.

Oil Circuit Breakers.

Ferranti Electric Ltd.

Transformers, Surge Absorbers.

J. P. Tubular Heater Co.

Electric Heating Systems.

Sangamo Electric Limited,

Watt-hour Meters,

Peak Load Controllers.

N. Slater Co. Limited,

Cutouts and Disconnects.

Telegraph Condenser Co.

Power Static Condensers.

Weston Electric Instrument Corp.

Indicating Instruments of all kinds.

Radio Test Equipment.

Mather & Platt Ltd.

Motors and Generators, All Types,

A.C. and D.C. Complete line of

Centrifugal Pumps.

A. Reyrolle & Co. Limited.

Metal Clad Switchgear.

Ilg Electric Ventilating Co.

Ventilating Fans and Blowers.

Hewitt Electric Co.

Rectifiers (Glass bulb).

ILG ELECTRIC VENTILATION

ILG Variable Air Controllers for Type "B"
Universal Blowers

Open



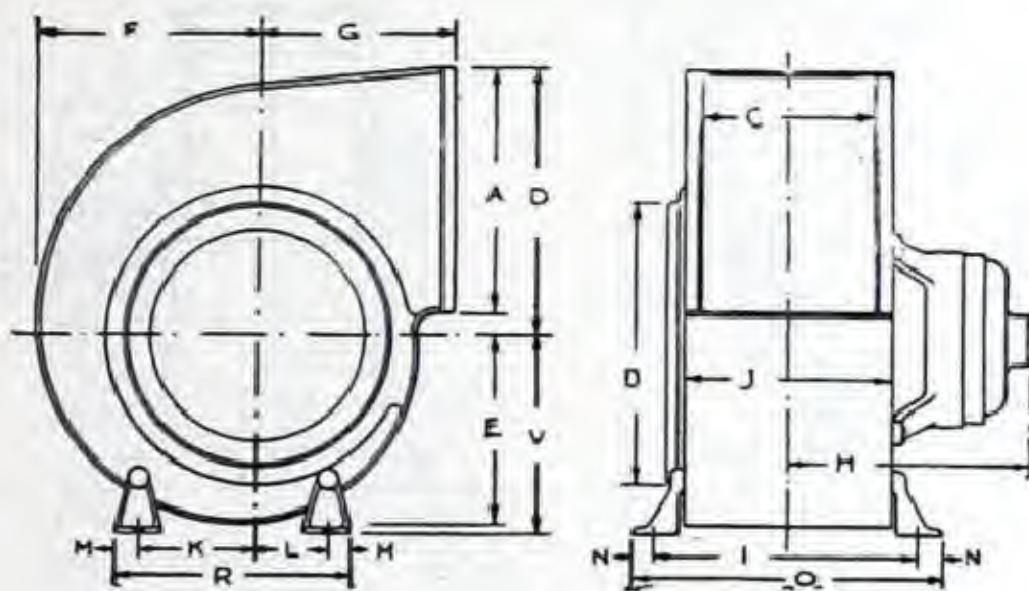
Closed

Variable air control is often desirable. The ILG Variable Air Controller accomplishes this very effectively. It consists of a shutter like mechanism which is fastened to the discharge side of the blower and operated manually or by remote electrical control.

The ILG Variable Air Controller permits the use of the more efficient constant speed squirrel cage motor, with its substantial power saving and sturdy dependability. The power required to drive the blower drops off with the reduction in the air delivery. This is a direct saving.

Shipping Weights

B-25.....	40 lbs.	B-55.....	95 lbs.
B-30.....	45 lbs.	B-60.....	110 lbs.
B-35.....	50 lbs.	B-70.....	125 lbs.
B-40.....	60 lbs.	B-80.....	150 lbs.
B-45.....	65 lbs.	B-90.....	165 lbs.
B-50.....	90 lbs.		

DIMENSIONS OF TYPE "B" DIRECT-CONNECTED
UNIVERSAL BLOWERS

Blower is shown for discharge 1F. Motor is on opposite side for discharge 2F.

Size	Wheel Dia.	A	B	C	D	E	F	G	H AC	H DC
25	12 3/4	13	13	9	14 1/8	10	11 3/4	10 1/8	14 3/4	19 1/2
30	15 1/2	16	16	11	17 3/8	12 1/8	14 1/4	12	14 3/4	19 1/2
35	18 1/4	19	19	13	20 1/2	14 1/4	16 3/4	14	15	23 1/2
40	21	22	22	15	23 5/8	16 3/8	19 1/4	16	18 1/2	24
45	23 3/4	25	25	17	26 3/4	18 1/2	21 3/4	18	19	24
50	26 1/2	28	28	19	29 7/8	20 5/8	24 1/4	20	19	30
55	29 1/4	31	31	21	33	22 3/4	26 3/4	22	21 1/2	31
60	32	34	34	23	36 1/8	24 7/8	29 1/4	24	24	31
70	37 1/2	40	40	27	41 5/8	30 1/8	35 1/4	27 1/8	28	36 1/2
80	43	46	46	31	48 1/8	34 3/8	40 1/4	31 1/8	30	38
90	48 1/2	52	52	35	54 1/8	38 3/8	45 1/4	34 5/8	32	42

Size	I	J	K	L	M	N	O	P	R	V
25	14 1/4	10 1/4	6	3 3/4	1 1/4	3/4	15 3/4	5/8	12 1/4	10 1/2
30	17	12 1/2	7 1/4	4 1/2	1 1/2	1	19	5/8	14 3/4	12 3/4
35	19 3/4	14 3/4	8 1/2	5 1/4	1 3/4	1 1/8	22	5/8	17 1/4	14 3/4
40	22 1/2	17	9 3/4	6 1/4	2	1 3/8	25 1/4	3/4	20	17
45	25 1/4	19 1/8	11	7	2 1/4	1 5/8	28 1/2	3/4	22 1/2	19
50	28 1/4	21 3/8	12 1/2	8	2 1/2	1 3/4	31 3/4	7/8	25 1/2	21
55	31	23 3/8	13 3/4	8 1/2	2 3/4	2	35	7/8	27 3/4	23 1/2
60	33 3/4	25 7/8	15	9 1/2	3	2 1/4	38 1/4	1	30 1/2	25 1/2
70	38	26 5/8	15	10	3 1/2	3	44	1	32	30 1/2
80	43	30 5/8	17	12	4	3 1/2	50	1 1/8	37	35
90	49	34 5/8	19	14	4 1/2	4	57	1 1/8	42	39

Prices on application.

ILG ELECTRIC VENTILATION

ILG Type "B" Universal Belted Blower



The ILG Type "B" Universal Belted Blower construction is similar to that of the direct connected unit; sides are cast iron and the bearing bracket is recessed in the sheet steel bowl. Pulley and wheel are overhung in the shaft which runs on oversized babbitted sleeve type bearings. No bearing is used in the inlet. Both single width, single inlet and double width, double inlet models are available.

ILG TYPE "B" BELTED UNIVERSAL BLOWERS
Capacities in C.F.M., Power and Speeds†

Size	Outlet Area, Sq. Ft.	Tip Speed Factor	R P M	1/4" S.P.		1/2" S.P.		3/4" S.P.		1" S.P.		1 1/4" S.P.	
				CF M	HP	CF M	HP	CF M	HP	CF M	HP	CF M	HP
B25	.8	3.3*	700	1650	.27	1250	.23	.....	.....	.....	.....	.....	.....
			750	1820	.35	1460	.27	.....	.....	.....	.....	.....	.....
			800	1965	.50	1655	.37	1250	.28	.....	.....	.....	.....
			900	2275	.65	2020	.58	1730	.50	1280	.37	.....	.....
			1000	2565	.89	2345	.81	2110	.72	1845	.64	.....	.....
			1100	2870	1.22	2670	1.13	2450	1.04	2235	.96	.....	.....
			1200	3170	1.60	2990	1.50	2795	1.40	2600	1.30	.....	.....
			1400	3760	2.60	3605	2.48	3440	2.37	3270	2.25	.....	.....
B30	1.2	4.0*	600	2640	.42	2100	.38	.....	.....	.....	.....	.....	.....
			650	2900	.64	2445	.50	1710	.35	.....	.....	.....	.....
			700	3170	.80	2785	.72	2290	.60	.....	.....	.....	.....
			800	3750	1.24	3410	1.13	3025	1.00	2570	.84	.....	.....
			900	4290	1.76	3990	1.62	3670	1.50	3330	1.36	.....	.....
			1000	4840	2.48	4560	2.34	4260	2.20	3980	2.04	.....	.....
			1100	5375	3.30	5125	3.19	4860	3.00	4610	2.85	.....	.....
			1200	5920	4.32	5700	4.15	5550	3.97	5210	3.80	.....	.....
B35	1.7	4.7*	550	3300	.6	2500	.45	.....	.....	.....	.....	.....	.....
			600	3710	.8	3060	.68	.....	.....	.....	.....	.....	.....
			650	4125	1.03	3540	.88	2850	.51	.....	.....	.....	.....
			700	4500	1.26	3975	1.12	3420	.95	.....	.....	.....	.....
			800	5290	1.98	4845	1.81	4410	1.66	3870	1.47	.....	.....
			900	6040	2.90	5645	2.70	5260	2.51	4840	2.31	.....	.....
			1000	6790	4.02	6440	3.80	6100	3.60	5745	3.39	5380	3.18
			1100	7495	5.32	7190	5.11	6880	4.91	6570	4.70	6240	4.47
B40	2.3	5.5*	450	4085	.64	2930	.48	.....	.....	.....	.....	.....	.....
			500	4810	.93	3820	.76	.....	.....	.....	.....	.....	.....
			550	5360	1.22	4590	1.06	3550	.86	.....	.....	.....	.....
			600	5975	1.62	5280	1.45	4460	1.23	.....	.....	.....	.....
			650	6575	2.08	5940	1.91	5260	1.69	4430	1.42	.....	.....
			700	7190	2.67	6600	2.49	6000	2.27	5310	2.01	4385	1.70
			800	8320	4.07	7815	3.81	7300	3.56	6760	3.42	6200	3.06
			900	9440	5.91	9000	5.61	8575	5.40	8100	5.10	7600	4.83

†Interpolation of the figures for other speeds should be made as follows:

- (1) The air delivery varies directly with the speed.
- (2) The static pressure varies as the square of the speed.
- (3) The horsepower varies as the cube of the speed.

*Tip speed equals factor times R.P.M.

Prices on application.

The ILG self-cooled motor feature is worthy of consideration when purchasing ventilation equipment. Fresh, cool outside air is drawn in through the motor allowing it to operate at a lower temperature and for a longer service life.

ILG ELECTRIC VENTILATION

ILG TYPE "B" BELTED UNIVERSAL BLOWERS

Capacities in C. F. M., Power and Speeds†

Size	R.P.M.	1/4" S.P.		1/2" S.P.		3/4" S.P.		1" S.P.		1 1/4" S.P.	
		CFM	HP	CFM	HP	CFM	HP	CFM	HP	CFM	HP
B45											
Out.	410	5300	.90	3593	.70						
Area	450	6110	1.20	5020	1.00						
Sq. Ft.	500	7050	1.75	6080	1.50	4650	1.22				
3.0	550	7950	2.37	7110	2.13	6140	1.85				
Tip	600	8820	3.13	8070	2.80	7180	2.60	6250	2.25		
Speed	700	10490	5.12	9840	4.80	9150	4.40	8940	4.12	7700	3.80
Factor	800	12160	7.70	11570	7.70	11050	7.00	10440	6.60	9850	6.25
6.2*											
B50											
Out.	370	6870	1.18	5330	.88						
Area	400	7600	1.48	6230	1.18						
Sq. Ft.	425	8250	1.80	7000	1.55						
3.7	450	8880	2.16	7680	1.88	6240	1.55				
Tip	500	10700	3.08	9030	2.72	7920	2.40	6500	1.95		
Speed	550	11220	4.18	10340	3.82	9400	3.47	8250	3.05		
Factor	600	12480	5.47	11630	5.12	10750	4.75	9800	4.33	8700	3.90
6.9*	640	13400	6.75	12630	6.32	11830	5.90	10950	5.48	10000	5.25
B55											
Out.	360	9330	1.80	7450	1.50						
Area	400	10700	2.60	9150	2.30	7190	1.75				
Sq. Ft.	425	11550	3.15	10150	2.80	8550	2.30				
4.5	475	13200	4.40	12000	4.00	10700	3.60	9100	3.15		
Tip	500	14050	5.20	12850	4.80	11620	4.40	10200	3.90		
Speed	525	14850	6.00	13750	5.70	12600	5.20	11350	4.70	9900	4.20
Factor	570	16180	7.90	15200	7.35	14180	6.85	13100	6.20	11920	5.80
7.6*											
B60											
Out.	300	9850	1.60	7120	1.20						
Area	350	12100	2.60	10150	2.20						
Sq. Ft.	375	13150	3.20	11450	2.80	9380	2.30				
5.4	400	14300	4.00	12700	3.50	10850	3.00				
Tip	425	15350	4.85	13800	4.40	12300	3.90	10200	3.25		
Speed	450	16425	5.80	15000	5.35	13550	4.85	11850	4.30		
Factor	475	17450	6.95	16150	6.45	14780	5.95	13320	5.30	11400	4.70
8.3*	500	18450	8.00	17200	7.50	15900	7.00	14600	6.40	13050	5.80
B70											
Out.	275	15000	2.70	11850	2.20						
Area	300	16750	3.65	14150	3.15						
Sq. Ft.	350	20350	5.95	18150	5.30	15850	4.70				
7.5	375	22000	7.45	20000	6.80	17900	6.10	15450	5.30		
Tip	400	23800	9.15	21950	8.50	20050	7.80	17850	6.95	15300	6.00
Speed	425	25400	11.00	23650	10.30	21900	9.60	19950	8.75	17800	7.80
Factor	450	27100	13.15	25500	12.40	23900	11.70	22150	10.85	20300	9.95
9.8*											
B80											
Out.	250	20750	3.95	17000	3.40						
Area	275	23500	5.50	20200	4.80	16300	3.90				
Sq. Ft.	300	26200	7.40	23250	6.70	20000	5.80				
9.9	325	28800	9.45	25950	8.50	23100	7.60				
Tip	350	31300	11.80	28950	11.00	26400	10.10	22350	8.60	20000	7.70
Speed	375	33950	14.90	31700	13.80	29450	12.90	26950	11.80	24300	10.70
Factor	400	36600	18.10	34400	17.10	32300	16.10	30000	15.00	27700	13.90
11.2*											
B90											
Out.	200	23200	3.70	17400	3.00						
Area	225	27400	5.60	22750	4.60						
Sq. Ft.	250	31600	7.80	27300	6.80	22500	5.70				
12.6	275	35250	10.60	31700	9.50	27600	8.30	22600	7.00		
Tip	300	39900	14.00	35800	12.80	32200	11.40	28250	10.20		
Speed	325	42600	17.70	39750	16.70	36700	15.50	33300	14.00	29500	12.50
Factor	350	46200	22.50	43500	21.20	40850	19.90	37700	18.40	34600	16.95
12.7*											

†Interpolation of the figures for other speeds should be made as follows:

- (1) The air delivery varies directly with the speed.
- (2) The static pressure varies as the square of the speed.
- (3) The horsepower varies as the cube of the speed.

*Tip speed equals factor times R.P.M.

Prices on application.

Accurately balanced blades insure quiet operation.

Rigid capacity tests guarantee rated outputs.

ILG ELECTRIC VENTILATION

BELTED BLOWER DATA

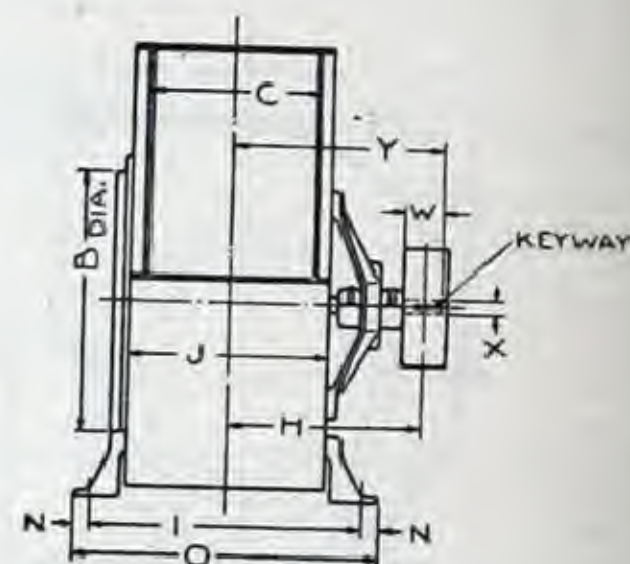
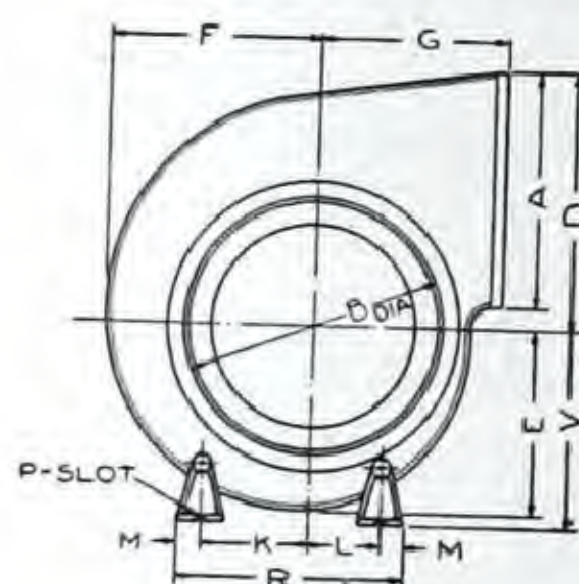
SINGLE WIDTH—SINGLE INLET—

Blower Size No.	R.P.M. Range	Standard Pulley Size	Shipping Weight
B25	685-1430	7"x3"	220
B30	610-1220	7"x3"	250
B35	530-1140	9"x4"	300
B40	460-920	9"x4"	485
B45	410-855	11"x4"	600
B50	370-640	14"x5"	800
B55	330-570	14"x5"	925
B60	310-490	16"x5"	1350
B70	260-460	22"x7"	1650
B80	240-400	28"x7"	2250
B90	190-340	36"x7"	2900

DOUBLE WIDTH—DOUBLE INLET—

Blower Size No.	R.P.M. Range	Standard Pulley Size	Shipping Weight
B50	370-740	16"x5"	995
B55	330-685	17"x7"	1150
B60	310-685	19"x7"	1600
B70	260-570	27"x9"	2075
B80	240-490	32"x9"	2825
B90	190-365	36"x9"	3700

Capacities of double width blowers are double those of single width blowers.



Dimensions in Inches of Single Width, Single Inlet Blowers

Size	A	B	C	D	E	F	G	H	I	J	K	L
25	13	13	9 14 1/8	10	11 1/4	10 1/8	15 5/8	14 1/4	10 1/4	6	3 1/4	
30	16	16	11 17 3/8	12 1/8	14 1/4	12	15 5/8	17	12 1/2	7 1/4	4 1/2	
35	19	19	13 20 1/2	14 1/4	16 3/4	14	16 1/4	19 1/4	14 3/4	8 1/2	5 1/4	
40	22	22	15 23 5/8	16 3/8	19 1/4	16	17 1/4	22 1/2	17	9 3/4	6 1/4	
45	25	25	17 26 3/4	18 1/2	21 3/4	18	18 3/4	25 1/4	19 1/8	11	7	
50	28	28	19 29 1/8	20 5/8	24 1/4	20	20 1/4	28 1/4	21 3/8	12 1/2	8	
55	31	31	21 33	22 3/4	26 3/4	22	23 1/4	31	23 5/8	13 3/4	8 1/2	
60	34	34	23 36 1/8	24 7/8	29 1/4	24	25	33 3/4	25 7/8	15	9 1/2	
70	40	40	27 41 5/8	30 1/8	35 1/4	27 1/8	31	38	26 5/8	15	10	
80	46	46	31 48 1/8	34 3/8	40 1/4	31 1/8	34 1/2	43	30 5/8	17	12	
90	52	52	35 54 1/8	38 5/8	45 1/4	34 5/8	40	49	34 5/8	19	14	

Size	M	N	O	P	R	V	W	X	Y	St'd Pulley	Key-way
25	1 1/4	3/4	15 3/4	5/8	12 1/4	10 1/2	3 3/4	1 1/8	17 1/8	7x3	1/8x1/8
30	1 1/2	1	19	5/8	14 3/4	12 3/4	3 1/2	1 1/8	17 1/8	7x3	1/8x1/8
35	1 3/4	1 1/8	22	5/8	17 1/4	14 3/4	4 1/4	1 1/8	18 1/4	9x4	1/8x1/8
40	2	1 3/8	25 1/4	3/4	20	17	4	1 1/8	19 1/4	9x4	1/8x1/8
45	2 1/4	1 5/8	28 1/2	3/4	22 1/2	19	4 1/8	1 1/8	20 3/4	11x4	3/8x1/8
50	2 1/2	1 3/4	31 3/4	7/8	25 1/2	21	5 1/8	1 1/8	22 3/4	14x5	3/8x1/8
55	2 3/4	2	35	7/8	27 3/4	23 1/2	5 3/8	1 1/8	25 3/4	14x5	3/8x1/8
60	3	2 1/4	38 1/4	1	30 1/2	25 1/2	5 1/8	1 1/8	27 1/2	16x5	3/8x1/8
70	3 1/2	3	44	1	32	30 1/2	6 1/2	2 1/8	34 1/4	22x7	1/2x1/4
80	4	3 1/2	50	1 1/8	37	35	6 1/4	2 1/8	37 1/2	28x7	1/2x1/4
90	4 1/2	4	57	1 1/8	42	39	7 1/2	2 1/8	43 1/4	36x7	1/2x1/4

Prices on application.

ILG ELECTRIC VENTILATION

ILG Type "B" Volume Blowers



The new ILG Type "B" Volume Blowers are suitable for all kinds of small volume, low pressure installations. The latest development in small blowers of this type, they combine surpassing high efficiency and low power consumption.

They are quiet and smooth running.

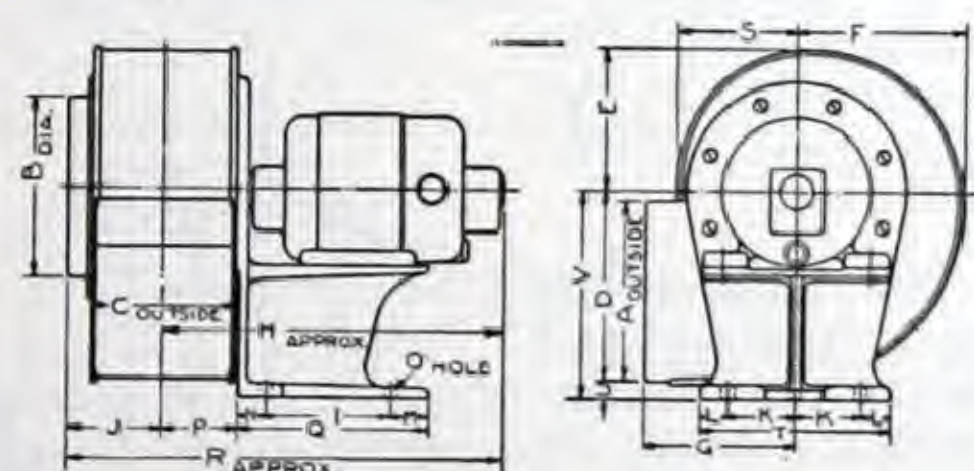
The housing and multi-blade wheel are die-cut steel. The wheel is carefully balanced. The inlet flange and the base which bears both housing and the direct connected motor are cast iron. Discharge is universal. Table shows capacities in C. F. M. against inches static pressure.

Performance Table

Size	RPM	HP	Free Delivery	1/8"	1/4"	3/8"
9	1140	1/70	180	145	100	....
9	1750	1/20	275	255	235	205
12	1140	1/20	410	370	320	250
12	1750	1/5	630	610	580	550
15	1140	1/7	790	725	680	610
15	1750	1/2	1200	1175	1140	1100
18	855	1/7	1000	920	820	710
18	1140	1/3	1340	1275	1210	1140
18	1750	1 1/4	2050	2000	1975	1935
21	855	1/3	1580	1480	1380	1260
21	1140	3/4	2100	2030	1960	1880

Size	1/2"	5/8"	3/4"	7/8"	1"	1 1/4"	1 1/2"
9	....	....	....	....	....	....	....
9	170	....	....	....	....	....	....
12	....	....	....	....	....	....	....
12	515	475	435	390	300	....	....
15	530	400	....	....	....	....	....
15	1070	1030	990	940	900	780	600
18	500	....	....	....	....	....	....
18	1070	985	880	720	....	....	....
18	1900	1850	1810	1770	1720	1610	1490*
21	1130	960	750	....	....	....	....
21	1800	1700	1620	1500	1400	1000	....

*Capacity—1 3/4" S. P.—1360 C.F.M. 2" S.P.—122 C.F.M.



Dimensions in Inches

Size	A	B	C	D	E	F	G	H	I	J	K	L
9	4¾	4¾	3¾	5	3¾	4⅞	4	8½	3¼	2½	1¾	¾
12	6¼	6¼	5	6⅝	4½	5⅝	5¼	10½	4¾	3⅝	2½	¾
15	7¾	7¾	6⅛	8¼	6	7	6½	14	6	3½	3¼	¾
18	9¼	9¼	7¼	9⅞	7⅛	8⅞	7¾	17½	7½	4½	4	¾
21	10¾	10¾	8½	11½	8⅞	9¾	9	20¾	8¾	5⅝	4¾	¾

Size	M	N	O	P	Q	R	S	T	U	V	Shipping Weight
9	¾	1	⅝	2	5	11⅞	3⅛	5	½	5½	45 lbs.
12	¾	1	⅝	2⅝	6½	13⅞	4⅞	6½	⅝	7¼	45 lbs.
15	¾	1¼	⅞	3⅞	8	17½	5	8	½	8¾	120 lbs.
18	¾	1¼	⅞	3¾	9½	22	6	9½	⅝	10½	160 lbs.
21	¾	1½	⅞	4⅝	11	26⅛	7	11	¾	12¼	225 lbs.

Prices on application.

ILG ELECTRIC VENTILATION

Type "P" Blowers



The ILG Direct-Connected Electric Volume Blowers are applicable for exhausting dust and fumes from laboratories and polishing rooms, removal of steam and heavy vapors from cooking vats in dye houses, breweries, canning factories, etc.

The discharge can be changed to four different positions, making it possible to install the blower from different angles, thus avoiding friction in short bends.

These blowers are particularly suitable for laboratory exhaust because housing is of cast-iron and wheel of cast aluminum, steel or cast-iron as desired.

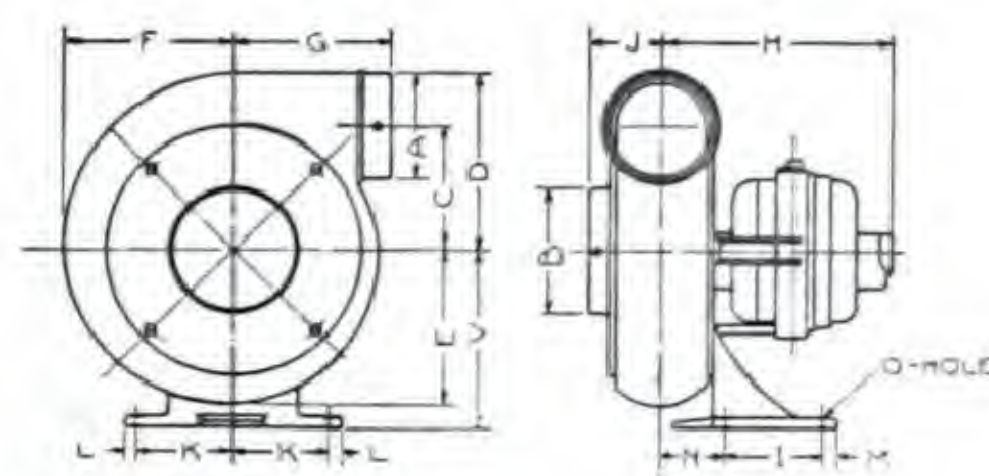
Performance Table

		Static Pressure in Inches of Water							
		1/4		1/2		3/4		1	
Blower Size No.	Rated R.P.M.	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input
7 1/2 P	3400	215	190	210	190	200	185	190	180
10P	*1420	175	100	145	90	100	85	50	80
10P	1720	270	150	235	149	200	148	160	146
15P	*1420	320	130	250	105	185	95	110	90
15P	1720	415	230	375	215	330	200	280	190
20P	*1420	1030	460	980	440	920	420	850	390
20P	1720	1180	820	1130	780	1085	765	1040	740

Static Pressure in Inches of Water

		Static Pressure in Inches of Water							
		1 1/2		2		3			
Blower Size No.	Rated R.P.M.	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input	Watts CFM Input
7 1/2 P	3400	165	175	135	170	70	150		
10P	*1420	0							
10P	1720	85	138	0					
15P	*1420	0							
15P	1720	150	165	0					
20P	*1420	710	340	550	280	0	0		
20P	1720	945	685	845	635	600	510		

*1420 Speed on 25 Cycle only.



Principal Dimensions

Size	Whl. Diam.	A	B	C	D	E	F	G
7 1/2 P	6 3/4	3	4 7/8	1 1/8	5	6 3/8	5 3/8	5
10P	8 1/8	3 3/8	5 1/2	1 1/8	5 3/4	7 7/8	6 1/8	5 1/2
15P	9 7/8	5	5 7/8	1 1/8	7	9 1/8	7 7/8	7 1/8
20P	13 1/4	6 3/4	7 3/4	1 1/8	9 5/8	12 3/8	10	9 7/8
Size	Whl. Diam.	H A.C.	H D.C.	J	K	L	N	O
7 1/2 P	6 3/4	9 1/2	9 3/8	2 1/2	3 7/8	3/8	2 1/8	2 1/8
10P	8 1/8	10 1/8	9 7/8	2 3/8	4 7/8	1/2	3/8	2 1/2
15P	9 7/8	11	11 1/8	3 1/8	6	1/2	3/8	3 3/8
20P	13 1/4	14 1/4	16 1/4	5 3/8	6 3/4	1/2	1	4 3/8

Prices on application.

ILG ELECTRIC VENTILATION

ILG Pressure Blowers



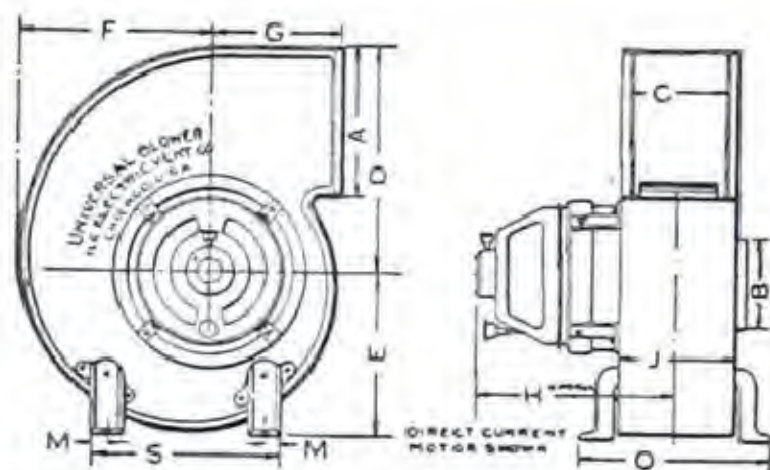
ILG Pressure Blowers for pressures from 2 inches to 6 inches are built in 3 sizes.

These machines can be used for large forges, melting furnaces, and miscellaneous high pressure work. They are very suitable for mine ventilation in connection with flexible ducts for delivering air long distances.

110 VOLTS

Blower Size No.	Speed R.P.M.	C.F.M.	Static Pressure	Watts Input	Current	Shipg. Weight
25.....	1750	2700	2"	1500	D. C.	365
		2000	3"	1250		
		1200	4"	1000	A. C.	290
		....	5"	....	
		....	6"	....	
30.....	1750	3500	2"	3600	D. C.	490
		3100	3"	3300		
		2600	4"	2900	A. C.	450
		2000	5"	2400		
		....	6"	....	
35.....	1750	5000	2"	7250	D. C.	555
		4500	3"	7000		
		3600	4"	5800	A. C.	500
		2500	5"	4000		
		1000	6"	3500		

Speed Controllers furnished on Direct Current. Suffix Letter "F" for 25 Cycle. Prefix Letter "O" for 220 volts. Prefix Letter "U" for 440 volts.



Principal Dimensions

Blower Size	Whl. Dia.	A	B	C	D	E	F	G
25.....	15 1/4	10 1/4	7 1/4	6 1/4	13 3/8	10 7/8	12	8 7/8
30.....	17 3/4	12 1/8	14	8	17 3/8	13 3/8	15 1/8	10 3/4
35.....	20 1/4	14 1/8	14 1/2	9 1/4	20 1/2	14 3/4	19 1/8	10 7/8

Blower Size	Whl. Dia.	H A.C.	H D.C.	J	M	O	S
25.....	15 1/4	15 1/2	19	8 1/4	1 1/2	17 1/4	13
30.....	17 3/4	17 1/2	21	10	1 1/2	18	15 1/4
35.....	20 1/4	18 1/2	22	12	1 1/2	19 1/2	16

Note—Dimensions E and S change slightly with change of discharge.

Prices on application.

ILG Ventilators and Blowers are available for all duties and capacities. From the small kitchen ventilator to the large industrial blower systems, the Ilg nameplate stands for quality and guaranteed capacities.

ILG ELECTRIC VENTILATION

ILG Unit Heaters



ILG UNIT HEATERS

The new ILG Unit Heater has won its way into factories, stores, garages, etc., everywhere by sheer ability to heat faster and better—at lower cost.

Its smooth, powerful ILG Self-Cooled Motor Propeller Fan enables it to concentrate a stream of warm air at the floor level and minimizes heat loss above the working zone.

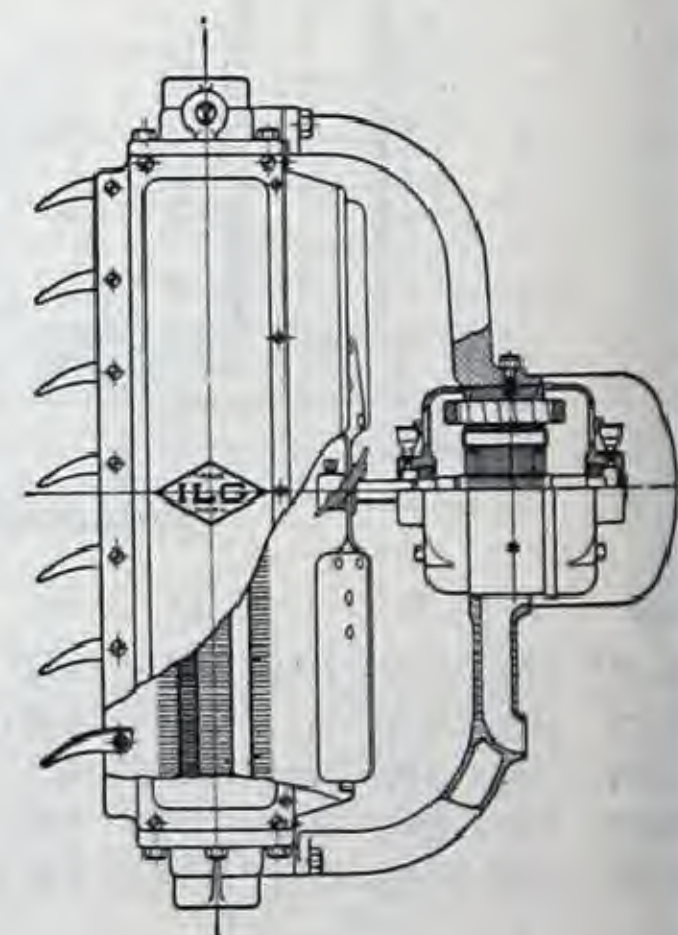
Concentration of high heat value in each ILG Unit Heater affords substantial savings in installation. Ordinarily the unit heater is suspended by its eye bolts 7 or 8 feet from the floor. Available in single and two speed units; the ILG Unit Heater can be operated manually, by electric thermostat, or steam regulator.



Coil: The ILG Unit Heater Coil is constructed throughout of copper, 99% pure. The seamless tubes are friction fitted to the extended fin surface in such a way as to increase the size and efficiency of the primary heating surface. No soldering, brazing or welding is used anywhere in the coil. Each coil is tested with 500 pounds hydrostatic pressure.

Fan wheel: The ILG Unit Heater fan wheel is made of aluminum consisting of four blades rigidly held by a steel spider. It is rotationally balanced eliminating vibration. ILG has drawn on many years of experience in the propeller fan field in the design of this wheel.

Motors: The motor is the heart of the unit heater and no unit heater can be any more dependable than its motor. ILG has recognized the importance of this truth by designing and building a unit heater motor especially for the new ILG Unit Heater. The motor is a specialist, intended solely for unit heater duty. Its stamina and simplicity, its smoothness and quietness, make it as nearly perfect a unit heater motor as has been developed. It is enclosed for protection purposes. Positive motor temperature control is provided by the exclusive ILG self cooling design. All standard circuits and voltages can be supplied. Constant speed is standard. Two speed, single phase motors are available at a small extra charge.



Prices on application.

ILG ELECTRIC VENTILATION
CAPACITIES OF ILG UNIT HEATERS

60 Cycles—2 lbs. Steam

Size	RPM	Enter- ing Temp.	B.T.U.	Leav- ing Temp.	CFM†	Watts	EDR‡	Cond.
13U-I	1140	60	31850	122	470	65	133	32.9
13U	1140	60	57300	137	700	45	239	59.4
		70	54200	142				56.2
13U	1750	60	77800	127	1070	140	324	80.6
		70	72600	133				75.3
17U	855	60	84500	136	1050	50	352	87.5
		70	80200	141				83.1
17U	1140	60	104000	129	1400	120	433	107.8
		70	97900	135				101.5
17U	1750	60	141500	121	2150	350	611	146.7
		70	131000	127				135.8
19U	855	60	123000	127	1700	125	513	127.5
		70	115000	133				119.2
19U	1140	60	155000	123	2260	285	646	160.7
		70	145000	129				150.2
19U	1750	60	210000	116	3470	855	875	217.7
		70	197000	123				204.2
25U	685	60	180500	138	2160	140	752	187.2
		70	168000	143				174.2
25U	855	60	210500	133	2700	270	878	218.2
		70	198000	138				205.3
25U	1140	60	259000	126	3600	640	1080	268.5
		70	242000	132				251.0
31U	685	60	270000	138	3300	215	1125	280.0
		70	256000	143				265.5
31U	855	60	319000	132	4130	415	1330	331.0
		70	300500	137				311.5
31U	1140	60	396000	126	5500	975	1650	411.0
		70	369000	131				382.5

ILG Unit Heaters are tested and rated in accordance with the Standard Code adopted by the Industrial Unit Heater Association and the American Society of Heating and Ventilating Engineers. . . Ratings apply only to recirculation and free discharge. . . †C.F.M.=Cubic feet per minute of standard air at 70° F. and standard basis of rating (2 lb. steam pressure and 60° F. entering air). . . ‡E.D.R.=Equivalent direct radiation at standard basis of rating.

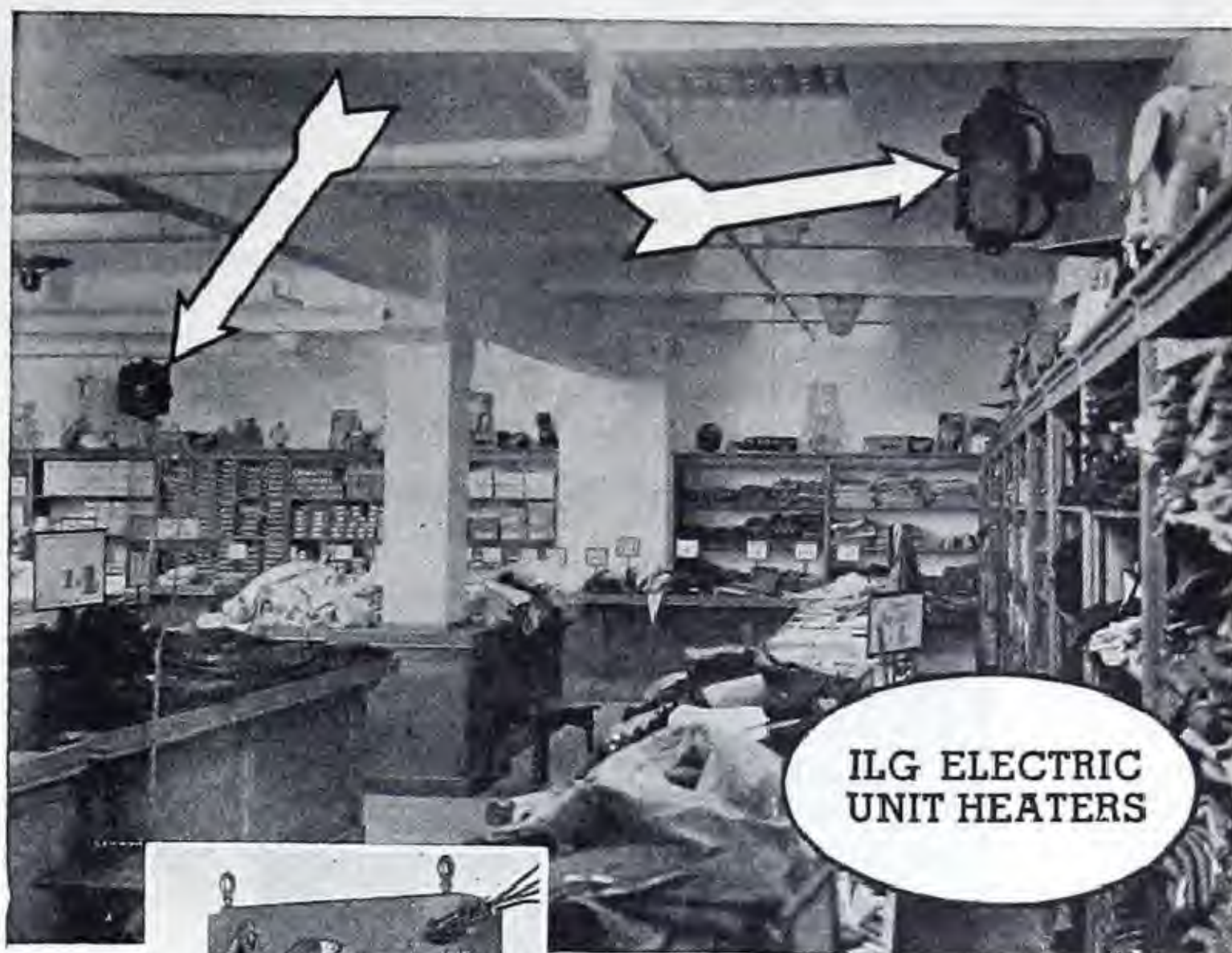
Dimensions and Weights

Size	Height	Width	Depth	Supply Risers	Return Risers	Net Wgt.	Shpg. Wgt.
13U	21"	15½"	18½"	1¼"	1"	120	180
17U	24"	18½"	19¼"	1½"	1"	150	210
19U	27"	21½"	21¼"	1½"	1"	178	245
25U	35"	27¾"	28"	2½"	1½"	350	420
31U	42"	33½"	31"	2½"	1½"	465	545

Where steam pressure is referred to as a condition of rating it is meant to be the gauge pressure maintained on the heating surface and to determine the pressure required at the boiler a suitable line drop must be allowed for. Where heaters are to handle air at temperatures below freezing it is recommended that a minimum pressure of five pounds gauge should be maintained on the heating surface.

Prices on application.

ILG ELECTRIC VENTILATION
ILG Unit Heaters



For specific installations where ordinary heating methods are not practical, there is nothing like the ILG Electric Unit Heater. It fills a definite need with efficient and economical operation—eliminates cost of central heating plants, pipe lines and caretakers—heats instantly and uniformly—is clean, safe, dependable—and has an ILG fully enclosed, self-cooled motor propeller fan that insures quiet, steady distribution of heat at the working zone.

The heating coil is of non-glow type protected against excessive temperature rise by patented automatic thermal cutout operating in conjunction with magnetic starter.

List No.	Capacity K.W.	Capacity B.T.U.	C.F.M.	R.P.M.	Net Wt.	Shpg. Wt.
513	5	17100	335	855	60	75
713	7	24000	465	855	60	75
913	9	30800	600	1140	65	80
917	9	30800	600	855	100	125
1213	12	41000	800	1140	65	80
1217	12	41000	800	855	100	125
1513	15	51200	1000	1140	65	80
1517	15	51200	1000	855	100	125
1813	18	61500	1200	1750	70	80
1817	18	61500	1200	1140	105	130
1819	18	61500	1200	855	190	240
2217	22½	75200	1500	1140	105	130
2219	22½	75200	1500	855	190	240
2717	27	92200	1800	1140	105	130
2719	27	92200	1800	855	190	240
3019	30	102500	2000	1140	195	245
3617	36	123000	2400	1750	110	135

Prices on application.

ILGAIR AIR CONDITIONING

The 1935 line of Ilgair Cooling and Air-Conditioning equipment consists of one self-contained unit, the model 11 Spot Kooler, four ceiling type cooling units numbered Nos. 135CU, 175CU, 195CU and 255CU, two floor type cooling units Nos. 500 and 501 and eight sizes of compressors or condensing units as follows:—

IW 1002, IW 1502, IW 2002, IW 3003,

IW 5003, IW 7503, IW 10003, IW 15003.

The Model 11 Spot Kooler is, of course, complete in itself. The ceiling and floor cooling units, however, are not self-contained but must be connected singly or in multiple to one of the condensing units listed above.

Ilg Spot Koolers



The Ilg Spot Kooler is a self contained unit designed primarily for concentrated cooling and made in the half ton size only.

These units can be furnished in attractive burled walnut wood or metal cabinets. They cool, dehumidify and recirculate the room air.

The compressor unit consisting of a twin cylinder compressor driven by a half horsepower motor; water cooled condenser and control equipment are housed in the lower section of the cabinet.

The cooling coil is located at the rear of the upper section of the cabinet and a quiet fan draws the room air over this coil; cooling and extracting the moisture, if any is in the air and passing the cooled air out into the room.

The cooled air may be diverted in any direction by means of the exclusive Ilg circular deflector. There are no drafts. The unit is controlled by an electrically operated switch located on the front of the cabinet, and electrical and water connections are necessary.

This is a Completely Electrical, Self Contained Unit

Capacity Tons of Refrigeration	H.P.	Alternating Current 110 Volts, 220 Volts, 1 Phase 1 Phase	Direct Current 110 or 220 Volts	Net Wgt. Lbs.
1/2	1/2	\$315.00	\$315.00	325

Quantity Spot Kooler discounts on orders shipped and billed at one time are 5% on quantity of six; 10% on quantity of ten or more.

BTU Capacity	Air Delivery CFM	Con- denser Cooled by	Overall Dimensions H. W. D.	Piping Con- nections Water Inlet and Outlet P.T. or 1/2" C
6000	280	Water	42 3/4" 29 1/4" 18 1/2"	3/8" P.T. or 1/2" C

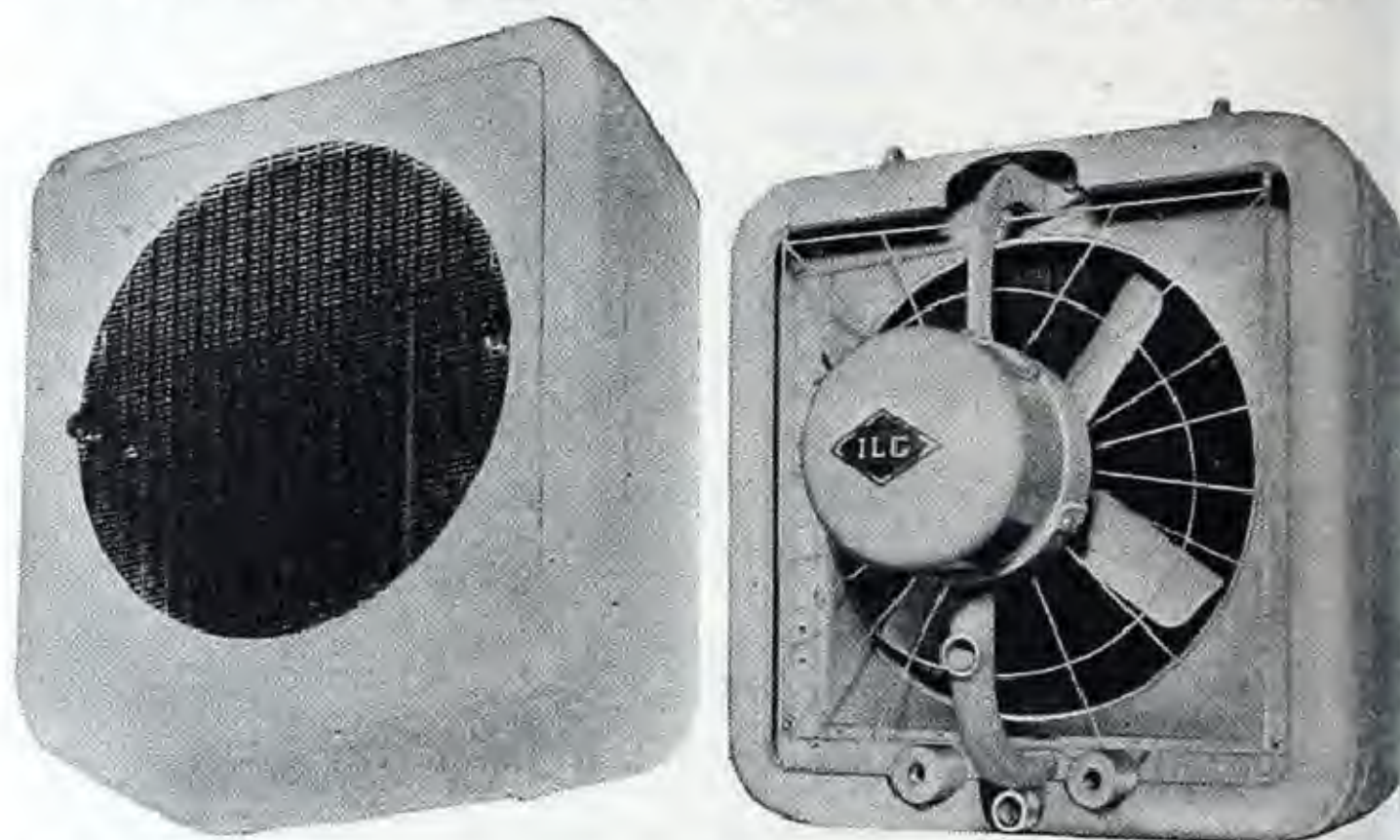
"P.T." refers to pipe thread; "C" refers to copper.

ILGAIR AIR CONDITIONING

ILG SPOT-KOOLER INSTALLATION INSTRUCTIONS

1. Read instructions.
2. Open unit—remove cover and the lower front panel
3. Remove hold down straps, chocks, etc., from top and bottom compartments.
4. Locate unit, adjust switch to "off" position and connect unit to water supply, drain and proper electrical circuit. Provide water shut-off valve and see that pipes are connected to water inlet and outlet as indicated on connection plates. (Wrong connection results in flooding.) Do not have drain pipe higher than water outlet. Fuse electrical circuit for twenty amperes.
5. Open water valve so that water will flow when unit starts. Remove valve caps and open both valve at left hand side of receiver as far as possible. Replace caps tightly.
6. Oil motor in top compartment, replace cabinet cover oil motor in the lower compartment and start apparatus by setting switch to the "on" position. Make sure that circuit breaker knob on water control switch is pushed into closed position. The motor should run the compressor, and the fan in upper compartment should blow air out into the room. This air should be cold almost immediately.
7. Stop and start unit several times to make sure you installation is correct, and replace front panel.

Ilg Kold Ceiling Type Cooling Units



The ceiling type cooling unit is not a self contained cooler but is connected singly or in multiple to the external source of cooling, which may be an Ilg Kold compressor or ice bunker located in the basement or other available space. Available in several sizes, the Ilg ceiling coolers, consisting of a copper coil and Ilg self cooled motor propeller fan, can be used to great advantage on cooling installations from one ton capacity up. The air is cooled, dehumidified and recirculated.

The Ilg Kold Ceiling Type Cooling Unit is quiet and attractive, furnished in ivory finish as standard.

These units are used singly or in multiple with

ILG KOLD COMPRESSORS

Model No.	R.P.M.	Number of Valves Required	Alternating Current Expansion 220 Volts, 440 Volts, 60 Cycle, 60 Cycle, Direct			Net Wt. Lbs.
			1 Ph's	3 Ph's	Current	
135UC	1140	1	\$106.00	...	\$112.50	154
175UC	855	1	122.00	...	130.00	193
195UC	855	2	150.00	\$150.00	162.00	248
255UC	685	2	206.00	206.00	224.00	310

Expansion valve, List Price, each \$11.00.

Model No.	Watts	CFM	Overall Dimensions			Connection Dimensions		
			H.	W.	D.	Sup- ply	Re- turn	Drai
135CU	45	810	21 1/4"	21 1/4"	18 3/4"	1/4"	1/2"	3/4"
175CU	50	1220	24 1/4"	24 1/4"	21"	3/8"	3/4"	3/4"
195CU	125	1970	27 1/4"	27 1/4"	26 1/4"	3/8"	3/4"	3/4"
255CU	140	2500	33 1/4"	33 1/4"	26 3/4"	3/8"	1"	3/4"

ILGAIR AIR CONDITIONING

Model 135 CU

UNIT COOLER DIRECT EXPANSION CAPACITIES IN BTU PER HOUR

Size of coil, 15" x 15". Face area, 1.56 sq. ft. Nominal tonnage, 1.25 tons. Net weight, 150 lbs.

Suction temperature of refrigerant at unit cooler surface.

40°F. 28 lb. Methyl chloride
37 lb. F-12

Speed	Dry Bulb	Relative humidity of air entering unit				
		40%	50%	60%	70%	80%
5 RPM	75°	8100	9600	10350	11000	11500
Watts	80°	10400	11750	12600	13300	13450
0 CFM	85°	12800	14100	15000	15300	16200
Face	90°	15300	15750	17500	18150	18700
velocity	95°	17850	19000	20000	20700	21300
385	100°	20450	21600	22600	23100	24000
40 RPM	75°	9750	11550	12400	13200	13850
Watts	80°	12550	14100	15200	15950	16200
0 CFM	85°	15400	17000	18000	18400	19500
Face	90°	18400	18900	21000	21800	22500
velocity	95°	21450	22900	24000	24900	25650
520	100°	25700	26000	27200	27900	28900

Model 175 CU

UNIT COOLER DIRECT EXPANSION

Size of coil, 18" x 18". Face area, 2.25 sq. ft. Face velocity, 540 feet. Nominal tonnage, 2 tons. Net weight, 190 lbs.

CAPACITIES IN BTU PER HOUR

Suction temperature of refrigerant at unit cooler surface.

40°F. 28 lb. Methyl chloride
37 lb. F-12

Speed	Dry Bulb	Relative humidity of air entering unit				
		40%	50%	60%	70%	80%
	75°	14400	17100	18400	19500	20500
RPM	80°	18550	20900	22400	23600	23900
Watts	85°	22800	25100	26600	27100	28000
0 CFM	90°	27200	28000	31000	32200	33200
	95°	31700	33800	35400	36700	37900
	100°	36300	38500	40200	41200	42600

ILGAIR AIR CONDITIONING

Model 195 CU

UNIT COOLER DIRECT EXPANSION

Size of coil, 21" x 21". Face area, 3.06 sq. ft. Face velocity, 640 feet. Nominal tonnage, 3 ton. Net weight, 240 lbs.

CAPACITIES IN BTU PER HOUR

Suction temperature of refrigerant at unit cooler surface.

40°F. 28 lb. Methyl chloride
37 lb. F-12

Speed	Dry Bulb	Relative humidity of air entering unit				
		40%	50%	60%	70%	80%
	75°	21000	24850	26750	28400	29800
855 RPM	80°	27000	30400	32650	34300	34800
125 Watts	85°	33150	36500	38700	39500	42000
1970 CFM	90°	39500	40700	45200	47000	48400
	95°	46200	49200	51600	53500	55200
	100°	52800	56000	58500	60100	62000

Model 225 CU

UNIT COOLER DIRECT EXPANSION

Size of coil, 27" x 27". Face area, 5.06 sq. ft. Face velocity, 494 feet. Nominal tonnage, 4.25 ton. Net weight, 320 lbs.

CAPACITIES IN BTU PER HOUR

Suction temperature of refrigerant at unit cooler surface.

40°F. 28 lb. methyl chloride
37 lb. F-12

Speed	Dry Bulb	Relative humidity of air entering unit				
		40%	50%	60%	70%	80%
	75°	30800	36400	39200	41700	43700
685 RPM	80°	39500	44500	47800	50250	51000
140 Watts	85°	48600	53600	56750	57900	61500
2500 CFM	90°	57900	59600	66200	68750	70800
	95°	67600	72200	75700	78300	80800
	100°	77500	82000	85700	88100	90800

1. Ratings apply only to recirculation and free discharge of air, a uniform flow of refrigerant to and from the unit, and a liquid refrigerant temperature of 86° F.

2. To determine the refrigerant suction pressure at the compressor, which is lower than the suction pressure at the unit cooler, a suitable pressure drop in the suction line must be allowed for.

ILGAIR AIR CONDITIONING

Ilg Floor Type Cabinet Units



Ilg-Kold Air Conditioning Cabinets are made of auto body steel walnut finish and can be furnished for cooling or heating only, or both. When furnished for cooling only, the unit will effectively dehumidify. The moisture removed from the air being carried away by the drain.

The unit when furnished for heating, can be connected for either steam or hot water and can be furnished with an effective humidifier.

These units are not self contained, and a remote installation of condensing unit or ice bunker as the cooling medium, is necessary.

The cabinet houses the cooling or heating coils and a twin blower fan unit, which draws the air through the front grille to which an air filter is attached, through the coils and discharges through the grille in the top of the cabinet.

The large air capacity of the No. 500 Ilg-Kold air conditioning unit permits a more moderate drop in temperature of a larger amount of air, and thus minimizes the stratification of the air at the floor. This permits draftless comfort cooling.

The motor which drives the twin blower unit is furnished with 3 speeds 1140—850—690. A 3 speed switch is mounted on side of cabinet. High speed is suitable for quick heating or cooling, low or medium speed for quiet operation.

These units are used single or in multiple with ILGKOLD Compressors.

Model No.	Functions	110 or 220 Volts 60 Cycle		Ex-pan-sion Valve	Wgt. Lbs.
		1 Phase A.C.	220 Volts Direct Current		
500	Cooling and De-humidifying only or Heat-ing only.....	\$185.00	\$195.00	\$11.00	185
501	Cooling, Dehu-midifying, Heating and Filtering.....	220.00	230.00	11.00	210

BTU Capacities*	Cooling	Heating	Watts	CFM	Air† De- livery		Connection Heating		Dimensions Cooling		
					Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Drain
14100	46700	125	500	1"	1"	1"	1"	1"	1"	1"	3/4"

Overall dimensions: height, 32 3/4"; width, 32 3/4"; depth, 13 3/4".

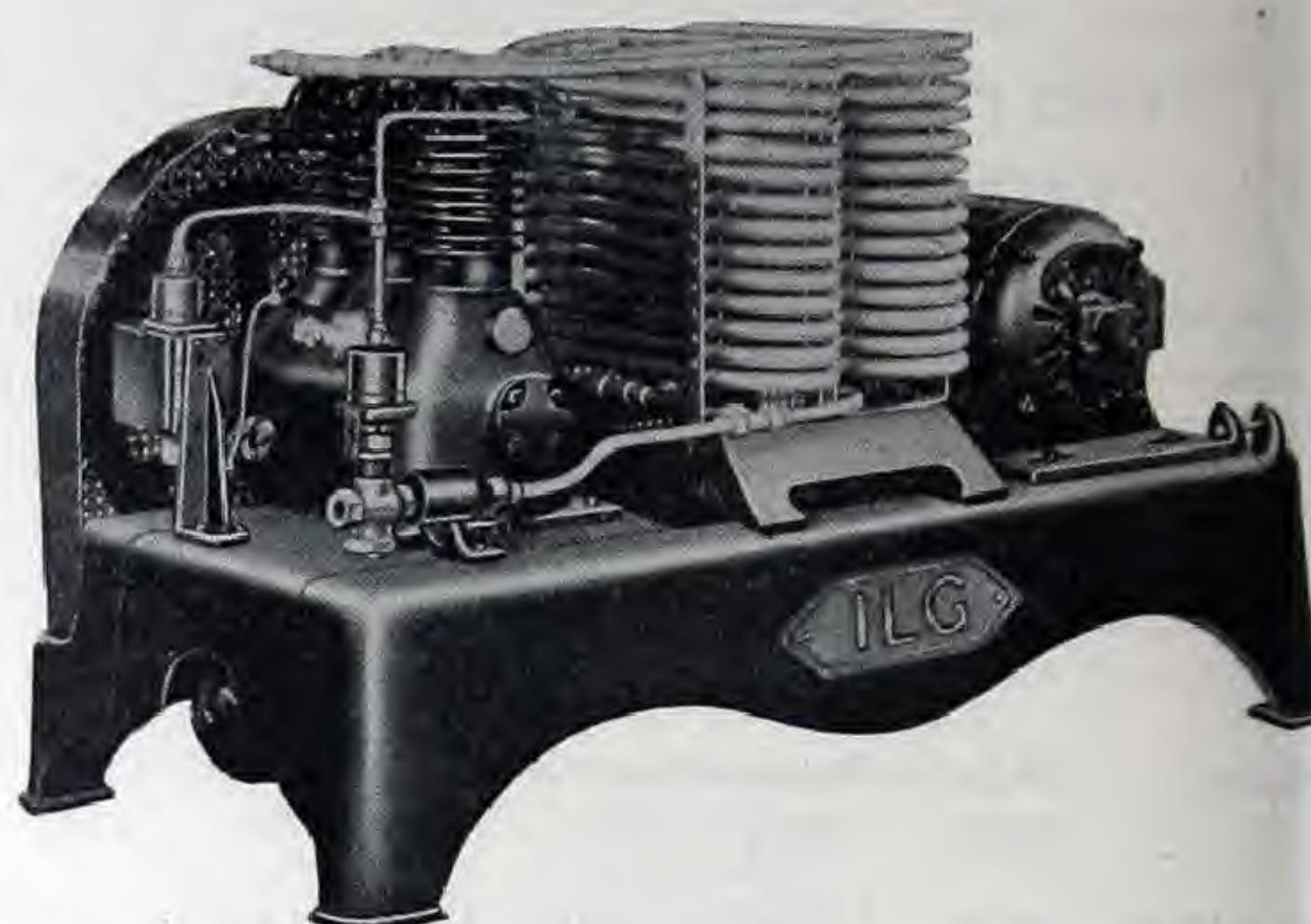
†At 1140 RPM, top speed of the 3 speed motor.

*Cooling capacity under same conditions as outlined for ceiling units.

Heating capacity applies only to recirculation and free discharge on 2 pounds steam pressure and 60° entering air.

ILGAIR AIR CONDITIONING

Ilg Condensing Units



Eight sizes of compressors or condensing units are available for use with Ilg cooling units of the No. 135CU to 255C ceiling type series and the No. 500 floor type series. The condensing unit shown above is the No. IW3003 size.

The specifications of the complete series are shown in the following pages:

Model No.	H.P.	220 Volts 60 Cycle Alternating Current		Direct Current	
		1 Phase*	3 Phase	110 Volts	220 Volts
IW1002	1	\$245.00	\$260.00	\$345.00	\$345.00
IW1502	1 1/2	306.00	308.00	365.00	365.00
IW2002	2	354.00	344.00	428.00	428.00
IW3003	3	470.00	435.00	556.00	556.00
IW5003	5	840.00	728.00	962.00	940.00
IW7503	7 1/2	....	1,030.00	1,270.00	1,246.00
IW10003	10	....	1,088.00	1,360.00	1,354.00
IW15003	15	....	1,140.00	1,680.00	1,450.00

Model No.	Pounds of Refrigerant Furnished with Unit**		Solenoid Valve Net Extra†		A.C. or D.C. Room Ther-mostat Net Extra†	Shpg Wt., Lbs.
	Meth. Chlor.	Freon	A.C.	D.C.		
IW1002	8	10	\$7.00	\$8.00	\$10.20	425
IW1502	8	10	7.00	8.00	10.20	480
IW2002	8	10	7.00	8.00	10.20	480
IW3003	12	14	7.00	8.00	10.20	750
IW5003	14	16	7.00	8.00	10.20	800
IW7503	17 1/2	20	24.00	27.40	10.20	1100
IW10003	17 1/2	20	24.00	27.40	10.20	1200
IW15003	..	20	24.00	27.40	10.20	1450

*Also furnished in 110 volts.

**Order must specify refrigerant. Otherwise meth chloride will be furnished.

†Solenoid valve and thermostat prices are net and subject to any discount.

Standard accessories included in above prices are: Pressure actuated water valve, low pressure control with a high pressure cutout. Also magnetic starter except on Model No. IW1000 for alternating current. These compressors are water cooled.

Finish—All surfaces are specially treated to resist corrosion, etc. The compressor and base are finished in gray enamel, and the condenser assembly is lacquered in bronze.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-1002

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and push button starter switch.

Overall dimensions:—Length, 38½"; width, 25"; height, 30½".

Mounting hole dimensions:—Length, 35"; width, 13¾"; 4⅞" diam. holes.

Crating dimensions:—Length, 42"; width, 26½"; height, 35½".

Weight of unit:—Net, 440 lbs. Shipping, 505 lbs.

Compressor—2-cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and stroke—2¼" x 3".

Speed—275 R.P.M.

Displacement—228 cu. ft. per hour.

Compressor weight—80 lbs.

Service valves—Drop forged brass, two-way shut-off with gauge connections.

Refrigerant line connection sizes:—¾" liquid; one ⅝" suction (S.A.E. flare).

Compressor seal:—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Lubrication—Crankshaft revolves in a bath of oil, supplying lubrication to all bearings, seal and cylinder wall. A permanent supply of special refrigeration oil is charged into the compressor at the factory. Visible oil level sight is provided in crankcase wall.

Oil Charge—6 Pints.

Drive—Multiple V-belt.

Cast iron flywheel No. 2306—16" O.D. double groove.

Cast iron Motor pulley No. 2758—2¾" O.D.; Shaft diameter—¾".

No. of V-belts—2 No. 2083; outside circumference—59".

Motor—1 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and wool yarn packing.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—¾" pipe; outlet—½" S.A.E.

Liquid receiver—Horizontal, seamless steel shell construction with spun ends and fusible safety plug.

Maximum allowable charge or ⅔ capacity:—

16½ lbs. of F-12

11½ lbs. of CH3CL.

Water valve—¾" Penn, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Base—Heavy cast-iron construction with adjustable motor plates.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl chloride optional.

Weight of charge:—

12 lbs. of F-12.

8 lbs. of CH3CL.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-1502

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 38½"; width, 25"; height, 30½".

Mounting hole dimensions:—Length, 35"; width, 13¾"; 4⅞" diam. holes.

Crating dimensions:—Length, 42"; width, 26½"; height, 35½".

Weight of unit—Net, 490 lbs. Shipping, 555 lbs.

Compressor—2-cylinder, vertical, reciprocating, valve-in-head, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and stroke—2½" x 3".

Speed—320 R.P.M.

Displacement—327 cu. ft. per hour.

Compressor weight—90 lbs.

Service valves:—Discharge—drop forged brass, two-way shut-off with gauge connections.

Suction—drop forged brass, two-way shut-off with gauge connections—¾" hard drawn fitting.

Refrigerant line connection sizes:—¾" liquid (S.A.E. flare); one ¾" suction (hard drawn).

Compressor seal:—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Lubrication—Crankshaft revolves in a bath of oil, supplying lubrication to all bearings, seal and cylinder wall. A permanent supply of special refrigeration oil is charged into the compressor at the factory. Visible oil level sight is provided in crankcase wall.

Oil Charge—6 Pints.

Drive—Multiple V-belt.

Cast iron flywheel No. 2306—16" O.D. double groove.

Cast iron motor pulley No. 2766—3¼" O.D.; shaft diameter 1".

No. of V-belts—2 No. 2083; outside circumference—59".

Motor—1½ H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and wool yarn packing.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—¾" pipe; outlet—½" S.A.E.

Liquid receiver—Horizontal, seamless steel shell construction with spun ends and fusible safety plug.

Maximum allowable charge or ⅔ capacity:—

16½ lbs. of F-12

11½ lbs. of CH3CL.

Water valve—¾" Penn, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Base—Heavy cast-iron construction with adjustable motor plates.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl chloride optional.

Weight of charge:—

12 lbs. of F-12.

8 lbs. of CH3CL.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-2002

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 38½"; width, 25"; height, 30½".

Mounting hole dimensions:—Length, 35"; width, 13¾"; 4⅞" diam. holes.

Crating dimensions:—Length, 42"; width, 26½"; height, 35½".

Weight of unit:—net, 490 lbs. Shipping, 555 lbs.

Compressor—2-cylinder, vertical, reciprocating, valve-in-head, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and stroke—2½" x 3".

Speed—400 R.P.M.

Displacement—409 cu. ft. per hour.

Compressor weight—90 lbs.

Service valves:—Discharge—drop forged brass, two-way shut-off with gauge connections.

Suction—drop forged brass, two-way shut-off with gauge connections—1" hard drawn fitting.

Refrigerant line construction sizes:—⅜" liquid (S.A.E. flare); one 1" suction (hard drawn).

Compressor seal:—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Lubrication—Crankshaft revolves in a bath of oil, supplying lubrication to all bearings, seal and cylinder wall. A permanent supply of special refrigeration oil is charged into the compressor at the factory. Visible oil level sight is provided in crankcase wall.

Oil Charge—6 Pints.

Drive—Multiple V-belt.

Cast iron flywheel No. 2306—16" O.D. double groove.

Cast iron Motor pulley No. 2758—3⅞" O.D.; Shaft diameter—1".

No. of V-belts—2 No. 2083; outside circumference—59".

Motor—2 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and wool yarn packing.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—⅜" pipe; outlet—½" S.A.E.

Liquid receiver—Horizontal, seamless steel shell construction with spun ends and fusible safety plug.

Maximum allowable charge or ⅔ capacity:—

16½ lbs. of F-12

11½ lbs. of CH3CL.

Water valve—⅜" Penn, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Base—Heavy cast-iron construction with adjustable motor plates.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl chloride optional.

Weight of charge:—

12 lbs. of F-12.

8 lbs. of CH3CL.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-3003

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 52½"; width, 25"; height, 31½".

Mounting hole dimensions:—Length, 48½"; width, 21¼"; 4⅞" diam. holes.

Crating dimensions:—Length, 56"; width, 27"; height, 36½".

Weight of unit:—Net, 680 lbs. Shipping, 760 lbs.

Compressor—3-cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and stroke—2½" x 3".

Speed—400 R.P.M.

Displacement—613 cu. ft. per hour.

Compressor weight—122 lbs.

Service valves—Drop forged brass, two-way shut-off with gauge connections.

Refrigerant line connection sizes:—⅜" liquid; two ½" suction (S.A.E. flare).

Compressor steel:—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Lubrication—Crankshaft revolves in a bath of oil, supplying lubrication to all bearings, seal and cylinder wall. A permanent supply of special refrigeration oil is charged in the compressor at the factory. Visible oil level sight is provided in crankcase wall.

Oil Charge—6 Pints.

Drive—Multiple V-belt.

Cast iron flywheel No. 2594—16" O.D. three-groove.

Cast iron Motor pulley No. 2775—3⅞" O.D.; Shaft diameter—1".

No. of V-belts—2 No. 2593; outside circumference—93"

Motor—3 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and wool yarn packing.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—⅜"; outlet—½" pipe.

Liquid receiver—Horizontal, seamless steel shell construction with spun ends and fusible safety plug.

Maximum allowable charge or ⅔ capacity:—

28 lbs. of F-12

9 lbs. of CH3CL.

Water valve—⅜" Penn, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Base—Heavy cast-iron construction with adjustable motor plates.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl chloride optional.

Weight of charge:—

4 lbs. of F-12.

12 lbs. of CH3CL.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-5003

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions—Length, 52½"; width, 25"; height, 32".

Mounting hole dimensions:—Length, 48½"; width, 21¼"; 4¼" diam. holes.

Crating dimensions—Length, 56"; width, 27"; height, 36½".

Weight of unit:—Net, 795 lbs. Shipping, 875 lbs.

Compressor—3-Cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and stroke—3¼" x 3".

Speed—400 R.P.M. with F-12. 470 R.P.M. with CH3CL.

Displacement—1035 Cu. Ft./Hr. with F-12. 1215 Cu. Ft./Hr. with CH3CL.

Compressor weight—146 lbs.

Service valves:—Discharge and Suction—Drop forged brass, two-way shut-off with gauge connections; (Optional—Suction—Drop forged brass, two-way shut-off with gauge connections—1" hard drawn fitting).

Refrigerant line connection sizes:—5/8" liquid (S.A.E. flare); two 5/8" suction (S.A.E. flare) or one 1" suction (hard drawn).

Compressor seal—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Drive—Multiple V-belt.

Cast iron flywheel No. 40598—15.7" O.D.

Pressed steel motor pulley:—For use with F-12—No. 0860—4.2" O.D. For use with CH3CL—No. 40579—4.8" O.D.

Shaft diameter—1⅞".

No. of V-belts—4 No. 40580; outside circumference 96".

Motor—5 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and ring oiler.

Standard motors include types as follows:—

A.C. Single Phase—Repulsion-induction.

A.C. Polyphase—Squirrel cage induction.

Direct Current—Compound wound.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet, ½" pipe; outlet, ½" pipe.

Liquid receiver—Horizontal, seamless steel shell construction with spun ends and fusible safety plug.

Maximum allowable charge or 2/3 capacity:—

28 lbs. of F-12

19½ lbs. of CH3CL

Water valve—½" Penn, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl Chloride optional.

Weight of charge:—16 lbs. of F-12. 14 lbs. of CH3CL.

Finish—All surfaces are specially treated to resist corrosion, etc. The compressor and base are finished in green enamel, and the condenser assembly is lacquered in bronze.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-7503

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 65"; width, 32¾"; height, 36½".

Mounting hole dimensions:—Length, 53"; width, 20"; 4¼" diam. holes.

Crating dimensions:—Length, 63"; width, 35"; height, 41".

Weight of unit:—Net, 1125 lbs. Shipping, 1235 lbs.

Compressor—3-Cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and Stroke—4" x 4¼".

Speed—275 R.P.M. with F-12. 345 R.P.M. with CH3CL.

Displacement—1525 cu. ft./hr. with F-12. 1920 cu. ft./hr. with CH3CL.

Compressor weight—184 lbs.

Service valves:—Discharge—Drop forged brass, two-way shut-off with gauge connections.

Suction—Drop forged brass, two-way shut-off with gauge connections—1½" hard drawn fitting.

Refrigerant line connection sizes:—5/8" liquid (S.A.E. flare); one 1½" suction (hard drawn).

Compressor seal—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Drive—Multiple V-belt.

Cast iron flywheel No. 5675—22½" O.D.

Pressed steel motor pulley:—

For use with F-12—No. 2797—4.5" O.D.

For use with CH3CL—No. 2795—5.1" O.D.

Shaft diameter—1¼".

No. of V-belts—6 No. 5840; outside circumference—108".

Motor—7½ H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and a ring oiler.

Standard motors include types as follows:—

A.C. Polyphase—Squirrel cage induction.

Direct Current—Compound wound.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—¾" pipe; outlet—¾" pipe.

Liquid receiver—Horizontal, seamless steel shell construction with electro-hydrogen welded crown ends and fusible safety plug prepared for vent piping.

Maximum allowable charge or 2/3 capacity:—

43½ lbs. of F-12

30½ lbs. of CH3CL

Water valve—¾" electromatic, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl Chloride optional.

Weight of charge:—20 lbs. of F-12. 17½ lbs. of CH3CL.

Finish—All surfaces are specially treated to resist corrosion, etc. The compressor and base are finished in green enamel, and the condenser assembly is lacquered in bronze.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-10003

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 67"; width, 32 $\frac{3}{4}$ "; height, 36 $\frac{1}{2}$ ".

Mounting hole dimensions:—Length, 53"; width, 20"; 4 $\frac{1}{16}$ " diam. holes.

Crating dimensions:—Length, 63"; width, 35"; height, 41".

Weight of unit:—1195 lbs. Shipping, 1305 lbs.

Compressor—3-Cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design, and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and Stroke—4" x 4 $\frac{1}{4}$ ".

Speed—345 R.P.M. with F-12. 400 R.P.M. with CH3CL.

Displacement—1920 cu. ft./hr. with F-12. 2225 cu. ft./hr. with CH3CL.

Compressor weight—184 lbs.

Service valves:—Discharge—Drop forged brass, two-way shut-off with gauge connections—1" hard drawn fitting.

Suction—Drop forged brass, two-way shut-off with gauge connections—1 $\frac{1}{2}$ " hard drawn fitting.

Refrigerant line connection sizes:—1" liquid (hard drawn); one 1 $\frac{1}{2}$ " suction (hard drawn).

Compressor seal—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Drive—Multiple V-belt.

Cast iron flywheel No. 5675—22 $\frac{1}{2}$ " O.D.

Pressed steel motor pulley:—

For use with F-12—No. 2794—5.1" O.D.

For use with CH3CL—No. 2796—5.8" O.D.

Shaft diameter—1 $\frac{5}{8}$ ".

No. of V-belts—6 No. 5840; outside circumference—108".

Motor—10 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and a ring oiler.

Standard motors include types as follows:—

A.C. polyphase—Squirrel cage induction.

Direct current—Compound wound.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—1" pipe; outlet, 1" pipe.

Liquid receiver—Horizontal, seamless steel shell construction with electro-hydrogen welded crown ends and fusible safety plug prepared for vent piping.

Maximum allowable charge or $\frac{2}{3}$ capacity:—

43 $\frac{1}{2}$ lbs. of F-12

30 $\frac{1}{2}$ lbs. of CH3CL

Water valve—1" electromatic, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl Chloride optional.

Weight of charge:—20 lbs. of F-12. 17 $\frac{1}{2}$ lbs. of CH3CL.

Finish—All surfaces are specially treated to resist corrosion, etc. The compressor and base are finished in green enamel, and the condenser assembly is lacquered in bronze.

ILGAIR AIR CONDITIONING

Ilg Condensing Unit Model IW-15003

SPECIFICATIONS

Condensing Unit consists of complete assembly, and includes the base, motor, compressor with all valves, condenser, receiver, V-belt drive, guard, dual control, and the automatic starter.

Overall dimensions:—Length, 67"; width, 32 $\frac{3}{4}$ "; height, 36 $\frac{1}{2}$ ".

Mounting hole dimensions:—Length, 53"; width, 20 4 $\frac{1}{16}$ " diam. holes.

Crating dimensions:—Length, 63"; width, 35"; height, 41".

Weight of unit:—1240 lbs. Shipping, 1350 lbs.

Compressor—3-Cylinder, vertical, reciprocating, single-acting. Suction and discharge valves are of proven design and make possible high operating efficiencies.

Cylinder body—Cast semi-steel with finned cylinder body and water-cooled head.

Bore and Stroke—4" x 4 $\frac{1}{4}$ ".

Speed—525 R.P.M. with F-12. 525 R.P.M. with CH3CL

Displacement—2920 cu. ft./hr. with F-12. 2920 cu. ft./hr. with CH3CL.

Compressor weight—184 lbs.

Service valves:—Discharge—Drop forged brass, two-way shut-off with gauge connections—1" hard drawn fitting.

Suction—Drop forged brass, two-way shut-off with gauge connections—1 $\frac{1}{2}$ " hard drawn fitting.

Refrigerant line connection sizes:—1" liquid (hard drawn) one 1 $\frac{1}{2}$ " suction (hard drawn).

Compressor seal—Bellows and lubricated ring type. Patented features provide temperature regulation and insure service-free operation.

Crankshaft—Extra heavy drop forged steel with ground and lapped bearing surfaces.

Pistons—High grade cast iron, accurately machined, three rings per piston.

Connecting rod—Drop forged steel.

Drive—Multiple V-belt.

Cast iron flywheel No. 5918—22 $\frac{1}{2}$ " O.D.

Cast iron motor pulley:—

For use with F-12—No. 40808—7.1" O.D.

For use with CH3CL—No. 40808—7.1" O.D.

Shaft diameter—1 $\frac{5}{8}$ ".

No. of V-belts—7 No. 5840; outside circumference—108

Motor—15 H.P. This motor is especially designed for refrigeration duty, and is built to give high starting torque with low starting and operating power consumption. Motor bearings are well lubricated with an ample supply of oil and a ring oiler.

Standard motors include types as follows:—

A.C. polyphase—Squirrel cage induction.

Direct current—Compound wound.

Condenser—Water-cooled, double copper tube using the highly efficient counter-flow principle.

Condenser water connections:—

Inlet—1" pipe; outlet—1" pipe.

Liquid receiver—Horizontal, seamless steel shell construction with electro-hydrogen welded crown ends and fusible safety plug prepared for vent piping.

Maximum allowable charge or $\frac{2}{3}$ capacity:—

43 $\frac{1}{2}$ lbs. of F-12

30 $\frac{1}{2}$ lbs. of CH3CL

Water valve—1" electromatic, pressure regulated.

Dual control—Low pressure control with high pressure cut-out.

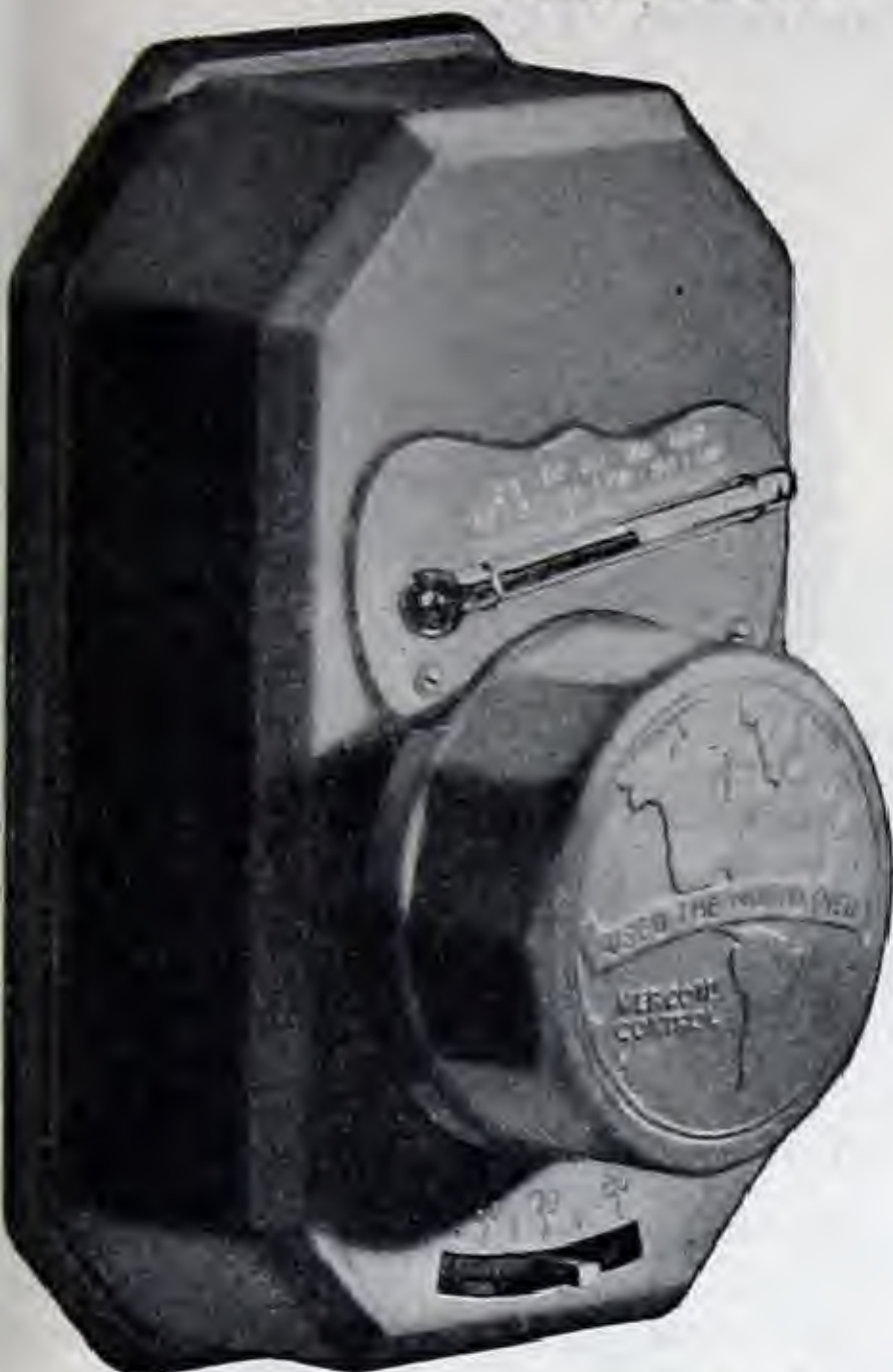
Strainer—Remote—to be installed in liquid line.

Refrigerant—Unit charged with Freon. Methyl Chloride optional.

Weight of charge:—22 lbs. of F-12. 19 lbs. of CH3CL.

Finish—All surfaces are specially treated to resist corrosion, etc. The compressor and base are finished in green enamel, and the condenser assembly is lacquered in bronze.

MERCOID THERMOSTAT
Air Temperature Control



No. 855 Thermometer attached

No. 855
The No. 855 Mercoid Thermostat is designed for control of automatic equipment such as refrigeration, oil burners, stokers, forced draft coal burners, or unit heaters. It is also extensively used in directly controlling electric heaters to prevent freezing in pump and valve rooms, and has many other applications in the industrial field.

This instrument is neat in appearance, and as compact as it is possible to make a heavy capacity type thermostat. For any application where size or where closer

differentials are desired the low voltage Mercoid Sensatherm and Type V Transformer Relay are recommended.

The dull gold finish of the No. 855 harmonizes with any scheme of decoration. The thermometer, attractive in appearance and especially designed for this thermostat, is hand calibrated to insure accuracy.

The Mercoid switch with its hermetically sealed mercury contact is immune to oxidation, dirt or corrosion. Burning, pitting and sticking,—sources of service trouble and expense with open-to-air contacts,—cannot occur with the sealed Mercoid switch. The contact remains permanently clean and the free flowing mercury insures perfect electrical contact at every operation.

This instrument is sturdily constructed throughout. The pressed steel base and all operating parts are cadmium plated to prevent corrosion. Adjustment is easily made by setting the indicator for the desired temperature as shown on the graduated scale.

The unique feature is the thermal element projecting from the front of the instrument, where it has free air circulation. The volatile liquid within this element expands or contracts with temperature changes and actuates the inner bellows and mechanism thus throwing the Mercoid switch to either the "on" or "off" position.

The following standard ranges and differentials are available.

Range	General Application	Approx. Differential
56-80° F.....	Heating.....	1½° F
38-60° F.....	Unit Heaters.....	1½° F
45-72° F.....	Unit Heaters.....	1½° F
65-90° F.....	Air Conditioning.....	3-4° F
25-60° F.....	Refrigeration.....	2½° F

Ranges higher than standard can be furnished on special order.

Ordering Data

When ordering specify number and range of instrument desired. Unless otherwise specified, instruments will be furnished single pole with 10 ampere rating, to cut out on rising temperature, with exception of refrigeration range 25° to 60° which is furnished to cut in on rising temperature.

List Prices

No. 855	Single Pole	Single Pole
Mercoid Thermostat	Single Throw	Double Throw
	10 Amp. 4 Amp.	10 Amp. 4 Amp.
For Heating, 56°-80°, 38°-60°, 65°-90°.....	\$16.50	\$15.50
For Unit Heaters, 45°-72°.....	16.50	15.50
For Refrigeration, 25°-60°.....	16.50	15.50
Thermometer, add to list..	1.50	1.50
Adjustment lock.....	1.00	1.00
Special Range, add to list..	4.00	4.00
Shipping Weight 2 Lbs.		

MERCOID THERMOSTAT
Air Temperature Control

No. 845



No. 845 Cover Removed

Listed By

Underwriters' Laboratories, Inc.

This thermostat operates on the same general principles as the No. 855 and is used for the same purposes. It can be furnished with 10 Ampere, Double Pole, Single Throw or 10 Ampere Single Pole, Double Throw switches and as the differential is slightly wider than that of the No. 855, it is used where close control is not required.

Standard ranges, for heating 56° to 80° F., 38° to 60° F.; for refrigeration 25° to 60° F. Special ranges higher or lower than standard are available on special order. The differential on heating type instruments is approximately 2°, and on refrigeration types approximately 4°.

Easily adjusted for the desired temperature by moving indicator at bottom of instrument. Locking device can be furnished on this adjustment to prevent tampering.

For heating applications this instrument is furnished with dull gold cover and flanged type outlet box as illustrated opposite on No. 855 thermostat. For refrigeration applications black covers and wall type outlet boxes are furnished. Furnished with thermometer on cover on special order.

LIST PRICES

No. 845	Single Pole	Single Pole	Single Pole	Single Pole	Double Pole	Double Pole
Mercoid	Single Throw	Double Throw	Single Throw	Double Throw	Single Throw	Double Throw
Thermostat	10	4	10	4	10	4
	Amp.	Amp.	Amp.	Amp.	Amp.	Amp.
For Heating, 56°-80°, 38°-60°.....	\$25.00	\$23.50	\$29.00	\$26.00	\$29.00	\$26.00
For Refrigeration, 25°-60°.....	30.00	28.50	34.00	31.00	34.00	31.00
Thermometer, add to list.	2.00	2.00	2.00	2.00	2.00	2.00
Locking Device, add to list.....	2.00	2.00	2.00	2.00	2.00	2.00
Special Range, add to list.....	4.00	4.00	4.00	4.00	4.00	4.00

Shipping weight, 2½ pounds

MERCROID BOILER CONTROL

Immersion Type

FOR HOT WATER
and
VAPOR-VACUUM
SYSTEMS



Fig. 36
Phantom View

Mercroid Immersion Type Controls have proven by their unfailing accuracy and durability, over years of service, to be the correct type of automatic limiting device for control of motor driven units on hot water boiler installations and vapor vacuum heating systems.

There is no lag in the operation of these controls such as is encountered with controls mounted on the outside of the boiler or risers. The brass bulb is installed directly in the boiler water, and the volatile liquid within, quickly and accurately follows temperature changes.

These controls are equipped with a snap action movement insuring positive operation of the Mercroid switch when the water reaches the temperature for which the control is set. They are sturdily constructed throughout and maintain their inherent accuracy for years.

RANGES AND DIFFERENTIALS

Fig. 36 and 37

Range Number	Range Specification Degrees	Range Adjustment	OPERATION					
			Low Setting Cut-in	Low Setting Cut-out	Medium Setting Cut-in	Medium Setting Cut-out	High Setting Cut-in	High Setting Cut-out
1	105 to 160	30°	105°	130°	125°	145°	145°	160°
2	140 to 214	49°	140°	165°	170°	190°	200°	214°
3	200 to 226	12°	200°	214°	207°	220°	214°	226°

Note: For double pole or two circuit instrument of 10 ampere capacity the operation will be approximately 10° wider than that shown above.

APPLICATIONS

Hot Water Boilers: As a safety limiting device, Fig. 36 or 37 with range No. 2 is recommended.

Hot Water Storage Tanks: As a regulating instrument, Fig. 36 or 37 is recommended with either range No. 1 or No. 2 depending on temperature desired.

Indirect Water Heaters on Steam Boilers: To supply domestic hot water from a steam boiler the control must operate the burner during the no heat period when the thermostat is shut off, and hold the boiler temperature just below the steaming point. Fig. 37 with range No. 2 mounted on side of steam boiler below water line gives excellent results. This instrument will withstand 250 deg. F. (15 lbs. steam pressure) without injury.

Vapor-Vacuum Boilers: The temperature of the water in a boiler changes according to changes of pressure or vacuum. Fig. 37 range No. 3 when installed on the side of a Vapor-Vacuum boiler below the water line, gives very positive regulation and overcomes trouble due to loss of vacuum. When set low, this control cuts out at 214° (10 oz. pressure) and cuts in at 200° (6" vacuum), but can be set to cut out as high as 226° (4½ lbs. pressure) and cut in at 214° (10 oz. pressure).

MERCROID BOILER CONTROL

Immersion Type



Fig. No. 37

CONSTRUCTION AND OPERATION

The volatile liquid, contained in the bulb and heavy bronze Bourdon Tube, expands and contracts with temperature changes, and operates the snap action mechanism which throws the Mercroid switch to the "on" or "off" position.

The Mercroid enclosed mercury contact switch used is not subject to open arcing, oxidation, corrosion or affected by dust and dirt, and will operate indefinitely without deterioration.

Each instrument has a wide adjustable range. The control setting can be quickly raised or lowered by turning the simple hand adjustment screw conveniently located on the back of the case.

The bulbs are made of drawn brass 1½" diameter, 3' long and have a threaded connection ½" I.P.S. Bulbs 1¾" long with ¾" connection can be supplied on special order at no extra charge. The pressed steel case is 5¾" in diameter with black heat-resisting finish. Approved type outlet box has knock-outs on either side. Removable cover permits quick electrical connections.

ELECTRICAL SPECIFICATIONS

Figs. 36 and 37 have a normal current rating of 10 amp. at 110 volts or 5 amp. at 220 volts. They will directly handle motors with the following capacities: Repulsion Induction 1 H.P.; Direct Current, ½ H.P.; Split Phase, ½ H.P. When used as a pilot control with the proper motor starting switch they will automatically regulate motors of the largest size.

ORDERING DATA

When ordering, specify figure number and range of instrument desired. Also electrical capacity and circuit arrangement.

Unless otherwise specified instruments will be furnished single pole, 10 amp. rating, to cut out on rising temperature.

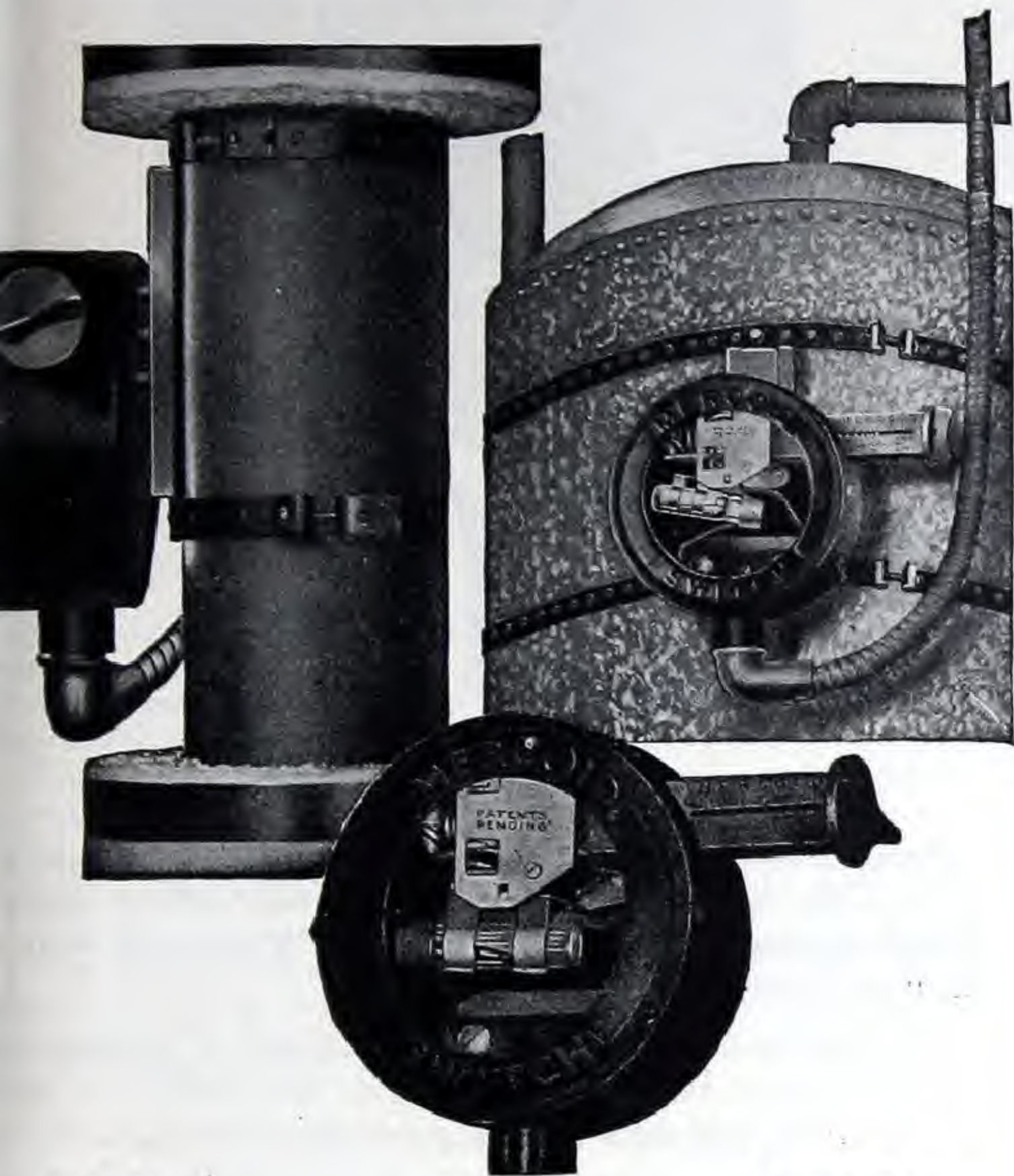
LIST PRICES

Mercroid Immersion Controls	Single Pole Single Throw		Single Pole Double Throw		Double Pole Single Throw	
	10 Amp.	4 Amp.	10 Amp.	4 Amp.	10 Amp.	4 Amp.
Fig. 36, Ranges 1 and 2.	\$18.00	\$17.00	\$22.00	\$20.50	\$22.00	\$20.50
Fig. 37, Ranges 1 and 2.	20.00	19.00	24.00	22.50	24.00	22.50
Fig. 37, Range 3.....	22.00	21.00	26.00	24.50	26.00	24.50

Shipping weight, 4 pounds.

MERCOID RISERTHERM

For Temperature Control by Surface Contact



Side View
Mounted on
Vertical Riser

Fig. 35

Mounted on
Hot Water Tank

FIGURE 35

The Mercoid Risertherm incorporates new features which make it positive and reliable in action, and very sensitive to temperature changes.

It is a temperature limiting control designed to be clamped on risers of hot water heating systems or the surfaces of hot water tanks. It is widely used with Oil Burners, Stokers, Buckwheat or Culm Burners, Gas Burners, etc., but has many applications in other fields. It is particularly recommended for old jobs where it would be difficult to remove the boiler plugs for installation of the Immersion Type Control.

This instrument is provided with a simple interchangeable mounting so that it can be readily attached to either vertical or horizontal pipes. Pipe straps with clamps are furnished which hold the instrument securely in place on any size pipe. It may also be applied to the surface of large diameter tanks as illustrated above by using extra length clamps. One five foot length of perforated steel strap is regularly supplied which may be cut to the desired size. Special lengths furnished when specified.

The standard range of the Mercoid Figure 35 Risertherm is from 110° to 200° F., with an approximate operating differential from 6° F. to 25° F., depending upon the size of pipe and the operating conditions of the installation. On hot water tanks or thin walled pipes, where the temperature lag is small, the closest differentials are obtained.

The instrument is furnished with a convenient outside adjustment and a graduated scale to facilitate a quick and easy setting for any required operating temperature.

MERCOID RISERTHERM

For Temperature Control by Surface Contact

CONSTRUCTION AND OPERATION

The improved Risertherm is equipped with the Figure 9-51 Tipless Mercoid Switch, which is the latest development in sealed mercury contact switches. This switch is constructed in such a manner that the opening and closing of the mercury contact is positive and instantaneous, thus eliminating erratic operation as a result of vibration.

The enclosed mercury contact cannot burn or stick, nor can it oxidize, pit or corrode. The switch will operate indefinitely within its rated capacity without deterioration.

This instrument is actuated by a bronze thermal element containing a highly expansive volatile liquid very sensitive to temperature changes. This element is carefully seasoned at high temperature which insures positive performance for many years. The thermal element is located in a brass housing, which clamps against the pipe or tank, and quickly transmits the heat to the thermal element within.

The binding posts located inside the case simplify the wiring at the time of installation. A connector is provided at the bottom permitting either BX or conduit wiring.

FIGURE 34

This instrument is identical with Fig. 35, except that the Mercoid switch is in reverse position and closes the circuit when the temperature rises to a predetermined point and opens the circuit when the temperature falls.

It is used in connection with a thermostat for dual control of unit heaters to prevent operation of the fan until the coils are heated, thereby insuring economical operation.

The standard range of the Mercoid Figure 34 Risertherm is between 140° F. and 230° F., with the same approximate operating differential as Figure 35.

LIST PRICES

Mercoid Risertherm	Single Pole		Double Pole
	Single Throw	4 Amp.	
Fig. 35, Range 110° to 200°—			
For Heating.....	\$12.00	\$11.00	\$14.50
Fig. 34, Range 140° to 230°—			
For Unit Heaters.....	14.00	13.00	16.50
Shipping Weight, 5 lbs., 11 oz.			

Northern Electric Power Apparatus Specialists in 16 cities across the country assure Power users of a reliable source of information and assistance at all times.

MERCROID PRESSURE CONTROL

Type DA-31

Independent adjustments conveniently arranged for both, high adjustment and low adjustment settings.



Complete View

The Type DA-31 Pressure Control while a new instrument, retains those tried and proven principles of former Mercroid Pressure Controls. The heavy Bourdon tube, as well as the Mercoid Switch and snap action mechanism, have established their reliability on many thousands of installations, over long periods of service, and under all operating conditions. To these features has been added the new external independent adjustments, with high and low setting, each directly indicated on a visible calibrated dial.

A glance shows the pressure at which the instrument will open or close the circuit.

Sealing or locking means provided as standard to prevent tampering.

Electrical Rating, 10 amp. 110 volts, 5 amp. 220 volts. Will directly handle, without the use of a relay, motors up to 1 H.P. Repulsion-Induction or ½ H.P. Split Phase or D.C.

The following ranges are immediately available for shipment

ADJUSTABLE RANGES AND DIFFERENTIALS

Range Number	Adjustable Operating Range	Differentials		Max. Pressure must not exceed	List Prices
		Min.	Max. Entire		
1	10-in. vac. to 12 lb.	1-lb.	Range	30-lb.	\$14.00
2	0 to 35 lb.	1¼-lb.	35-lb.	50-lb.	Prices
3	0 to 60 lb.	2-lb.	60-lb.	80-lb.	on ap-
4	0 to 100 lb.	3-lb.	100-lb.	125-lb.	plica-
5	0 to 150 lb.	4-lb.	150-lb.	200-lb.	tion

Other Ranges on Application.

MERCROID IMMERSION TYPE CONTROLS

Types DA-36 and DA-37

Now Available with Double Outside Adjustments, Accurately Calibrated Visible Dial, and Close Operating Differential



Type DA-36

No other control provides such desirable features for control of hot water boilers, hot water storage tanks, indirect water heaters on steam boilers or close pressure regulation of vapor-vacuum systems.

With the wide range adjustment, and ease of differential adjustment provided, it is necessary to carry only this one type instrument in stock to meet practically all requirements.

Mercoid Immersion Controls are accurate in performance and dependable after years of service. There is no lag in their operation, such as is encountered with controls mounted on the outside of boilers or risers. The brass bulb is installed directly in the boiler water, and the volatile liquid within quickly and accurately follows temperature changes.

The new Mercoid Type DA-36 and DA-37 controls retain those reliable features of former immersion controls, but eliminate the expense and inconvenience of checking the control operation against boiler thermometers. No guesswork or tests are now required. Close differentials are obtainable where desired, and the indicators show at a glance the temperatures at which the instrument operates.

Electrical ratings same as for Type DA-31.

Hot water boilers need not be drained when installing immersion type controls—complete instructions packed with each instrument.

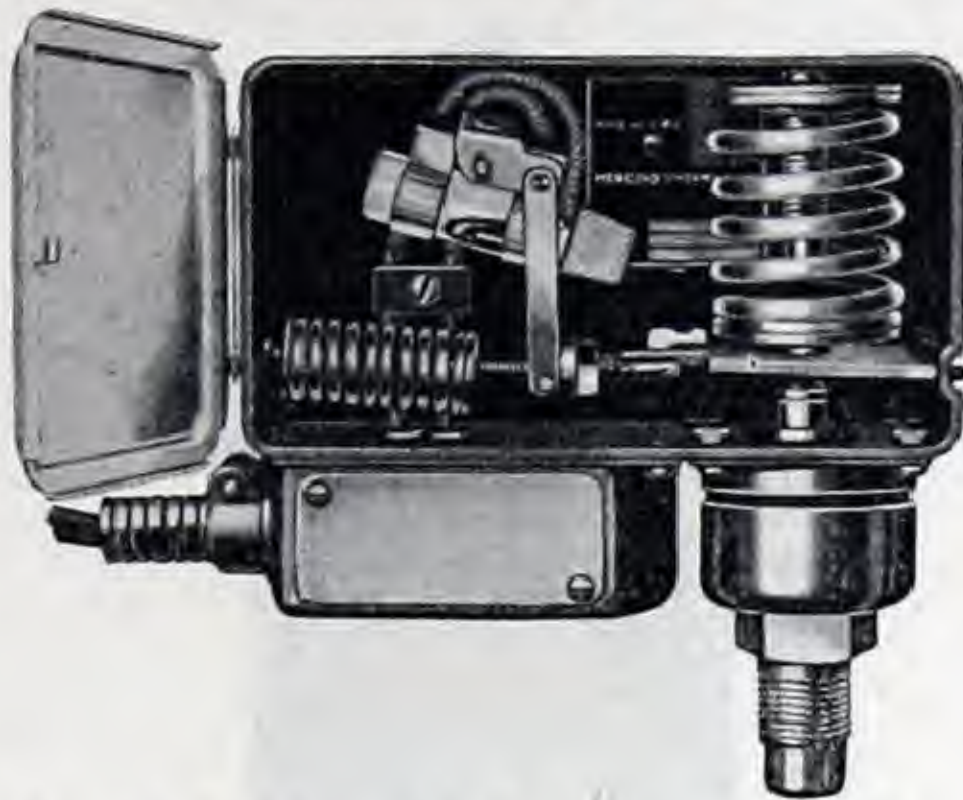
Range, Differentials and List Prices

Type Specification	Adjustable Operating Range	Minimum Differential When Operating Point Set At			List Price
		High	Med.	Low	
DA-36 Straight Stem	135 to 235°	3°	6½°	10°	\$18.00
DA-37 Back Angle	135 to 235°	3°	6½°	10°	18.00
DA-36 Straight Stem	100 to 200°	2°	5½°	9°	18.00
DA-37 Back Angle	100 to 200°	2°	5½°	9°	18.00

Maximum differential 100°.

Maximum temperature must not exceed 260° in the first two above or 222° in the case of the other two.

MERCOID CONTROLS
For Pressure and Vacuum
TYPES 848 A AND B



Models A and B Mercoid Controls are designed to automatically open and close an electric circuit with a change in pressure or vacuum on steam, air, gas, water, etc., or on any gases or liquids that will not attack brass. Widely used for boiler controls with oil burners, buckwheat burners, automatic stokers, also for pressure control on refrigerants other than ammonia.

The line includes controls for pressure, vacuum, and for pressure and vacuum.

These controls are particularly adapted to conditions that require a close differential.

Mercoid Controls give added protection and longer service life due to Mercoid enclosed contact mercury switches. They cannot be affected by dust, dirt or corrosion. The contacting surfaces are kept permanently clean and will operate indefinitely without any deterioration.

CONSTRUCTION AND OPERATION

The power unit in these controls, consists of a metal bellows which expands with an increase in pressure, and in turn, tilts the Mercoid enclosed contact switch to the "off" position, when the pressure reaches the predetermined setting of the instrument. As the pressure decreases, a spring returns the switch to the "on" position. The operation of the power unit remains constant and does not change with long use.

These instruments are of double adjustment type. They have a wide adjustable range and the differentials can be set for very close operation or can be widened to meet any field requirements. A graduated scale shows at a glance the position of the adjusting spring cap.

For steam pressures over fifteen pounds, a syphon must be used.

The case of the instrument, including the steel hinged cover, has a cadmium plate rust-proof finish.

Approved type outlet box is provided, with knockouts on side, back and bottom. All electrical connections can be easily made.

The threaded connections are 1/2" male, and 1/4" female P.S.

ADJUSTABLE RANGES AND DIFFERENTIALS

Model	Adjustable Operating Range	Minimum and Maximum Differential Obtained at Any Operating Pressure
-1	1 lb. to 15 lbs.	1 lb. to 6 lbs.
-2	30" vac. to 3" vac.	2" vac. to 18" vac.
-3	10" vac. to 10 lbs.	1 lb. to 9 lbs. or 2" to 18" mercury either vac. or pressure.
-1	10 lbs. to 60 lbs.	1 1/2 lbs. to 10 lbs.
-2	10" vac. to 45 lbs.	2 lbs. to 18 lbs. or 4" to 36" mercury either vac. or pressure.
-3	30" vac. to 35 lbs.	2 lbs. to 13 lbs. or 4" to 26" mercury either vac. or pressure.
-4	25 lbs. to 100 lbs.	2 lbs. to 15 lbs.

Differentials shown indicate total pressure difference between operation at high and operation at low. Shipping weight 4 pounds.

MERCOID CONTROLS
For Pressure and Vacuum
TYPE 848A AND B

ELECTRICAL SPECIFICATIONS

All models are furnished standard with a normal rating of 10 amp.-110V., 5 amp.-220V., either A.C. or D.C. When so ordered can be furnished with rating 3 amp.-440V. They will directly handle, without the use of a relay, motors within the following capacities.

Repulsion Induction, 1 H.P. Direct Current, 1/2 H.P.

Split Phase, 1/2 H.P.

The 848 Controls shown hereon can also be furnished with a normal rating of 4 amp.-110V., 2 amp.-220V., or 1 amp.-440V., either A.C. or D.C. at reduced list prices.

All Mercoid Controls will automatically regulate motors of the largest size when used as a pilot switch in series with the proper motor starting switch.

ORDERING DATA

When ordering standard controls specify, model and range of instrument desired. Unless otherwise specified, instruments will be furnished single pole, 10 amp. rating, to cut-out on rising pressure.

List Prices

No. 848 Mercoid Controls	Single Pole Single Throw	
	10 Amp.	4 Amp.
Model A-1, 1 lb.-15 lbs.	\$27.00	\$25.50
Model A-2, 30"-3" Vac.	28.00	26.50
Model A-3, 10" Vac.-10 lbs.	28.00	26.50
Model B-1, 10 lbs.-60 lbs.	27.00	25.50
Model B-2, 10" Vac.-45 lbs.	28.00	26.50
Model B-3, 30" Vac.-35 lbs.	28.00	26.50
Model B-4, 25 lbs.-100 lbs.	27.00	25.50
With Hand Reset, All Types, add to List.	2.00	2.00

No. 848 Mercoid Controls	Single Pole Double Throw	
	10 Amp.	4 Amp.
Model A-1, 1 lb.-15 lbs.	\$31.00	\$28.00
Model A-2, 30"-3" Vac.	32.00	29.00
Model A-3, 10" Vac.-10 lbs.	32.00	29.00
Model B-1, 10 lbs.-60 lbs.	31.00	28.00
Model B-2, 10" Vac.-45 lbs.	32.00	28.00
Model B-3, 30" Vac.-35 lbs.	32.00	29.00
Model B-4, 25 lbs.-100 lbs.	31.00	28.00
With Hand Reset, All Types, add to List.	2.00	2.00

No. 848 Mercoid Controls	Double Pole Single Throw	
	10 Amp.	4 Amp.
Model A-1, 1 lb.-15 lbs.	\$31.00	\$28.00
Model A-2, 30"-3" Vac.	32.00	29.00
Model A-3, 10" Vac.-10 lbs.	32.00	29.00
Model B-1, 10 lbs.-60 lbs.	31.00	28.00
Model B-2, 10" Vac.-45 lbs.	32.00	28.00
Model B-3, 30" Vac.-35 lbs.	32.00	29.00
Model B-4, 25 lbs.-100 lbs.	31.00	28.00
With Hand Reset, All Types, add to List.	2.00	2.00

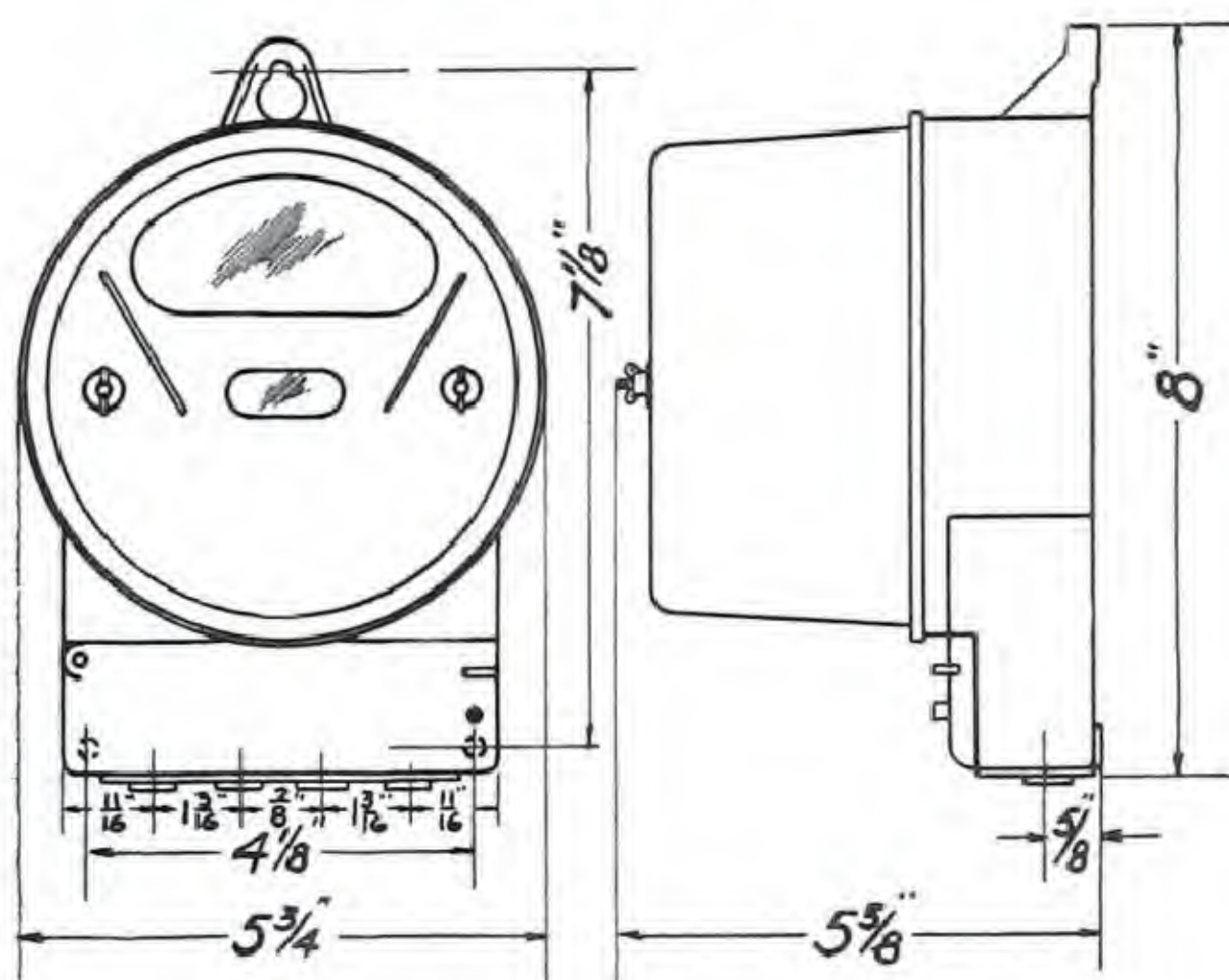
SANGAMO WATTHOUR METERS

Type HC Single Phase

5 and 10 Amp. Capacity



Type HC



OUTLINE DIMENSIONS

The Sangamo type HC watt-hour meter is built in all standard capacities and voltage ratings. Two sizes of base castings are used. The one shown herewith is for 5 and 10 ampere capacity only.

This meter embodies all the refinements known in the meter art and is so designed and built that its initial accuracy is maintained through many years of service.

The construction is such as to facilitate work of adjustment and repairs. All adjustments operate from the front and are of the micrometer type. Repairs are easily and simply made as all parts can be replaced without, in many cases, even disturbing the adjustments.

Bearings are of high quality and must pass a rigid inspection before being used. Lower bearings and jewels are treated with Epilame to prevent oil creepage.

Overload compensation and temperature compensation are used to produce a meter with practically ideal electrical characteristics under all conditions of load.

The meter can be supplied with either glass or metal covers, clock or cyclometer registers. Clock registers of the five circle type are standard but six circle clock registers can be supplied if desired.

The small capacity type HC meter is supplied in 5 and 10 amperes capacity, 2 and 3 wire, in voltages of 115, 230, 460 and 575 and in frequencies of 25, 30, 50 and 60 cycles.

Prices on application.

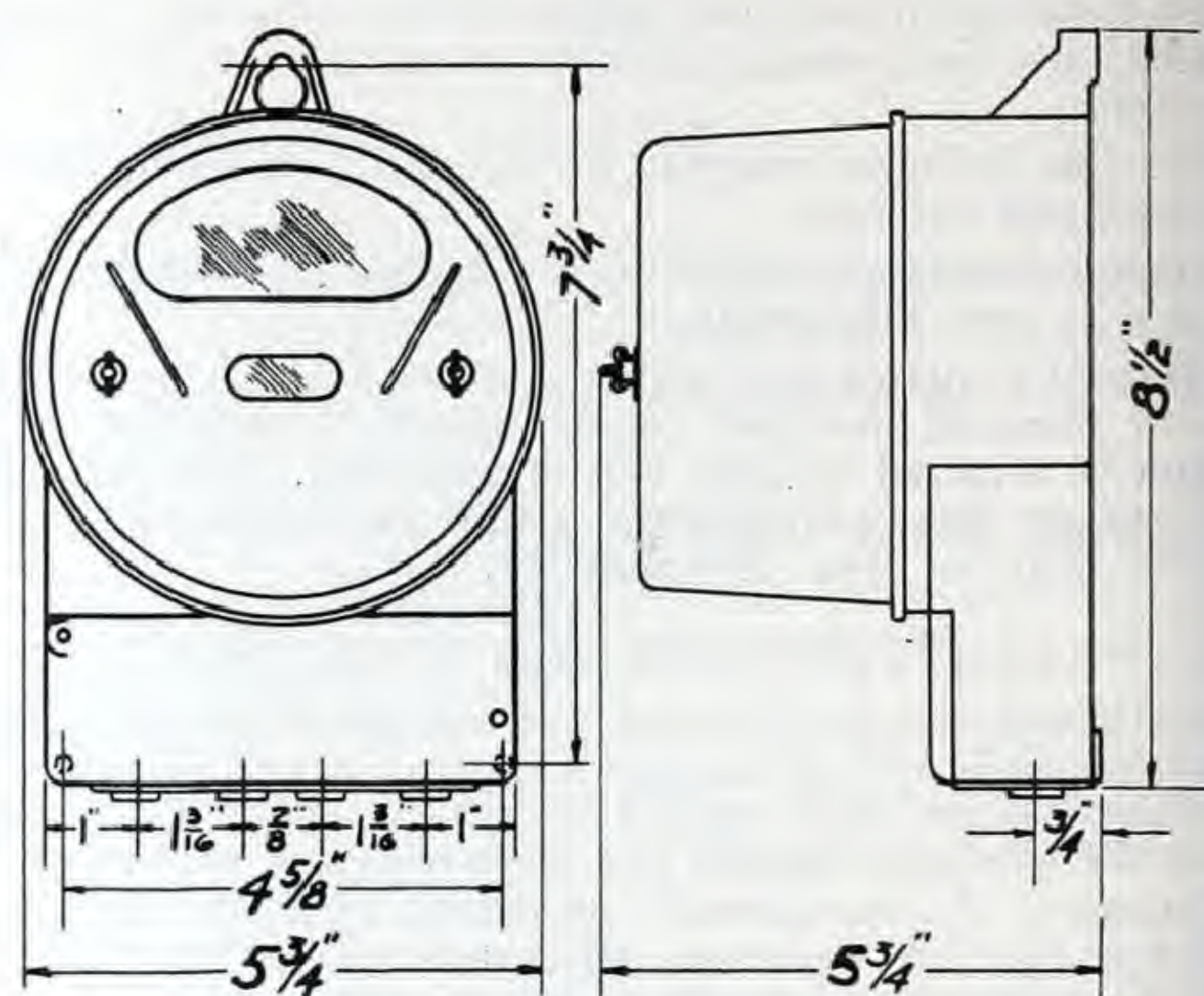
SANGAMO WATTHOUR METERS

Type HC Single Phase

15 to 50 Amp. Capacity



Type HC



OUTLINE DIMENSIONS

For 15, 25 and 50 ampere capacity the type HC meter built in a larger base than the 5 and 10 ampere meter. For 15 and 25 amperes, terminals of $\frac{1}{2}$ " diameter are used and for 50 amperes, the size of terminals is increased to $\frac{5}{8}$ " diameter. In all other respects the construction of the meter is similar for all capacities.

The series circuit is designed to carry many times the rated current and the overload compensation gives straight line accuracy from five to over three hundred per cent. load.

The potential coil is wound of enamelled wire, paper insulated between layers. The whole coil is taped and insulated with several coats of special insulating varnish. The magnetic circuit is an hydraulically rivetted assembly replaceable as a unit with the coil.

The moving element, bearings, permanent magnets, adjustments, etc., are all mounted on the front of a cast iron grid which can be easily removed as a unit for inspection of the electro-magnetic circuits. This grid also acts as a magnetic shield between the permanent magnets and the current and potential circuits.

The meter can be furnished with either glass or metal covers and either cyclometer or clock type recording trains. Unless otherwise specified, metal covers and clock type recording trains will be supplied.

The large capacity type HC meter is supplied in 15, 25 and 50 amperes, 2 and 3 wire, in voltages of 115, 230, 460 and 575 and in frequencies of 25, 30, 50 and 60 cycles.

Prices on application.

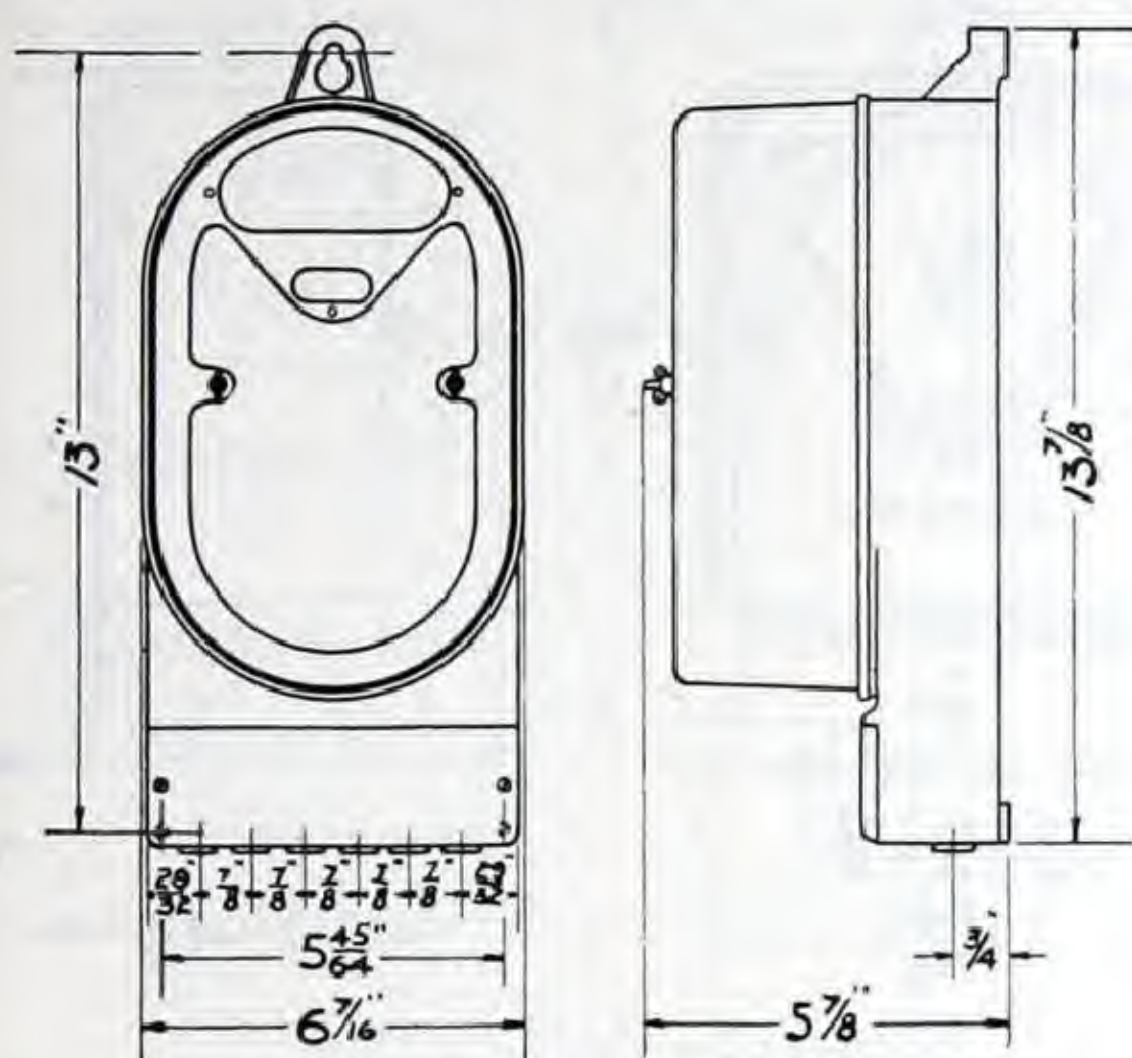
SANGAMO WATTHOUR METERS

Type HC Two Element Polyphase

Vertical Side Connected Service Type



Type HC



OUTLINE DIMENSIONS

The Sangamo type HC polyphase meter is built in two different vertical models, the bottom connected and the side connected. These meters are identical with the exception of the way the terminals are brought out.

Most of the parts are interchangeable with the single phase meter. The only special parts are the base, cover, spindle and grids.

The use of standard single phase parts permits the complete separation of the two elements by an iron barrier. This prevents magnetic interference between the two elements so that inductive or unbalanced loads will have no effect on the accuracy of the meter. The registration of both elements is correct to within very close limits under all conditions of load.

The two element, bottom connected polyphase meter has a terminal box at the bottom with the terminals arranged in two rows. The current terminals are at the back and the potential terminals at the front. The arrangement of terminals at the bottom of the meter is very convenient if there is a limited space available. The meter can also be used as a two element three wire single phase meter where it will record correctly under all conditions of unbalanced voltage.

The type HC vertical polyphase bottom connected meter can be supplied with either glass or metal covers and either odometer or clock type recording trains. Unless otherwise specified, metal covers and clock type recording trains will be furnished.

It is supplied in 5, 10, 15, 25 and 50 amperes; 115, 230, 460 and 575 volts; 25, 30, 50 and 60 cycles for use on three phase, three wire or two phase, three or four wire, and also can be applied as a three wire meter for use on three wire single phase or two phases of a three phase, four wire network system.

Prices on application.

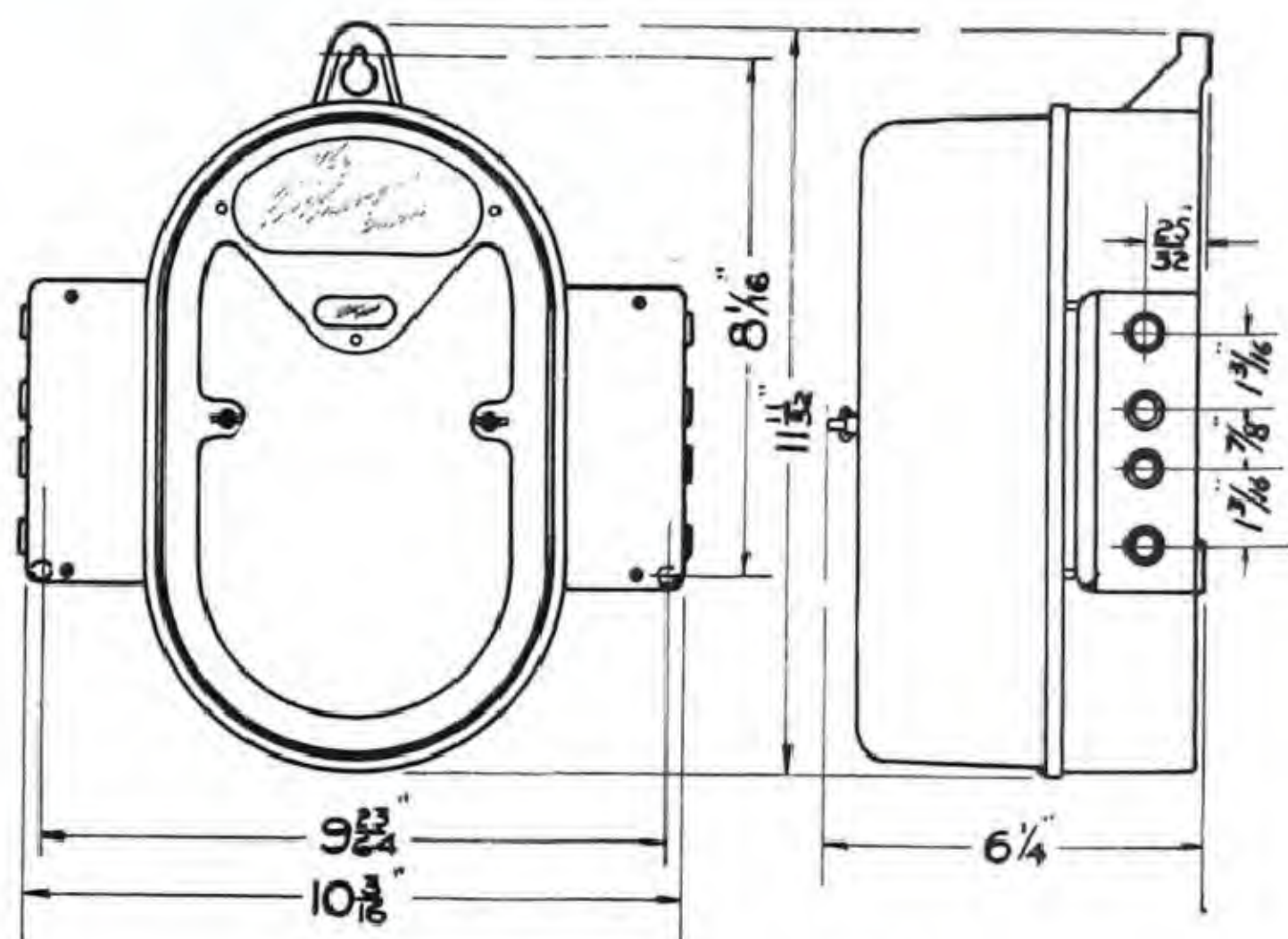
SANGAMO WATTHOUR METERS

Type HC Two Element Polyphase

Vertical Side Connected Service Type



Type HC



OUTLINE DIMENSIONS

The side connected polyphase meter is similar in construction to the bottom connected except for the terminal arrangement. The line terminals are on the left and the load terminals on the right.

All parts with the exception of the base, cover, spindle and grids are interchangeable with the single phase type HC meter.

The terminal arrangement is such that standard single phase parts are used and each terminal is replaceable in the same manner as in single phase meters.

The side connected vertical polyphase meter is preferred for some installations as it simplifies the connections to the meter, especially when the meter is used with other instruments or meters having side connections.

Both the side connected and bottom connected meter can be supplied with either glass or metal covers and either cyclo-meter or clock type registers. Unless otherwise specified, metal covers and clock type registers will be furnished.

It is built in 5, 10, 15, 25 and 50 amperes; 115, 230, 460 and 575 volts; 25, 30, 50 and 60 cycles, for use on three phase, three wire or two phase, three or four wire.

Prices on application.

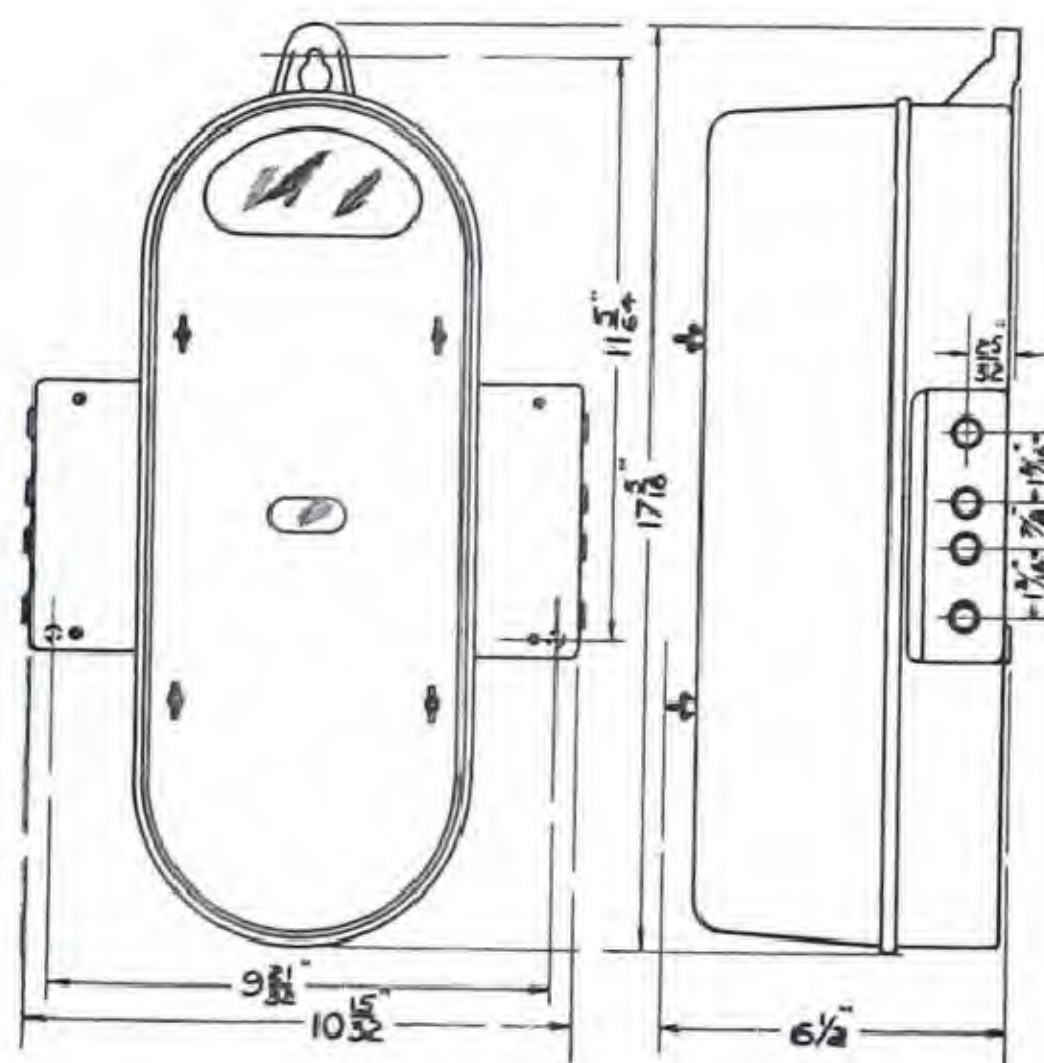
SANGAMO WATTHOUR METERS

Type HC Three Element Polyphase

Vertical Side Connected



Type HC



OUTLINE DIMENSIONS

For accurate metering of three phase, four wire circuits having unbalanced voltage as well as unbalanced current a three element polyphase meter is required.

The Sangamo Type HC three element meter accurately measures the energy on a three phase, four wire system under any unbalanced conditions.

With the exception of the cover, spindle, base and grid castings, all parts are interchangeable with those used in either Type HC single phase meters or Type HC polyphase meters.

The base assembly consists of three single phase elements mounted vertically in a single base. Each of the elements is provided with a standard torque balancing arrangement as used in other Sangamo polyphase meters. The grids carry three pairs of damping magnets with full and light load adjustment for each element. The moving system consists of a long spindle with three discs.

Testing the three element meter is very simple as each of the elements may be tested separately as a single phase meter, all potentials being excited.

The meter can be furnished with either glass or metal covers and either cyclometer or clock type registers. Meter may also be supplied with back stud connections for switch-board mounting, or with terminal arrangement for concentric cable. If required, the meter can be equipped with the Type HCB Maximum Demand Register.

The Type HC three element meter is supplied in 5, 10, 15, 25 and 50 amperes, 200/115 and 400/230 volts and in frequencies of 25, 50 and 60 cycles.

Prices on application.

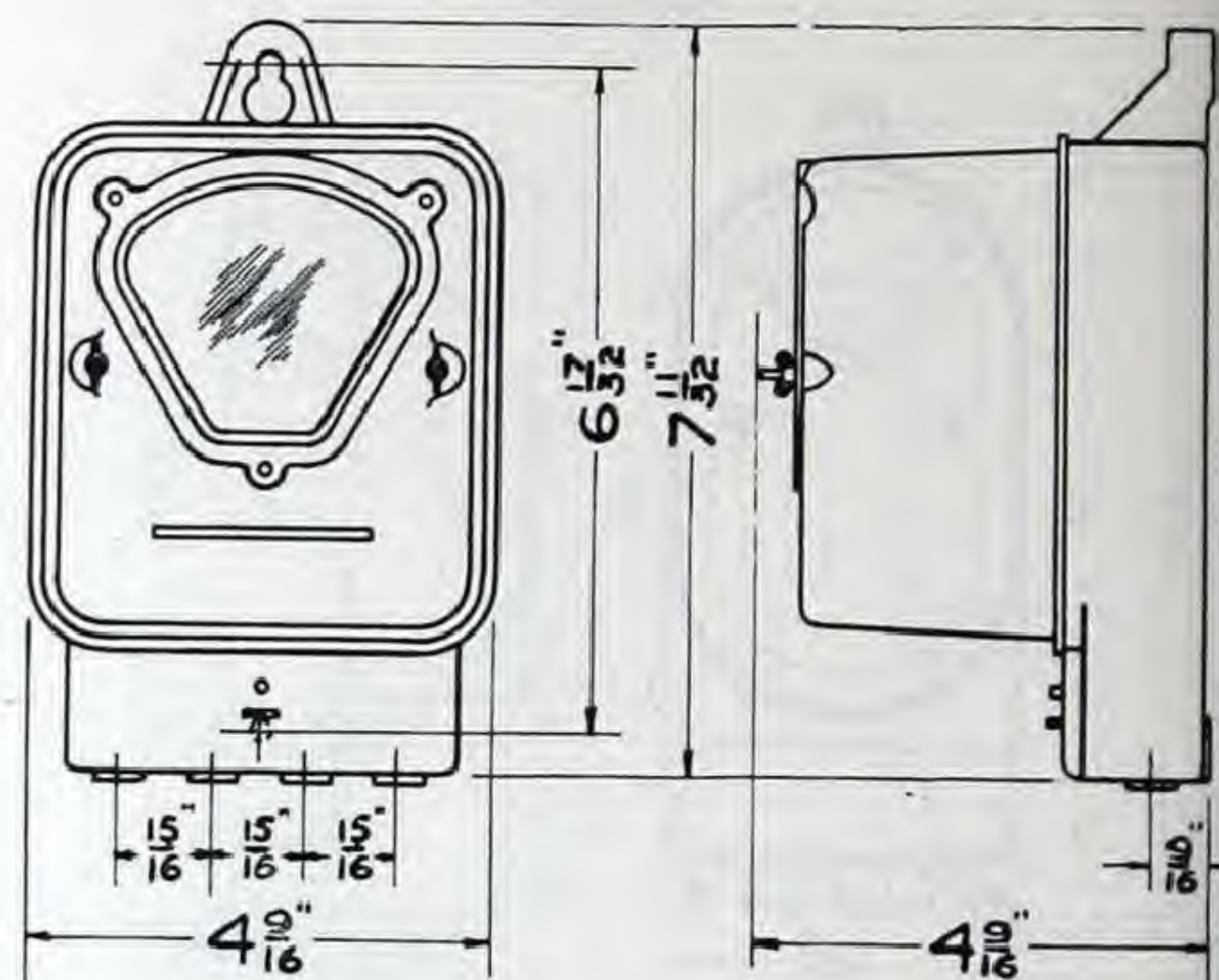
SANGAMO WATTHOUR METERS

Type S-3 Single Phase

5 and 10 Amp. Capacity



Type S-3



OUTLINE DIMENSIONS

The Sangamo type S-3 meter is built to meet the demand for a small compact meter for use on alternating current circuits. It is built in all standard capacities and voltage ratings. Two sizes of base castings are used. The one shown on this page is for 5 and 10 amperes only, the larger capacity meter is shown on another page.

This meter is the same as the Type S-2 so far as size, shape and general appearance is concerned, and many parts are interchangeable between the two types. The Type S-3 meter, however, incorporates several improvements both in regard to electrical characteristics and mechanical design.

The entire magnetic structure is supported on the undersurface of the cast iron grid. The moving system, recording train, permanent magnets and adjustments are mounted on the front of the grid. All parts of the meter may be inspected by simply taking out three screws, disconnecting the leads from the terminals and removing the grid from the base.

The Type S-3 meter can be furnished with either glass or metal covers and either cyclometer or clock type recording trains. Unless otherwise specified, metal covers and clock type recording trains will be supplied.

The small base type S-3 meter is built in 5 and 10 ampere capacities only, 115, 230, 460 and 575 volts, 25, 30, 50 and 60 cycles, for either two or three wire service.

Prices on application.

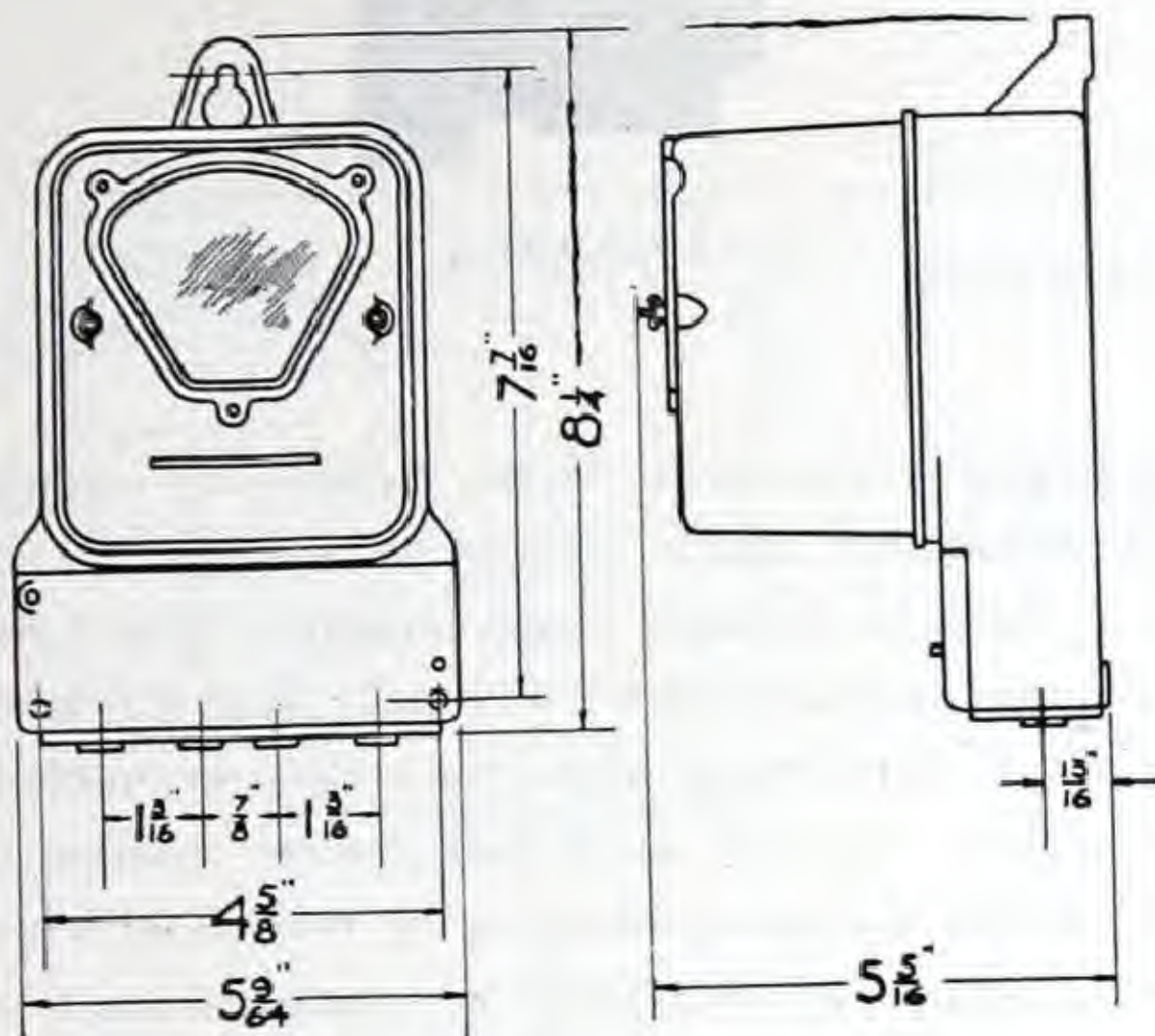
SANGAMO WATTHOUR METERS

Type S-3 Single Phase

15, 25 and 50 Amp. Capacity



Type S-3



OUTLINE DIMENSIONS

In the larger capacities the Type S-3 single phase meter is built in a cast iron base having considerably larger terminals than used for 5 and 10 ampere meters. For the same capacity the same size terminals as in the Type HC meter are used and the terminal arrangement is similar.

The bearings of the Type S-3 meter are similar in construction to the Type HC and can be inspected and replaced with minimum labour.

The recording train can be quickly removed for inspection and replaced with definite assurance that the meshing between the worm and worm wheel will not have to be adjusted.

The load curve of the meter is practically a straight line from 5 per cent. load to 250 per cent. load and the meter will carry 300 per cent. load continuously without injury.

Errors due to voltage and frequency variations are practically negligible and the meter is designed to be practically free from temperature error.

The meter will start recording at approximately $\frac{1}{2}$ of one per cent. load.

It can be furnished with either glass or metal covers and either cyclometer or clock type recording trains. Unless otherwise specified, metal covers and clock type recording trains will be supplied.

The Type S-3 meter in the larger base is built in capacities of 15, 25 and 50 amperes, 115, 230, 460 and 575 volts, 25, 30, 50 and 60 cycles, for either two or three wire service.

Prices on application.

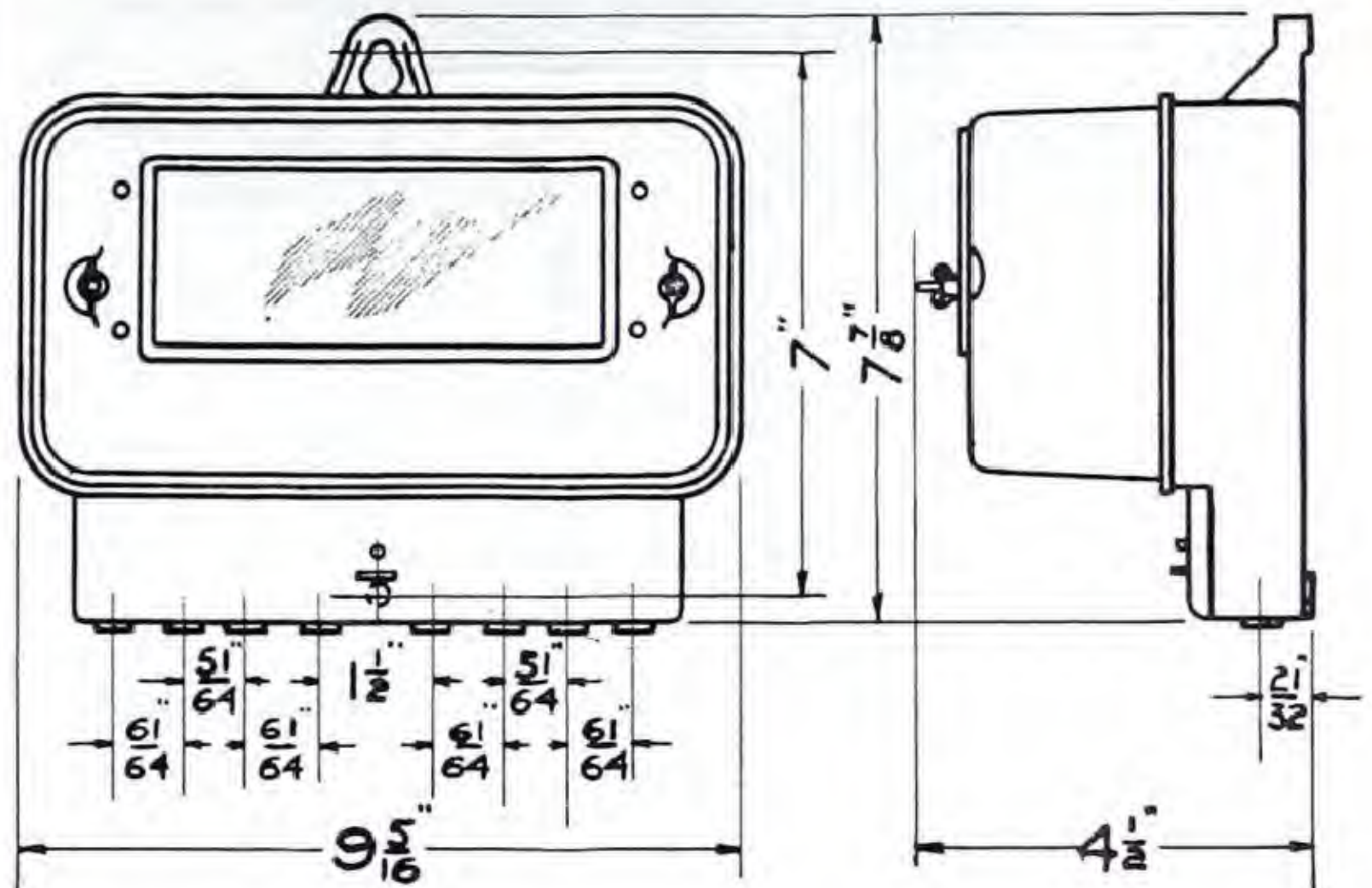
SANGAMO WATTHOUR METERS

Type S-3 Horizontal

POLYPHASE SERVICE TYPE



Type S-3



OUTLINE DIMENSIONS

The Type S-3 Horizontal Polyphase meter consists of two single phase elements mounted side by side. Each element is complete in itself but both elements record on a single train through a differential mechanism.

This construction has the advantage that the majority of parts are interchangeable with single phase meters, in fact, the only parts not interchangeable are the base cover and recording train.

Electrical or mechanical trouble with one element is instantly apparent to the meter reader and there is no possibility of the meter being left in service for long periods with only one element operating as is the case with meters of the vertical type.

On three phase balanced loads an indication of power factor may be obtained by checking the relative speeds of the two discs. A graph on the terminal chamber door permits the ratio of disc speeds to be translated directly into power factor.

The Type S-3 Horizontal Polyphase meter is available with either glass or metal covers but with clock type register only. Differential registers of the cyclometer type cannot be supplied. If desired two separate single phase registers can be furnished in place of the differential register.

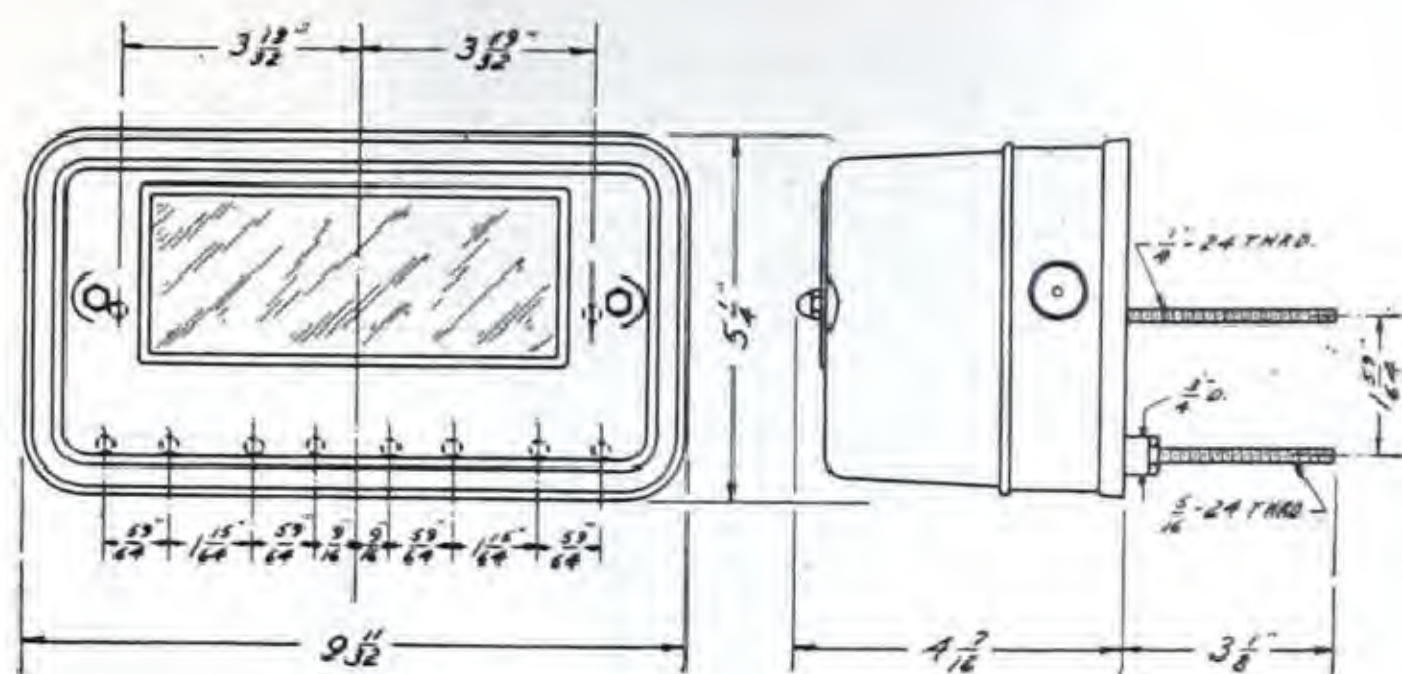
This meter is furnished in capacities of 5, 10, 15 and 25 amperes, 115, 230, 460 and 575 volts, 25, 30, 50 and 60 cycles, for use on three phase, 3 wire or two phase, 3 or 4 wire.

Price on application.

SANGAMO WATTHOUR METERS

Horizontal Polyphase Type S-3

Back Stud Connected for Switchboard Mounting



OUTLINE DIMENSIONS

The Type S-3 Horizontal Polyphase meter is also built with stud connections for mounting on switchboards. Its small size and rectangular shape make it very convenient for this purpose especially where space on the switchboard is at a premium.

The connection studs are brought out from the back of the base casting and two supporting studs are used to carry the weight of the meter. The base is flanged so that it fits flush to the board and presents a neat appearance.

This meter is recommended particularly for recording the amount of energy used in each department of industrial plants. By comparing the disc speed you can obtain the power factor of balanced three phase circuits so the meter can be used for power factor indications as well as energy consumption.

The type S-3 Horizontal Polyphase back stud connected meter is available with either glass or metal covers, but with clock type register only. Differential registers of the cyclo-meter type cannot be supplied. If desired, two separate single phase registers can be furnished in place of the differential register.

This meter is furnished in capacities of 5, 10, 15 and 25 amperes, 115, 230, 460 and 575 volts, 25, 30, 50 and 60 cycles, for use on three phase, 3 wire, or two phase, 3 or 4 wire.

Price on application.

SANGAMO PREPAYMENT METERS

Type SM-3

Single Phase, Two Wire and Three Wire



Type SM-3

The SM-3 Prepayment Meter fulfills any requirement for an instrument which collects in advance for electric service. Built in all single phase capacities from 5 amperes to 25 amperes inclusive, both 2 wire and 3 wire, it is admirably suited for all installations where the collection problem need be simplified. Summer or winter resorts, tourist camps, athletic fields, special apartments or residences where the length of occupancy is limited, or where accounts are delinquent, are a few of the representative installations where this type of meter can be used to a distinct advantage.

The base, case, and coin box are all cast aluminum, making a rugged, although lightweight instrument. The meter parts, with the exception of the series coils and cutaway register, are identical with the parts used in regular type S-3 meters. External connections are identical with standard watt-hour meters.

The coin mechanism is arranged for the Canadian quarter. By appropriate gear change wheels, any kilowatt-hour rate from three cents to ten cents, varying by one-half cent steps, can be secured. The rate can be changed on any individual meter by substitution of the proper rate change attachment. The total of the money inserted is registered on the three upper circles, while the kilowatt-hours unused are indicated on the single circle at the left. Coins can be inserted until the circle indicates 120 unused kilowatt-hours. In addition, the total kilowatt-hours used are indicated on the usual five circle meter register. The coin box, which can be sealed or locked in position independent of the meter seals, is rugged and is large enough to accommodate any commercial requirement irrespective of the meter capacity.

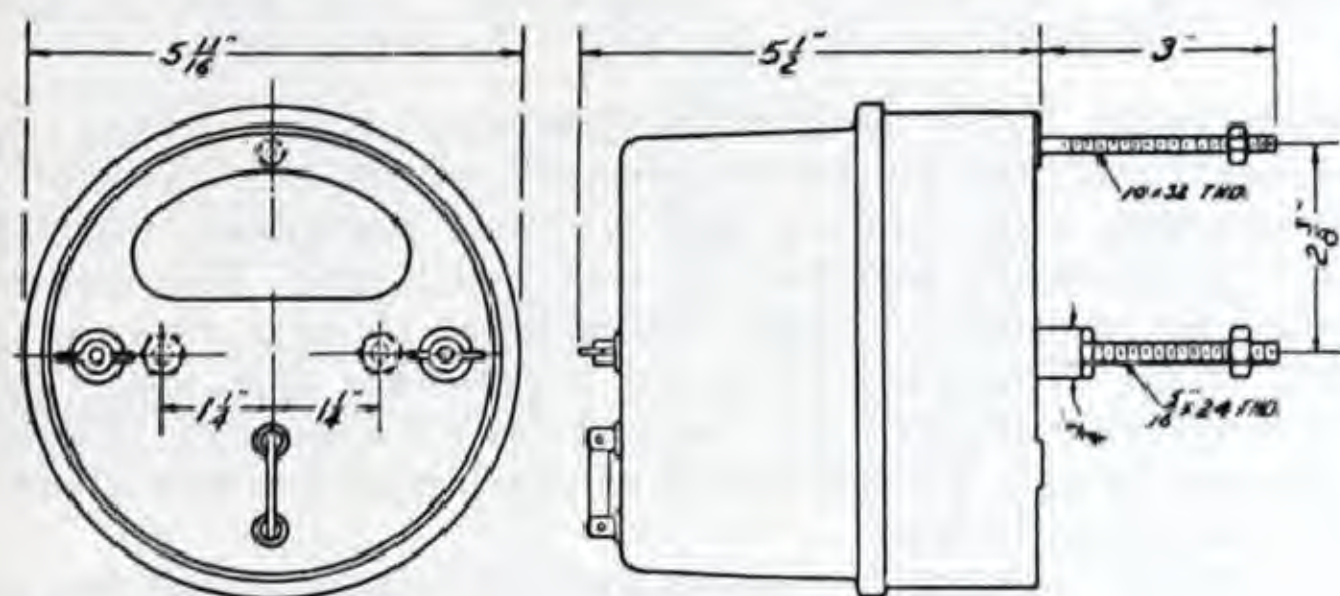
Price on application.

LINCOLN DEMAND AMMETER

Type AD Single Phase



Switchboard Type



Switchboard Type

The element of the meter consists of two bimetallic coils mounted in opposite directions on a common shaft. Each coil is encased in a separate bakelite ring with heaters, bakelite insulated, mounted above and below the coil. The indicating pointer is also secured to this shaft.

The shaft, coil and heater assembly is supported in a metal frame on which is mounted the Maximum Demand Pointer, as well as the zero, full load and tension adjustments.

When a meter is connected in a circuit, the current passes through the heaters, causing a change of temperature in the coil chambers. The coil tends to unwind, rotating the shaft and, in turn, moving the indicating pointer up the scale.

The re-set mechanism is conveniently located in the cover of the meter and may be readily sealed by the meter reader.

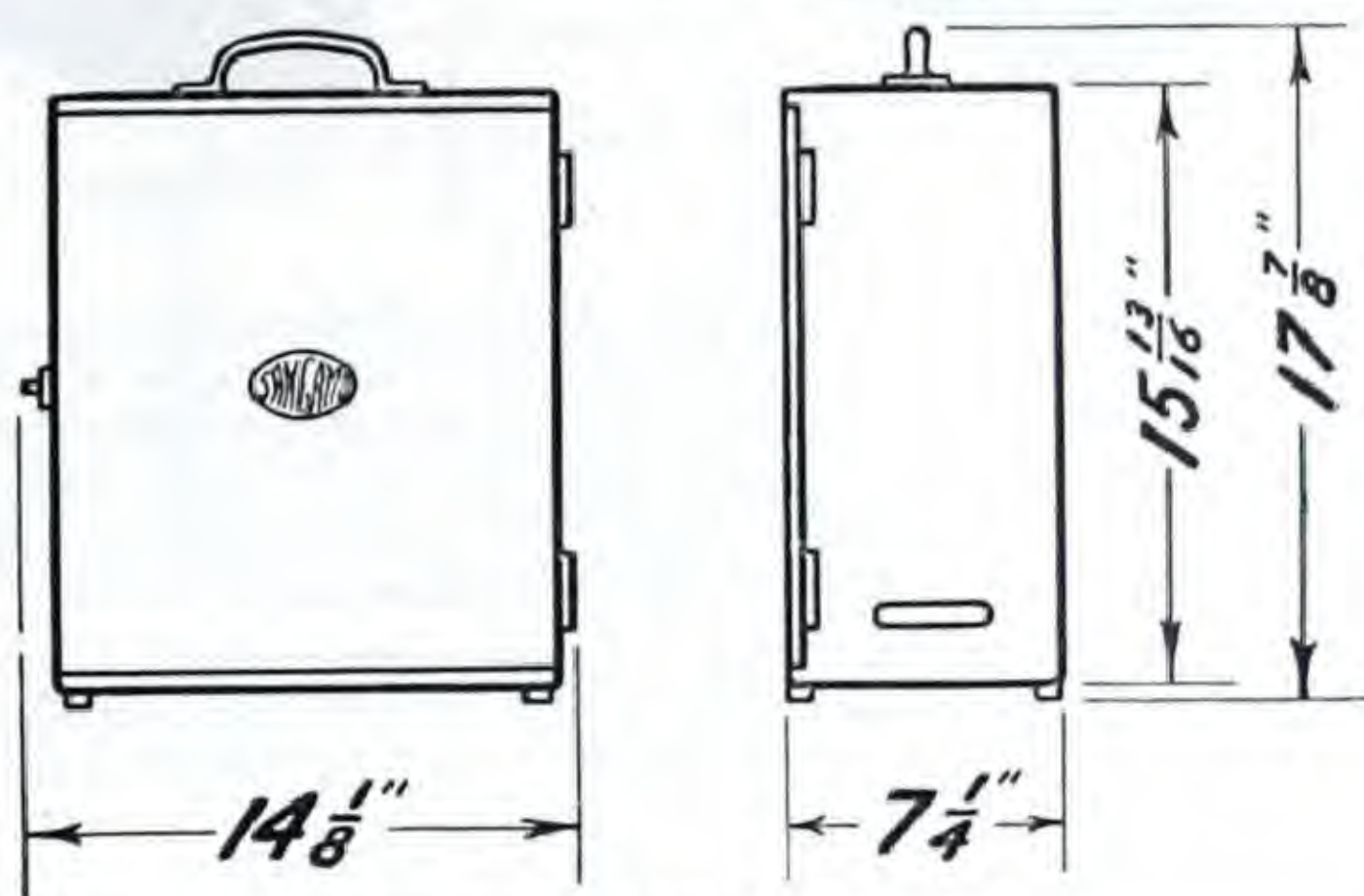
As illustrated, the Lincoln Type AD meter is made either service type or with back stud connections for switchboard mounting.

The service type meter is built in 5, 6, 12, 18, 30, 60 and 120 amperes, full scale capacity, while the switchboard type is supplied in 5 and 6 ampere capacities only.

Prices on application.

LINCOLN PORTABLE TEST METER

Type WD-2



OUTLINE DIMENSIONS

The Lincoln Type WD-2 Portable Test Meter was developed to meet the requirements of power suppliers for a portable meter to use for checking the accuracy of thermal demand wattmeters either "in situ" or in the meter test room.

It consists of a standard Lincoln wattmeter element mounted on a metal base with the necessary transformers for the different voltage ranges. The whole is housed in a strong wooden box with a convenient handle at the top and a door arranged so that it can be locked.

The meter element is enclosed in a dust-tight metal case, the cover of which may be removed to obtain access to the adjustments, etc. A reset device is mounted in the cover so that the demand pointer may be reset after a reading has been taken.

The terminals are arranged on a strip of insulating material at the bottom of the case. Separate terminals are used for the different voltage ranges, and a connection diagram furnished with each meter. Openings in the sides of the wooden case are provided for the entrance connecting leads.

The meter has many uses, one of which is as a temporary meter to obtain a customer's demand where a demand meter would not be regularly installed.

Another use is as a check meter in cases of customers' complaints. It may be installed in series with the customer's meter and left for a sufficient length of time to obtain a check of the customer's meter readings. In cases of this kind the test meter could be reset over short intervals of time or left as long as required. In this way meters can be tested over different points on the scale as the load changes.

When used in the meter test room for checking the accuracy of Lincoln demand wattmeters, it has the advantage of making it unnecessary to hold a constant load during the whole test period.

The Lincoln Type WD-2 Portable Test Meter is regularly built for a capacity of 5 amperes only and voltages of 115, 230 and 575. It can, however, be supplied in any current rating up to 25 amperes or for different voltage ratings up to 600 volts when required.

Prices on application.

SANGAMO PORTABLE TEST METERS



Portable Test Meter

Multiplier

Sangamo Portable Test Meters facilitate the testing of all types of watthour meters and can be used either in the meter room or for in "situ" testing. The advantages of using this type of meter are readily understood when it is realized that no indicating instruments or stop-watches are necessary and the errors due to variations in load and voltage are eliminated.

The meter element is of special construction and the current and potential windings are arranged to provide a number of capacities and two voltage ranges within the same instrument.

The register is of the three-pointer type. The large circle represents a single revolution of the disc and is divided into hundredths. The two small pointers make one revolution for each 10 and 100 revolutions of the disc respectively. A resetting device is provided consisting of a small button on the top of the case and so arranged that upon applying a slight pressure all the hands are returned to zero.

All moving parts, including the staffs of the register, operate in jewel bearings, thus insuring against possible wear. Friction has been reduced to a minimum in the entire moving system, insuring sustained accuracy and permanence of calibration under all conditions of service.

The meter is enclosed in a metal box with a removable cover and is provided with a carrying strap. The element is mounted on the under side of the bakelite panel and is removable as a unit. A simple sealing device is provided so the meter can be sealed against any possible tampering by unauthorized persons.

The meter is built in two types, the HP-6 which has six current ranges 1-5-10-25-50-100 amperes, and the HP-3 with three current ranges up to 25 amperes, 1-10-25 amperes being standard. Both types are arranged for 115 and 230 volt operation, the changes from one voltage to the other being accomplished by means of a rotating switch. For higher voltages an external multiplier must be used.

The changes in capacity in the type HP-6 are accomplished by rotating a drum controller of special construction operated by a dial switch on the panel. In the type HP-3 connections to different binding posts are made for each range, and the drum controller is eliminated. The 1, 5, and the 10 ampere current coils in the HP-6 are protected by fuses mounted in the panel and easily replaceable.

Sangamo portable test meters are compensated for temperature at all power factors and a certified copy of the test report is included with each instrument.

Prices on application

LINCOLN DEMAND METERS

Polyphase 2 Element Service Type

KVA Meter Type VA-3. Wattmeter Type WD-3.



Overall Dimensions

Width $5\frac{5}{8}$ ". Depth $5\frac{3}{4}$ ". Length $9\frac{5}{8}$ ". $\frac{1}{4}$ " holes, $4\frac{5}{8}$ " on centers one way and $8\frac{3}{4}$ " the other way.

The Type VA-3 Indicating Demand KVA Meter was developed for use on power circuits where the demand in volt-amperes was required and where a polyphase watthour meter was already installed or was available. The meter is similar in appearance and dimensions to the type WD-3 which is an Indicating Demand Wattmeter but when used with VAD Transformer will indicate KVA Demand. Excepting rotary switch, all features and capacities are the same as VA-3 described below.

The meter element is of standard Lincoln construction and is mounted at the top of the base with the pointers extending downward over the scale. The connection box is at the bottom with the terminals arranged in the standard manner. The element itself consists of two coils of bimetal mounted in opposite directions on a common shaft, each coil being encased in a separate bakelite housing. Heaters are mounted above and below each bi-metallic coil. The heaters are supplied with current from two small transformers mounted below the element.

The primaries of the small transformers are tapped in such a manner that the angle between the voltage and current supplying the meter element is shifted so that the meter reads in volt-amperes for different power factor ranges. The taps from the transformers are brought out to a small rotary switch which can be set and sealed in any one of four positions. The connections to the switch are arranged so that the meter can be made to read (a) watts, (b) KVA at 99 to 86% power factor, (c) KVA at 90 to 65% power factor, and (d) KVA at 75 to 43% power factor. To use the meter for indicating the demand in KVA it is only necessary to know the approximate power factor as each position of the switch covers a considerable range and the ranges overlap. Throughout each range the meter will read within 2% and will never read higher than the true volt-amperes.

The meter is arranged with two pointers. The indicating pointer fastened to the shaft indicates at all times the demand as governed by the thermal characteristics of the load. The maximum pointer shows only the maximum point reached by the indicating pointer since the meter was reset. The metal cover has a pointer reset mechanism in the front with arrangement for sealing. The meter is arranged with a temperature compensating device so that changes in ambient temperature have practically no effect on the accuracy of the meter.

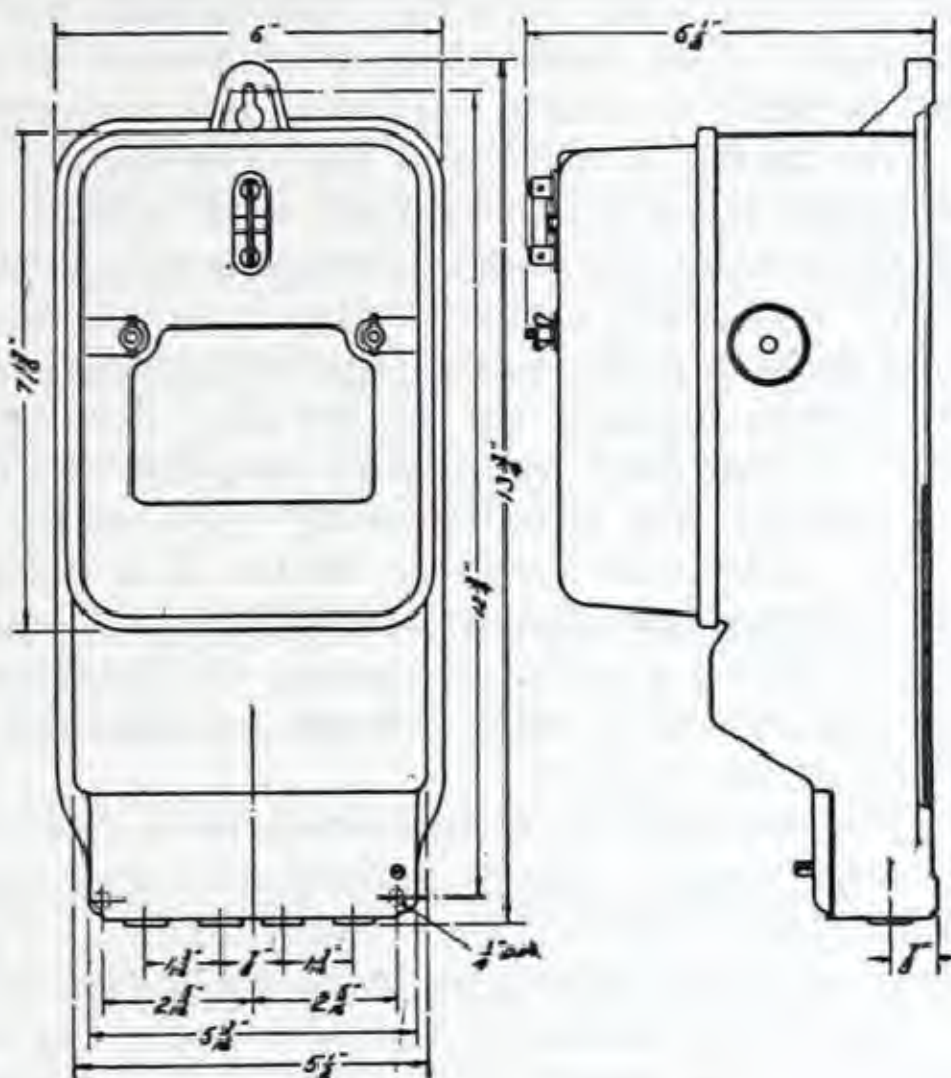
The type VA-3 meter as shown above is built in the following self-contained capacities. It is also built as a self-contained meter in capacities of 50 and 100 amperes but in a larger base. Above 100 amperes instrument transformers must be used in combination with a 5 ampere meter. KVA ratings represent full scale readings.

Amps.	115 Volts	230 Volts	460 Volts	575 Volts
5.....	1.5 KVA	3.0 KVA	6.0 KVA	7.5 KVA
10.....	3.0 KVA	6.0 KVA	12.0 KVA	15.0 KVA
15.....	4.5 KVA	9.0 KVA	18.0 KVA	22.5 KVA
25.....	7.5 KVA	15.0 KVA	30.0 KVA	37.5 KVA

Prices on application.

LINCOLN-SANGAMO DEMAND-ENERGY METER

Type ED-3 Single Phase Single Phase 2 or 3 Wire



Outline Dimensions

The type ED-3 Single Phase Demand-Energy Meter combines the Sangamo type S-3 watthour meter and the Lincoln Thermal Demand Meter. It is built for use on either two or three-wire single phase circuits and is recommended for measuring both demand and energy consumption on domestic and commercial customers.

The energy element is identical in general construction to the type S-3 single phase watthour meter and, with the exception of the dial and potential coil, all parts are of standard construction.

The demand element of the type ED-3 meter is a Lincoln single phase Demand Wattmeter element similar to that of the Type WD-2 meter. The transformer which is required for the demand element is combined with the potential coil of the watthour meter. This is accomplished by winding a secondary coil over the regular potential coil. This secondary winding does not affect the characteristics or accuracy of the watt-hour element.

A small current transformer is mounted in the base of the meter and supplies 5 amperes to both the demand and energy elements although the meter may be rated at from 10 to 100 amperes. To change the ampere rating of the meter, it is necessary to change only the current transformer. The use of this transformer permits the meter to be built in capacities up to and including 100 amperes using standard 5-ampere demand and energy elements.

The Type ED-3 single phase Demand-Energy Meter is built in the following self-contained capacities. K.W. Ratings represent full scale reading:

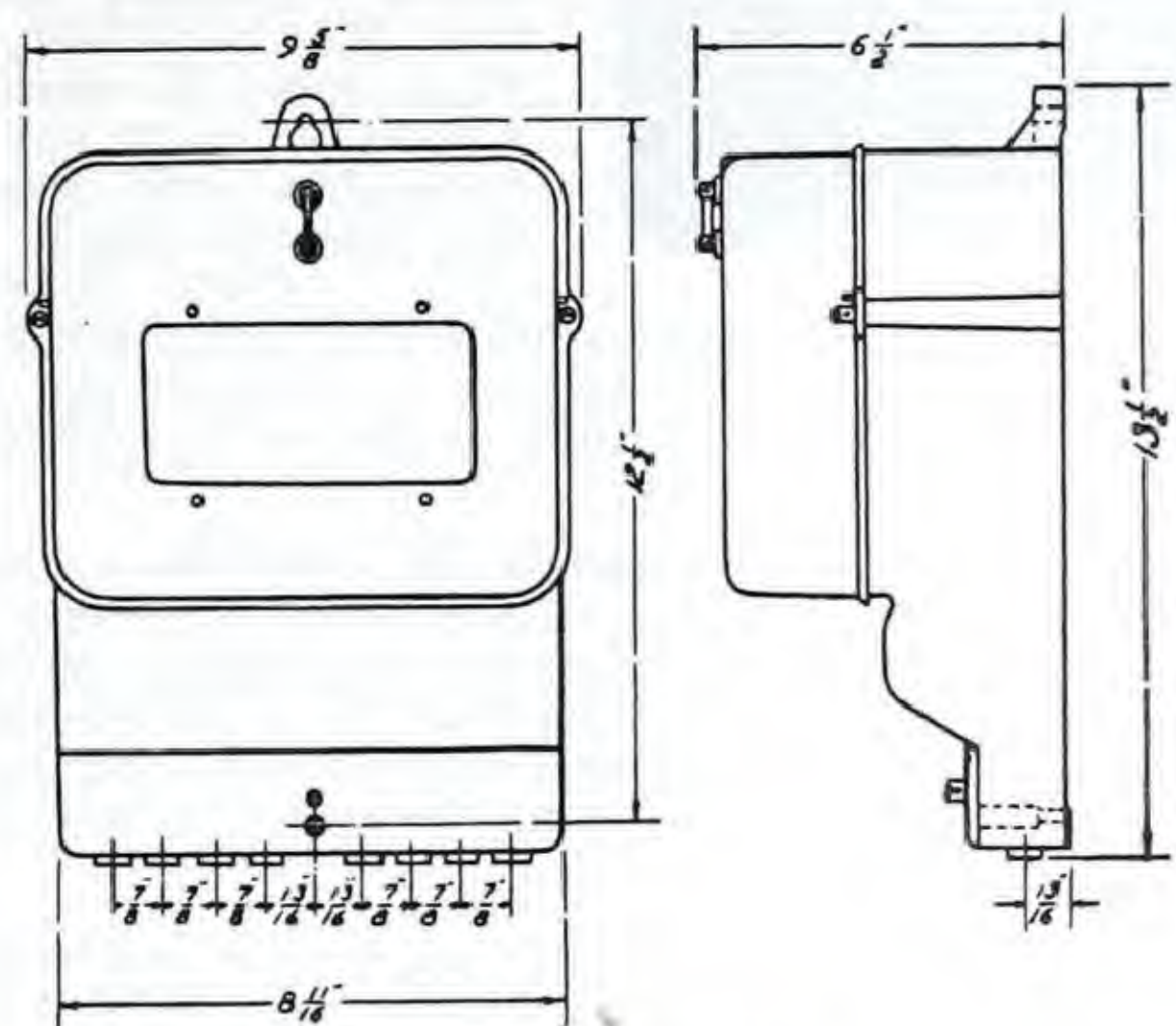
Amps.	115 Volts	230 Volts	575 Volts
5.....	.75 kw.	1.5 kw.	3.75 kw.
10.....	1.5 kw.	3.0 kw.	7.5 kw.
15.....	2.25 kw.	4.5 kw.	11.25 kw.
25.....	3.75 kw.	7.5 kw.	18.75 kw.
50.....	7.5 kw.	15.0 kw.	37.5 kw.
100.....	15.0 kw.	30.0 kw.	75.0 kw.

Prices on application.

LINCOLN-SANGAMO DEMAND-ENERGY METER

Type ED-3 Polyphase

3 Phase, 3 Wire or 2 Phase, 3 or 4 Wire



Outline Dimensions

The Type ED-3 polyphase demand-energy meter combines the Sangamo type S-3 horizontal polyphase meter and the Lincoln Thermal demand meter. It is built for use on 3-phase, 3-wire or 2-phase, 3 or 4-wire power circuits where consumption in KWH and demand in KW only is required.

The watthour element consists of two single phase meters placed side by side and arranged to record on one register through a differential mechanism. Secondary windings over the standard potential coils are used to supply current proportional to the line voltage to the demand element.

The demand element is similar to that supplied in the type WD-2 meter and is arranged to indicate on a scale which is printed in the watthour meter dial.

Two small current transformers are mounted in the base of the meter and supply current to both the demand and energy elements proportional to the current in the line. The elements are all built for five amperes, the current transformers being changed in meters of larger capacity. All meters of over five amperes capacity have a dial multiplier but in every case the multiplier is the same for both the demand and watt-hour readings.

The type ED-3 polyphase demand-energy meter is built in the following self-contained capacities. KW. Rating represents full scale reading:

Amperes	115 Volts	230 Volts	575 Volts
5	1.5 kw.	3.0 kw.	7.5 kw.
10	3.0 kw.	6.0 kw.	15.0 kw.
15	4.5 kw.	9.0 kw.	22.5 kw.
25	7.5 kw.	15.0 kw.	37.5 kw.
50	15.0 kw.	30.0 kw.	75.0 kw.

Prices on application.

LINCOLN-SANGAMO DEMAND ENERGY METER

Type 4L-2 Polyphase Service Type

3 Phase, 3 Wire or 2 Phase, 3 or 4 Wire



The Lincoln-Sangamo Type 4L-2 Unit meter measures all the factors that make up a scientifically correct bill. It combines, on one base and under one cover, a Sangamo horizontal polyphase watt-hour meter, a Lincoln Thermal Demand Wattmeter and the equivalent of a Lincoln V.A.D. transformer. It measures KWH and demand either in KW or KVA.

The watt-hour element consists of a standard Sangamo type S-3 horizontal polyphase meter in which the majority of parts are interchangeable with those of the Type S-3 single phase meter. Each element is

complete in itself but both elements record on a single train through a differential mechanism. If desired, two single recording trains can be furnished in place of the differential train.

The demand element consists of a polyphase thermal demand meter similar to that of the type WD-2 meter. The primaries of the small transformers, supplying the circulating current to the heaters, are tapped and the leads brought out through a switch. The demand element can be set to read either KW or KVA by adjusting the switch to the correct setting.

The switch is arranged so that it may be set in four positions, first Watts, second KVA at 99 to 86% P.F., third KVA at 90 to 65% P.F., and fourth KVA at 75 to 43% P.F. It is necessary to know only the approximate Power Factor as each position covers a considerable range and will operate within 2% over the whole range. The approximate Power Factor of the circuit is obtained by noting the speed of the two watt-hour meter discs. A chart is supplied on the meter showing the relation between the ratio of disc speeds and Power Factor on balanced loads.

The Type 4L-2 Meter is also built with back stud connections for switchboard mounting. The meter proper is identical with the Type 4L-2 service type meter and has the same characteristics. The connection studs are brought out in one line across the back of the meter, each stud being separately insulated and separately fastened in the base. Three separate supporting studs are used to carry the weight of the meter and hold it securely in position.

Both elements in the meter are arranged to have the same multiplier. All meters have the demand scale and watt-hour register arranged as 5 ampere, 115 volts so that multipliers must be used on meters of greater capacity or higher voltage. If instrument transformers are used, the multiplier for both the demand scale and the watt-hour register is the ratio of the transformers times the internal multiplier as marked on the nameplate.

The Type 4L-2 Demand-Energy Polyphase Meter is built in the following self-contained capacities for 25, 50 or 60 cycle. K.W. Ratings represent full scale reading:

Amperes	115 Volts	230 Volts	460 Volts	575 Volts
5	1.5 kw.	3.0 kw.	6.0 kw.	7.5 kw.
10	3.0 kw.	6.0 kw.	12.0 kw.	15.0 kw.
15	4.5 kw.	9.0 kw.	18.0 kw.	22.5 kw.
25	7.5 kw.	15.0 kw.	30.0 kw.	37.5 kw.

Prices on application.

SANGAMO GRAPHIC METERS

Type OD Circular Chart



The Sangamo type OD Circular Chart Graphic Meter is now available in ammeters and voltmeters or a combination of both instruments.

The principle of operation is entirely new, the response being similar to an overdamped instantaneous meter. This results in a legible record even when the meter is used on circuits carrying rapidly fluctuating loads or with varying voltage. The operating mechanism is simple and rugged and is built to resist damage under severe handling.

The meter is designed for operation in the field where an accurate record is required and where the meter must be reliable under the most adverse conditions. The combination meter recording either volts or amperes on the same chart, or the two pen meter combining two voltmeters and two ammeters, makes an extremely flexible instrument. The ease of changing over from one day to eight day operation is a feature not usually found in a meter of this type.

The type OD Graphic meter is a very flexible, accurate, and rugged instrument for either permanent or portable use and it offers a reliable means of obtaining clear and legible records of load and voltage conditions anywhere on your distribution system.

The instrument is mounted in a cast aluminum case and the door closes tightly against a rubber gasket which makes a completely weatherproof installation. Openings in the case allow for the connecting leads to be brought in either through a conduit for portable use or an opening for conduit when the instrument is mounted permanently. Ample room is provided inside the case to connect the leads to the binding posts.

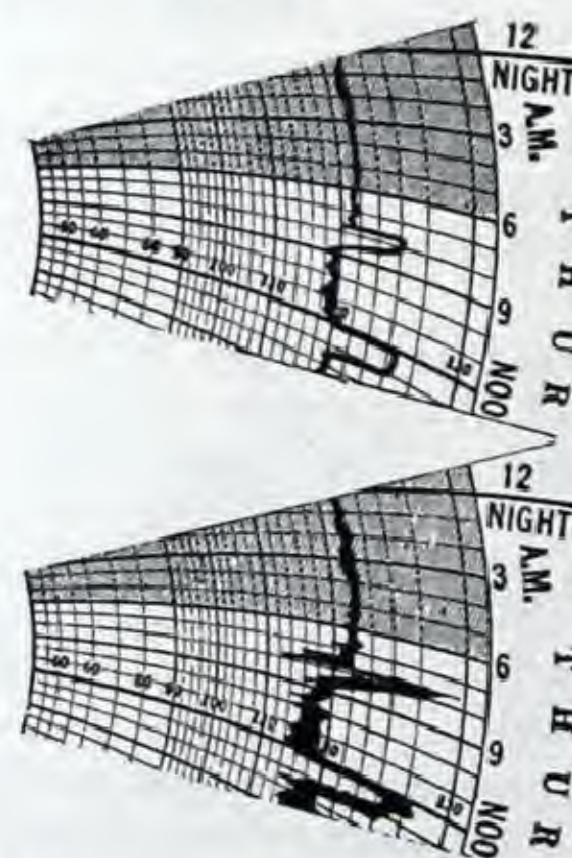


Fig. 3. Sections of charts taken on same load
Upper section—with Type OD meter.
Lower section—with an instantaneous type, meter.

The performance characteristic of the meter is a logarithmic response having a 90% base time of approximately thirty seconds. This results in complete freedom from the over-shooting present in the instantaneous type of meter and results in ability to analyze the most rapidly fluctuating load. This also means the complete elimination of smearing and the certainty of ink supply for the entire period of the chart record. Figure 3 shows a section of chart taken with a type OD Voltmeter and an instantaneous meter on the same load. The upper section taken by the type OD meter is much easier to read and shows no sign of over-shooting as shown on the lower section which is the same record taken on a meter of the moving coil instantaneous type.

SANGAMO GRAPHIC METERS

Type OD Circular Chart

The losses are low being approximately 10 watts for the voltmeter and 6 watts for the ammeter. The watts loss is the same for both voltage ranges. The full scale torque is approximately 5000 millimeter grams compared with 1200 to 1400 in the moving coil type of meter. The construction of the meter combined with its high torque results in freedom from error even if the meter is not perfectly level.

The characteristics of the scale are theoretically those of a scale of squares but there is some departure from this due to the geometry of the movement of the pen so that the scale approaches a linear relation.

The pens are of the standard Sangamo design which has proven so satisfactory in strip chart graphic meters. A single filling of the pen gives ample ink supply for the full eight day run under the most fluctuating conditions of load.

All type OD meters are equipped with two-speed clocks to give either one or eight day records. The instruments are self-contained up to 260 volts, for higher voltages external multipliers must be used. The ammeter ranges are 0-5, 0-25, 0-50 amperes. The meter can be used on either 25 or 60 cycle without change in calibration. The meter is available in the following combinations:

Single Pen, single range ammeter 0-5, 0-25, 0-50 amperes.

Single Pen, single range voltmeter 130 or 260 volts.

Single Pen, two range voltmeter 130 and 260 volts.

Single Pen, single range volt-ammeter 130 or 260 volts, 0-5, 0-25, 0-50 amperes.

Single Pen, two range volt-ammeter 130 and 260 volts, 0-5, 0-25, 0-50 amperes.

Two Pen, single range ammeter 0-5, 0-25, 0-50 amperes.

Two Pen, single range voltmeter 130 or 260 volts.

Two Pen, two range voltmeter 130 and 260 volts.

Two Pen, single range volt-ammeter 130 or 260 volts, 0-5, 0-25, 0-50 amperes.

Two Pen, two range volt-ammeter 130 and 260 volts, 0-5, 0-25, 0-50 amperes.

Prices on application.

TO BUYERS OF POWER APPARATUS

Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.

Motor Controls.

Condit Electrical Mfg. Corp.

Oil Circuit Breakers.

Ferranti Electric Ltd.

Transformers, Surge Absorbers.

J. P. Tubular Heater Co.

Electric Heating Systems.

Sangamo Electric Limited,

Watt-hour Meters,

Peak Load Controllers.

N. Slater Co. Limited,

Cutouts and Disconnects.

Telegraph Condenser Co.

Power Static Condensers.

Weston Electric Instrument Corp.

Indicating Instruments of all kinds.

Radio Test Equipment.

Mather & Platt Ltd.

Motors and Generators, All Types,

A. C. and D. C. Complete line of

Centrifugal Pumps.

A. Reyrolle & Co. Limited.

Metal Clad Switchgear.

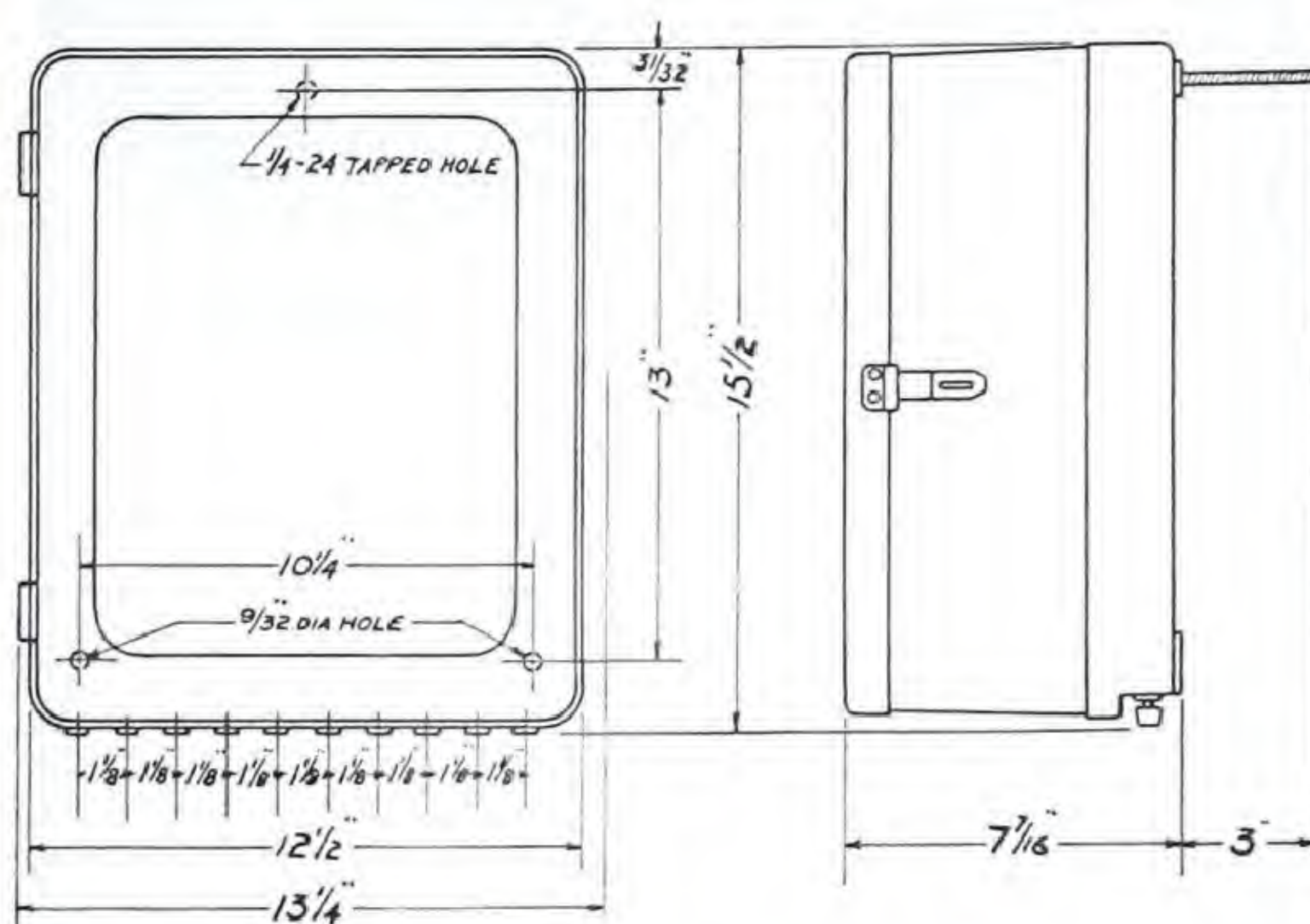
Ilg Electric Ventilating Co.

Ventilating Fans and Blowers.

Hewittic Electric Co.

Rectifiers (Glass Bulb).

LINCOLN STRIP CHART GRAPHIC WATTMETER



OUTLINE DIMENSIONS

The Lincoln Strip Chart Graphic Wattmeter is a two element instrument for use on two or three phase A.C. circuits. It records KW demand or, if used with a Lincoln VAD transformer KVA or RKVA demand.

In principle, the Lincoln Graphic is a Lincoln Indicating Meter with its moving hands replaced by a pen. A construction using few moving parts, all of which move very slowly, eliminates the necessity of frequent test and repair which insures low maintenance cost.

Because the Lincoln Graphic operates on the thermal principle, it indicates the true thermal, not the arithmetic, average of the load. Therefore the curve it traces is accurate and legible and free from the rapid fluctuations of the instantaneous meter, with no possibility of the split peak sometimes occurring in records from the block interval type.

As the curve is smooth and accurate and may be read with pin-point accuracy at any point whether the load is steady or violently fluctuating, the Lincoln Graphic may be operated with $\frac{1}{2}$ inch per hour paper travel and still give more legible records than other types with 2 inch per hour paper travel. This slow chart speed marks an outstanding economy in paper and ink consumption.

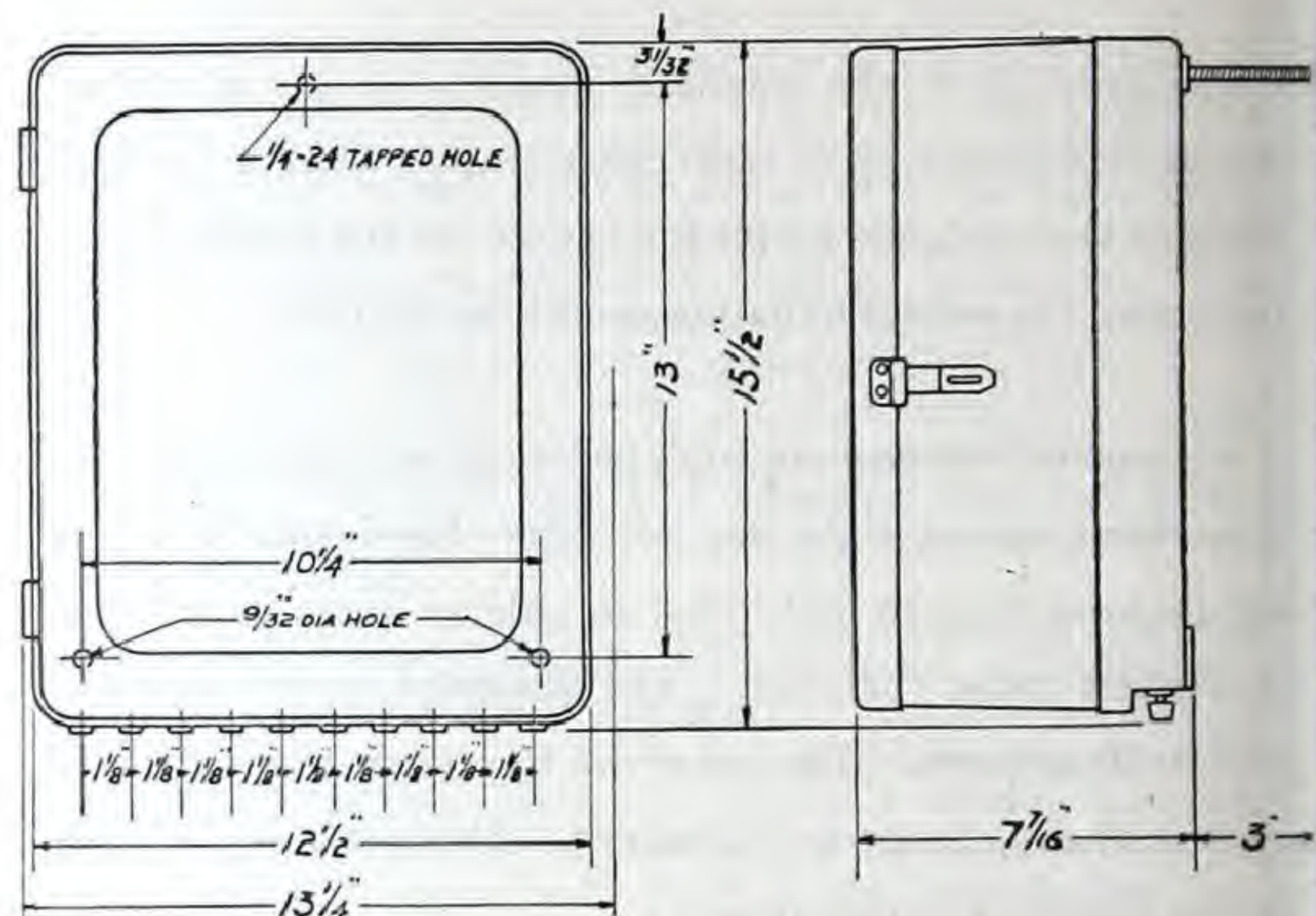
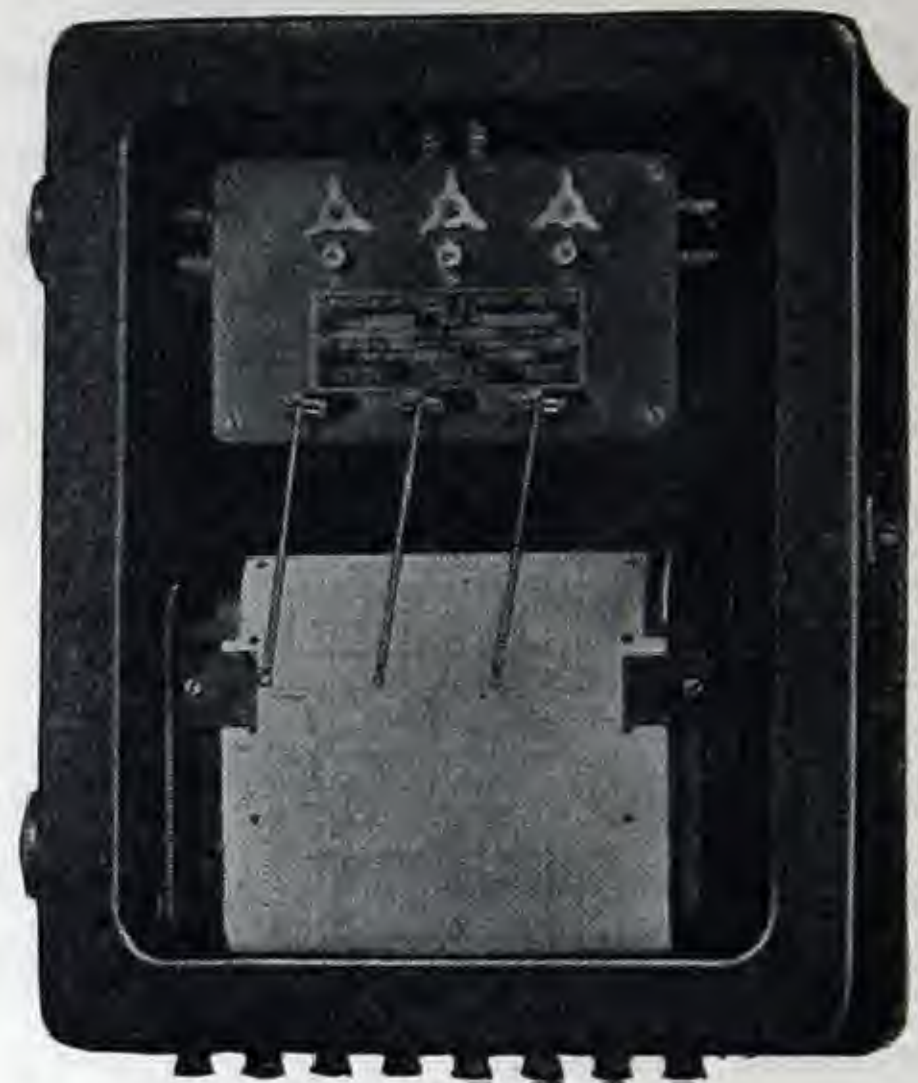
The source of power which drives the paper is either a 15 day manually wound clock or a synchronous motor. Clock drive may be supplied in either $\frac{1}{2}$ inch or 1 inch per hour paper travel while motor drive may be either $\frac{1}{2}$ inch, 1 inch or 2 inches per hour.

The standard meter is supplied with terminals arranged for bottom connections but it can also be supplied with back stud connections for switchboard mounting.

This meter is furnished in capacities of 5, 10, 15 and 25 amperes, 115, 230, 460 and 575 volts, 25, 50 or 60 cycles.

Prices on application.

SANGAMO GRAPHIC VOLT-AMMETER Two or three Pen Strip Chart



OUTLINE DIMENSIONS

The Sangamo Strip Chart Graphic Volt-Ammeter is a convenient instrument for the measurement of three voltages or three currents simultaneously. It is especially adapted for use on large three phase power feeders where a continuous record of the current balance of the phases is required. The instrument is also built with two pens for use where it is necessary to obtain two records only. Each element of the meter can be arranged to measure either volts or amperes, making the instrument an extremely flexible and valuable one for special investigation of circuit conditions.

The actuating elements operate on the thermal principle but have a rapid response similar to that of an over-damped instantaneous meter. They are similar to those employed in the type OD circular chart graphic meter and the adjustments are identical with this meter. The elements are simple and rugged, no springs or bearings being used.

The paper mechanism is similar to that used in the Lincoln strip chart graphic wattmeter and can be furnished with either synchronous motor or clock drive. Clock drive may be supplied in either $\frac{1}{2}$ inch or 1 inch per hour paper travel, while motor drive may be either $\frac{1}{2}$ inch, 1 inch or 2 inches per hour.

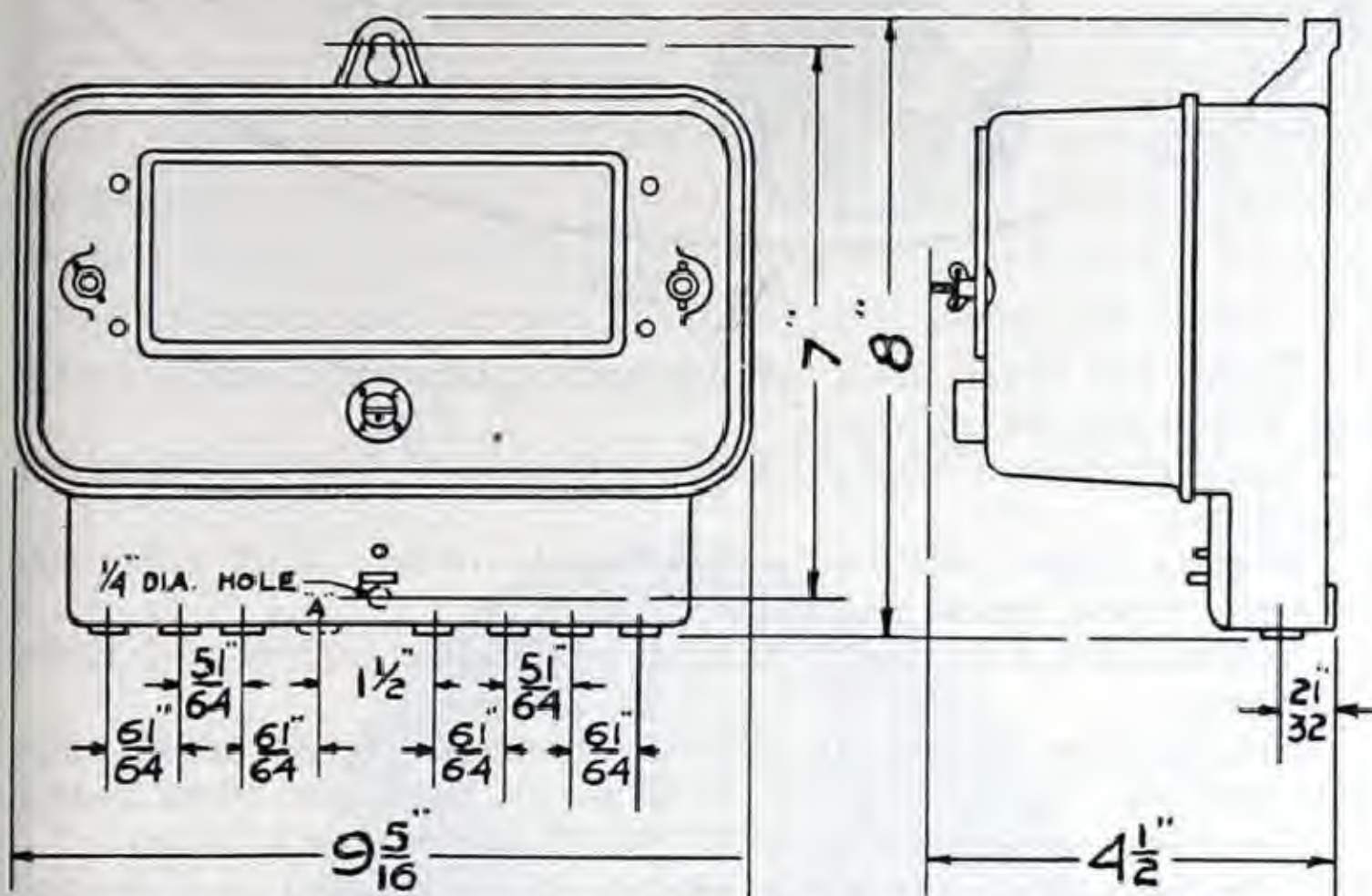
The characteristic of each scale is approximately that of a scale of squares. In the three pen instrument each scale has a length of $1\frac{3}{4}$ inches. The pens are of standard design as regularly used in Sangamo graphic meters.

The Sangamo Strip Chart Graphic Volt-Ammeter is regularly supplied in a case for mounting on a switchboard. However, it can be furnished in a weatherproof case if required.

The current range is 0-5 amperes and the voltage ranges 0-130 volts or 0-260 volts.

Prices on application.

SANGAMO VAD TRANSFORMER



OUTLINE DIMENSIONS

The VAD transformer is a phase shifting device which may be used with any wattmeter type instrument or meter for the measurement of volt-amperes. It is particularly adapted for use with a Lincoln polyphase demand meter of either the indicating or graphic recording type for the measurement of volt-ampere demand. The design of the transformer is such that the readings obtained are correct within very small and definite limits and any error is always negative so that the meter can never read higher than the true volt-amperes. The transformer is also arranged so that the meter will indicate reactive volt-amperes.

The device consists of three small auto-transformers which are energized by the circuit voltage. These transformers are so tapped that certain derived voltages are shifted to phase angles corresponding to selected power factors. The secondary terminals are arranged in four groups and are connected to the terminals of a rotary switch. By rotating the switch the two potentials supplying the meter may be shifted in phase angle corresponding to the power factor ranges as marked on the nameplate. The power factor ranges are selected to give a maximum error of less than two percent throughout the entire range.

The taps are arranged in the transformers to give the following ranges: A—watts; B—volt-amperes at 90% to 65% power factor; C—volt-amperes at 75% to 43% power factor and D—reactive volt-amperes.

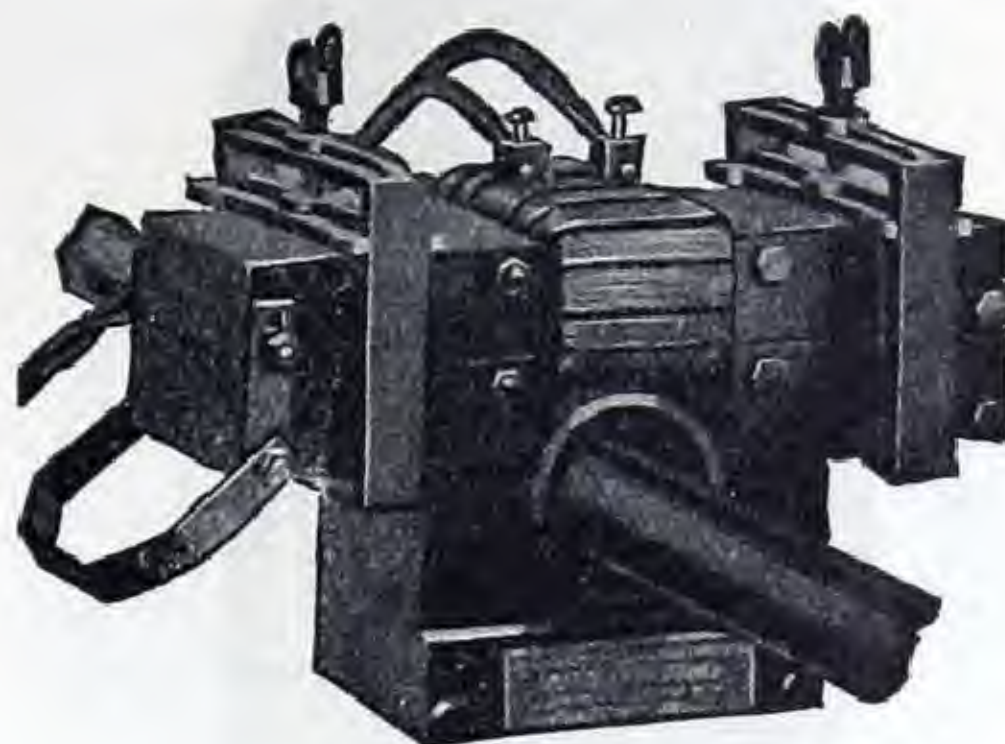
The new arrangement of taps in combination with the rotary switch permits changing from one position to another without changing any connections. It also has the following advantages:

1. The watts position may be used for testing the meter.
2. The reactive position may be used for checking the phase rotation.
3. The use of both the watts position and the reactive position may be used to determine the actual power factor of the load for the correct setting for reading volt-amperes.

The VAD transformer is built for use on 3 phase, 3 wire or 2 phase, 3 or 4 wire power circuits of 115, 230, 460 and 575 volts at frequencies of 25 to 60 cycles. If required, the transformer may be supplied with back stud connections for switchboard mounting.

Prices on application.

SANGAMO SPLIT CORE TRANSFORMER



No. 1366

The Sangamo Split Core Transformer is designed primarily to be used with a Lincoln demand ammeter for testing the loading of distribution transformers or other equipment. It may also be used in conjunction with a Sangamo type OD circular chart graphic ammeter or a Lincoln strip chart ammeter when a graphic record of load conditions is required.

It consists of a laminated iron core made in two sections with provision for clamping the two sections around the wire or cable on which the tests are to be made. The surfaces of the cores which are clamped together are of generous proportions and are carefully ground to insure good magnetic contact. Ratio coils are supplied with the transformer which covers a range of from 30 to 1000 amperes 25 to 60 cycles. Five standard ratios are available as follows:

Coil	Colour of Coil	Range in Amperes	Dial Constant and Ratio
100/5	Black	30-100	20
150/5	Brown	45-150	30
250/5	Blue	75-250	50
500/5	White	150-500	100
1000/5	Green	300-1000	200

There is no interruption of service or need to cut a cable to run a test. The split core transformer is simply clamped in position around the conductor and the leads connected to the coil and meter. It is not even necessary to take readings during the test. Only one reading at the end of the run is required. The Lincoln indicating type demand ammeter will show the maximum current for the test period.

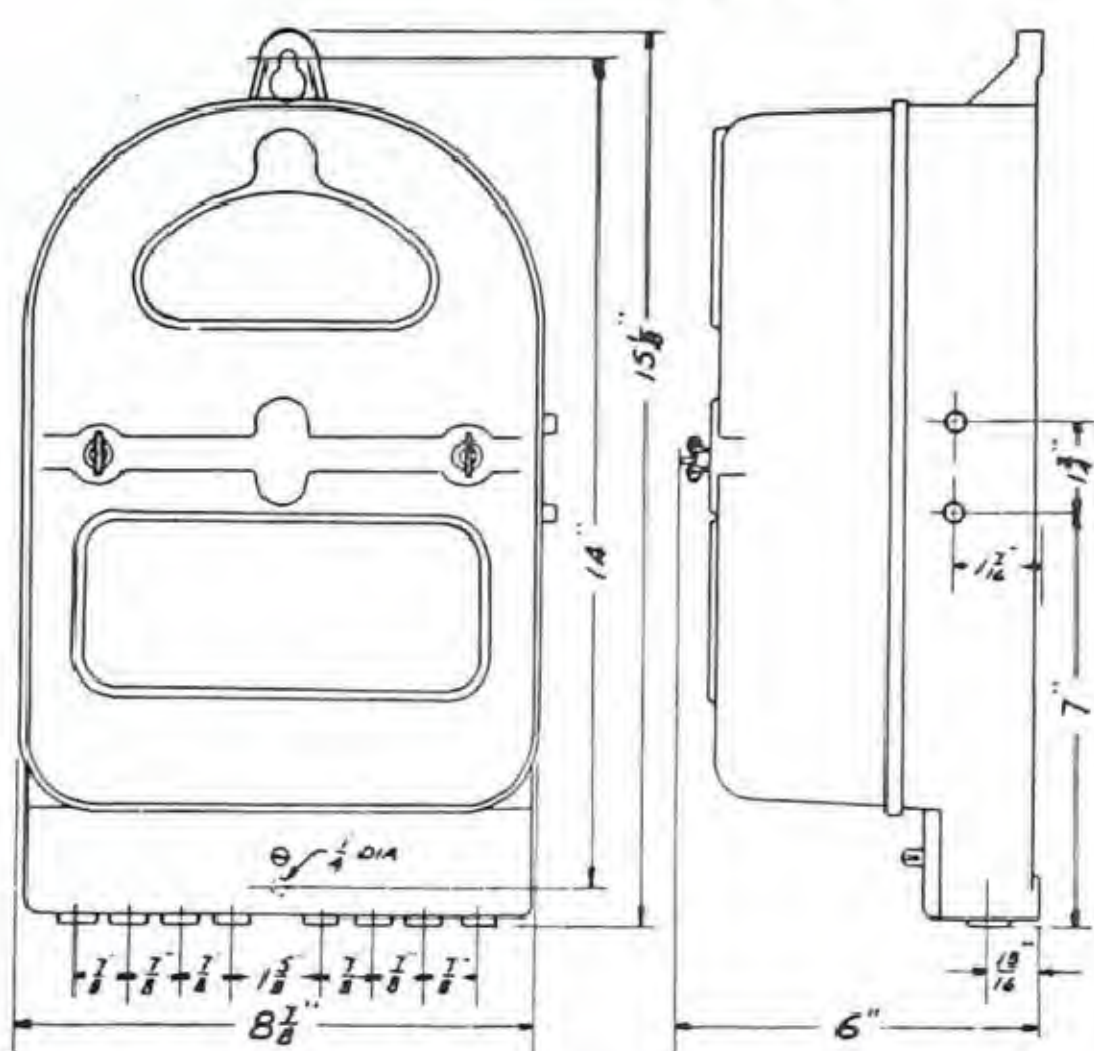
If a complete record of the load is required the split core transformer can be used with the type OD circular chart graphic ammeter. This instrument will show how the load varies during the test, how long the peak lasts and when it occurs. At the end of the test the chart can be removed and carefully studied. When used with the type OD meter a special 100 ampere coil is supplied. The other coils are interchangeable for use with either a type OD or indicating meter. To measure currents of lower value than 30 amperes, the conductor may be looped through the transformer twice or three times decreasing the minimum range to 15 or 10 amperes.

Distribution transformers should be checked for loading and balance at frequent intervals and the Sangamo split core transformer greatly simplifies this testing. Frequent tests will prevent burn-outs and loss of equipment.

Split core transformers are regularly furnished complete with one coil and a short piece of heavy rubber tubing to insulate the cable around which the transformer is clamped. Other coils, lead wire and ammeters are furnished separately.

Prices on application.

LINCOLN PEAK LOAD CONTROLLER



OUTLINE DIMENSIONS

Helps Reduce Power Bills.

Improves Load Factor.

Reduces your Cost per Kilowatt Hour.

Lowers your Power Cost per Manufactured Unit.

Points the Way to More Efficient Machine Operation.

The Lincoln Peak Load Controller is an instrument which can be set to ring a bell, sound a siren, or operate a circuit breaker when your power load reaches a predetermined peak.

In nearly every plant there is some equipment that need not be operated at definite times or for sustained periods. When the Lincoln Peak Load Controller is installed a check up of operating schedules will reveal these and such operations will be the ones "cut out" when the "alarm" sounds. By thus keeping down its power demand the average plant can save a large percentage of its cost of power.

The cost of power is almost universally based on the maximum demand and a sliding scale of rates per kilowatt hour on the number of hours use of maximum demand. It is, therefore, apparent that the higher your demand is the larger your demand charge will be and there will also be more kilowatt hours to pay for at the higher rates. Conversely, when you reduce your demand on the same amount of power used, the total demand charge is lower and there are fewer kilowatt hours charged at the higher rates and more at the lowest rate.

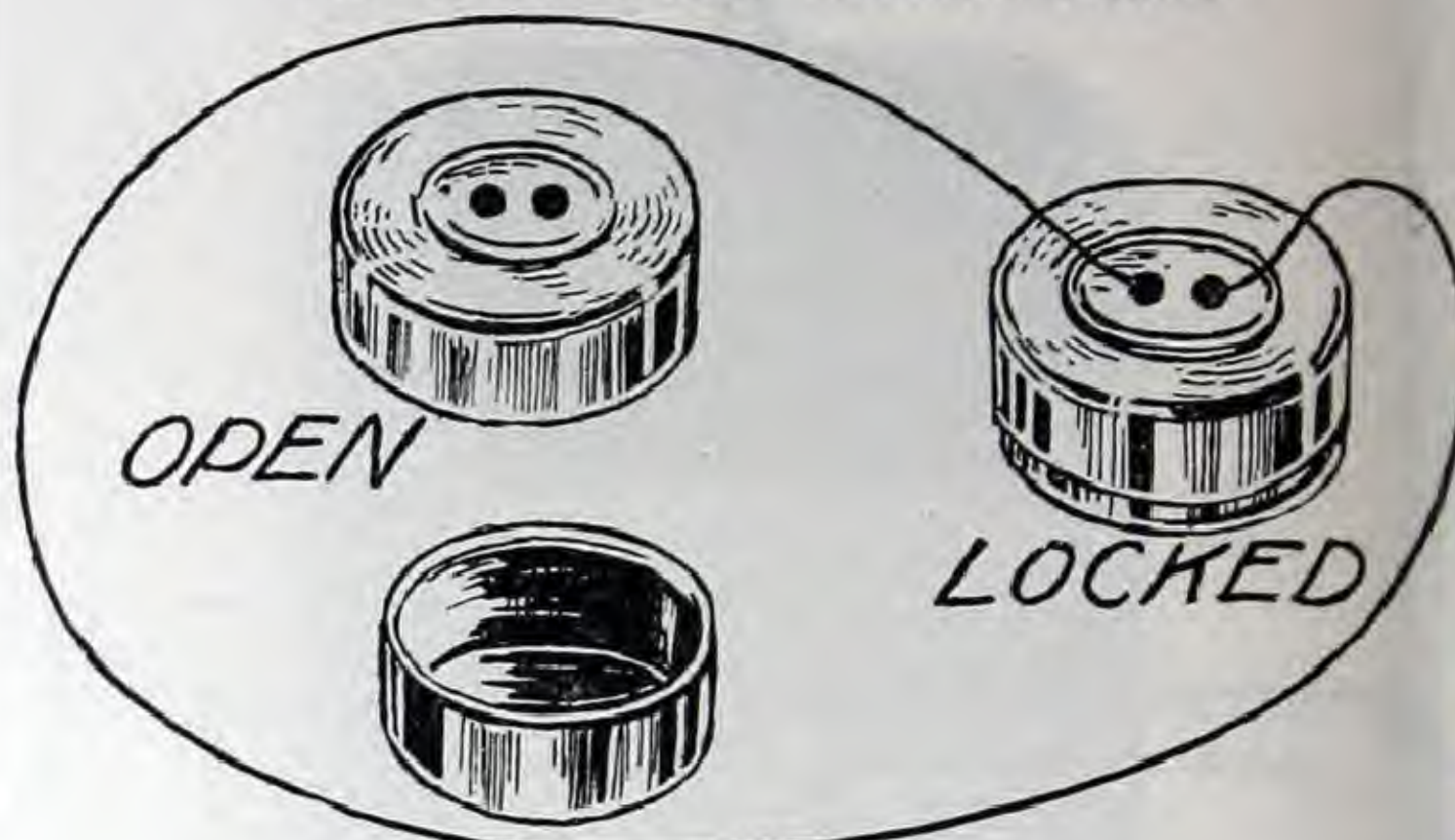
The Lincoln Peak Load Controller is built as a unit and is arranged for connections to the power line or to instrument transformers and has two terminals to which a bell or other alarm can be connected.

It is built in capacities of 5, 10, 15 and 25 amperes; 115, 230, 460 or 575 volts; 25, 30, 50 and 60 cycles, for use on 3 phase, 3 wire or 2 phase 3 or 4 wire power circuits.

Standard construction is front connected as shown but it can be furnished as a back stud connected instrument for mounting on a switchboard if desired.

It can also be furnished to read in KVA in place of kilowatts if required.

Prices on application.

SANGAMO AUTOMATIC SEALS
For Meters and Service Boxes

No. 3250

There are many uses for Sangamo automatic seals, a few of which are as follows:

Sealing service boxes to prevent access by unauthorized persons;

Sealing reset devices on demand meters and terminal covers on watthour meters;

Sealing flat rate water heater connection boxes and thermostats;

Sealing fuse boxes to prevent incorrect fuses being substituted or fuses bridged. This use of seals has been found to be very effective in public buildings or institutions.

The Sangamo automatic seal is manufactured in Canada. It is tamper-proof and inexpensive. Samples will be gladly sent on request.

The Sangamo automatic seal is made in two sections which when pressed together lock in such a manner that they cannot be separated without obvious mutilation. One of the sections is provided with two holes so that the ends of a wire may be passed through the holes and twisted together inside the seal cup. The other section is then pressed over the first section and the ends of the sealing wire are thus protected against tampering.

Both sections of the seal are made of tinned steel which as well as having great strength will withstand rusting or corrosion for a long period of time. The sections are made so that they can be easily pressed together between the thumb and finger but when once locked together, cannot be separated.

Initials or other means of identification of the owner company are die stamped in the metal so that all seals can be identified. If required, seals can be furnished serially numbered or marked with the year of issue. In no case are seals supplied blank or without identification.

Prices on application.

SANGAMO METER CLEANING SOLUTIONS
For Cleaning Meter Registers

Watthour meters require cleaning at periodic intervals. If this is not done, dust and dirt will collect in the bearings, register, etc., causing the meters to run slow.

The most difficult part of the meter to clean is the register, and it is very important that the register be kept as clean and as free from friction as possible. One method of cleaning registers is to disassemble them and clean each part separately. This method is expensive and there is always the danger of parts becoming lost or damaged or of incorrect assembly. Another method is washing the register in gasoline or benzine.

The best and most efficient method so far developed for cleaning meter registers is the use of Sangamo Cleaning Solutions. The dirtiest of registers can be cleaned in a few minutes and the surfaces will be left entirely free of grease.

The Solutions consist of four liquids designated as Cleaner, 1st Rinser, 2nd Rinser and Dryer, and are put up in containers of one gallon capacity each. Each container is marked with a distinctive label and full directions as to how the liquids should be used are given on the labels.

The solutions are similar to those used for the cleaning of watches and will not corrode or tarnish the metal parts if used according to directions.

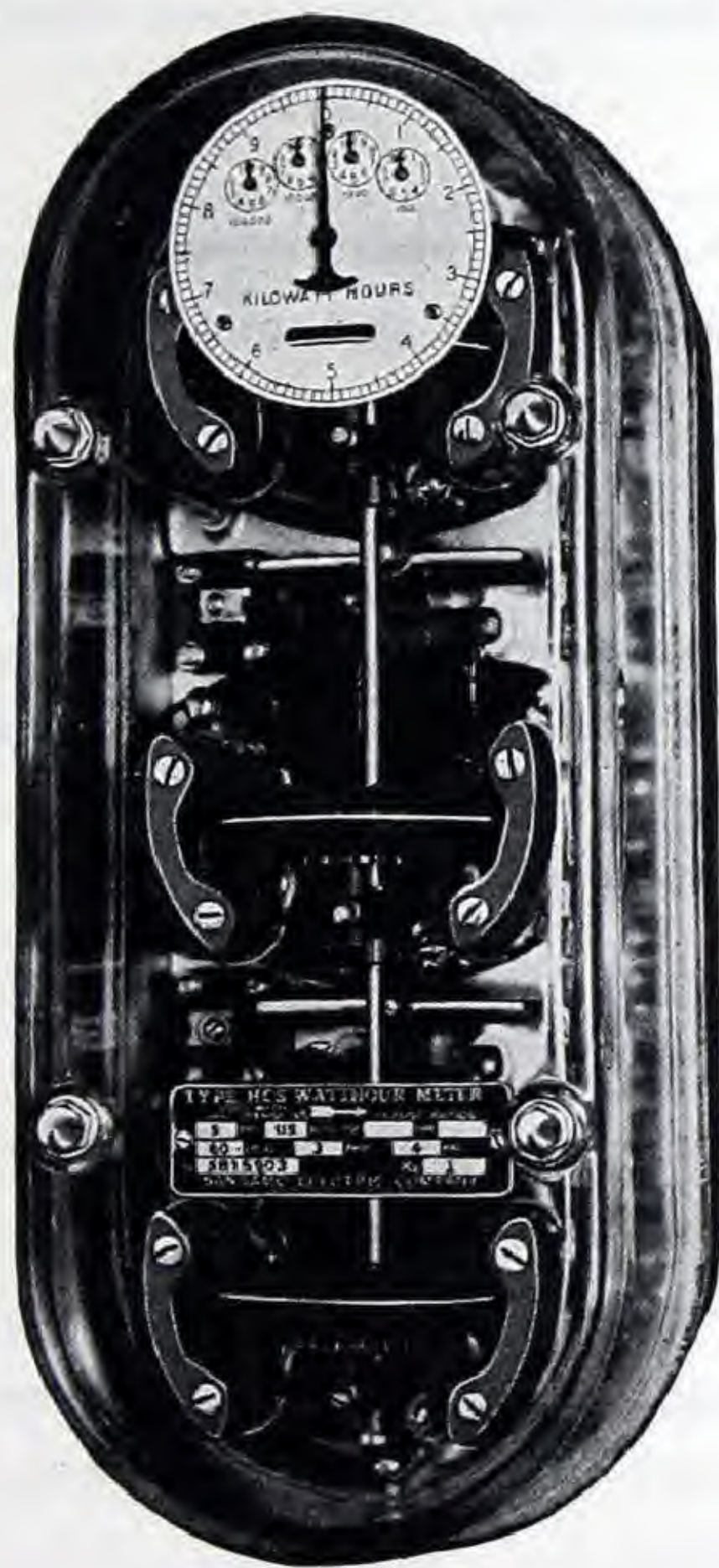
Prices on application.

SANGAMO WATTHOUR METERS

A.C. Switchboard Type

Sangamo, Alternating Current, Switchboard Watthour Meters are built in three types: The Type HC, Round Pattern, is beautifully finished with highly polished metal parts. All visible brass parts may be either nickel or copper finished as required. This type has long been the standard on switchboards where style and appearance are of paramount importance. The Type HCN, Narrow Type, is designed for minimum space requirements with maximum facilities for testing, including disconnects for both current and potential coils. Being only $5\frac{3}{4}$ inches wide, four units can be placed side by side on a single 24 inch panel without hindering later inspection and testing. The Type HCS, is a carefully designed meter arranged for switchboard mounting in the conventional manner and supplied at a minimum price.

TYPE HCS SWITCHBOARD METERS



Type HCS—Four-Wire
Three-Phase Meter

The Type HCS, alternating current, switchboard meters, are built in single disk, two disk and three disk construction, for use on single-phase and polyphase, including four-wire three-phase, circuits. The Type HC construction, with its overload and temperature compensations, is used throughout. The electrical characteristics are the same as the corresponding service type HC meters. Many of the parts are interchangeable with the service type meters. Other parts are physically interchangeable, but differ only in the highly polished finish used for appearance in the switchboard construction.

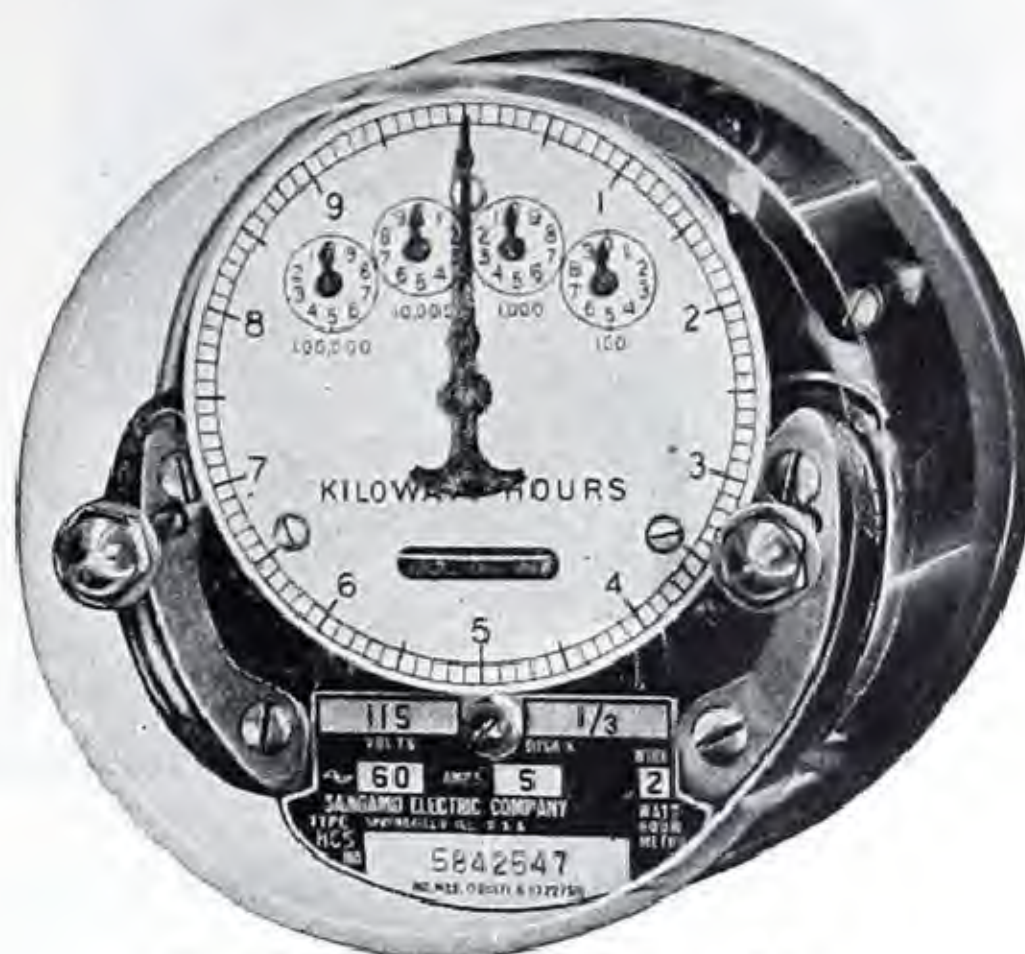
Prices on application.

SANGAMO WATTHOUR METERS

A. C. Switchboard Type

TYPE HCS SWITCHBOARD METERS

Continued



Type HCS, Singlephase Meter

On all meters, separate studs are provided for both the current and potential coils, so that the same meter may be used either self-contained or with instrument transformers. All current studs are $\frac{5}{16}$ " in diameter, and, on the polyphase, all potential studs are $\frac{1}{4}$ ". By using these ample sizes, mounting studs are not required. The standard stud length is $3\frac{1}{2}$ ". For metal boards, insulating bushings will be supplied without extra charge, when specified.

The registers on all types have circular dials with a sweep hand for the first circle, the value of which is ten kilowatt hours. In addition, there are four smaller totalizing circles. These registers are all direct reading or have decimal multipliers. Four circle registers, having all circles the same size, or maximum demand registers, can be supplied when specified, the former without extra charge and the latter with the extra charge specified in the price schedule.

The glass covers are held in position by case studs fitted with acorn nuts. For sealing, standard wing nuts may be substituted. All glass covers have the same depth on meters either with or without demand registers, so that any combinations of these may be mounted on a switchboard and still present a uniform appearance.

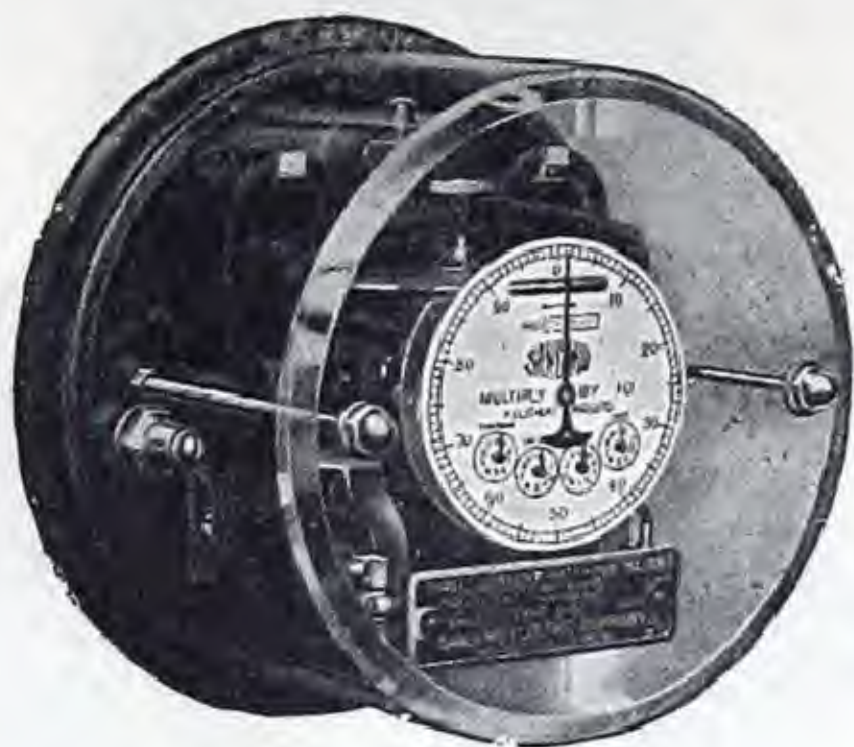
The test constant of the 5 ampere 115 volt single-phase is one-third of a watthour per disk revolution. The constant for the 5 ampere 115 volt polyphase is two-thirds, and for the 5 ampere 200/115 volt three disk one watthour per disk revolution. The constants of the other capacities progress according to the ratio of the increase in current and potential ratings.

The full load and light load adjustments are of the micro-meter type as used in all Sangamo alternating current meters. Each meter is individually lagged at the factory for power factor, and the connections firmly soldered. On all polyphase meters, each element is provided with a balancing adjustment, which, like the full load and light load adjustments, is operated from the front of the meter. The meters have excellent electrical characteristics, and, in addition, the mechanical designs provide for long, trouble-free operation and easy maintenance.

Prices on application.

SANGAMO WATTHOUR METERS

D. C. Switchboard Type



Type D-5 Two-Wire, Direct-Current Switchboard-Type Watthour Meter

The first Sangamo Switchboard-Type, Direct-Current Watthour Meters were put on the market over thirty years ago. Several refinements have been made since that time, but the mercury-motor principle of operation, which has proven so satisfactory, remains unchanged. The mercury-motor meter has inherent advantages, resulting from the flotation of the moving system, that cannot be equalled by any other type of meter. These switchboard meters are made in two types, the two-wire and the three-wire. The three-wire meter consists of two two-wire meters mounted in a single base and connected by a differential train, which records the sum of the loads registered by the separate elements. This form of construction combines simplicity and dependability since it consists essentially of two two-wire meters. Repair work is facilitated and testing simplified.

INHERENT ADVANTAGES

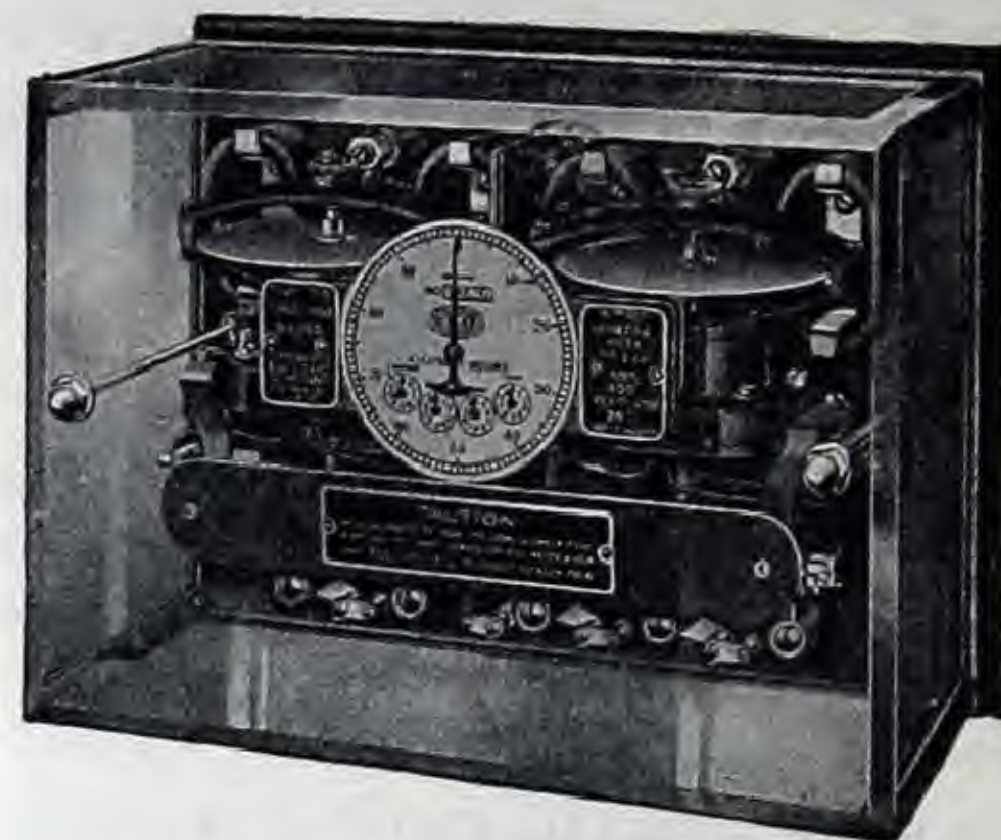
(1) **Durability:** The Sangamo Type D-5 Mercury-motor Watthour Meter far excels all other types in durability. This is due primarily to the mercury flotation of the moving system, which reduces friction to a minimum and precludes the destructive effects of any vibration to which the meter may be subjected.

(2) **Torque:** The ratio of driving torque to friction torque in Type D-5 Meters is extremely large, and what is more important, it remains practically unchanged over long periods of time, due to the extremely small amount of wear that takes place. The actual torque is 60 millimeter-grams at full load. The force or equivalent weight acting upon the upper jewel bearing is only a little over 2.8 grams.

SANGAMO WATTHOUR METERS

D. C. Switchboard Type

(Continued)



Type D-5 Three-Wire, Direct-Current Switchboard-Type Watthour Meter

This gives a ratio of torque to effective weight on the bearings of 21.2, which is many times greater than in any other type of watthour meter.

(3) **Shunt Operation:** Since all meters over 10 amperes in capacity are operated off shunts, there is only one type and size of meter to be handled and tested. Any Type D-5 Meter may be tested by disconnecting the leads from the shunt and using a 10-ampere load without in any way disturbing the main circuit.

(4) **Low Losses:** The low energy losses in the Type D-5 Meter are a distinct advantage.

(5) **External Fields:** Due to the fundamental design of mercury motor meters, powerful external fields result in no inaccuracy in Sangamo Type D-5 Meters.

(6) **Lightning:** Sangamo Type D-5 meters have extremely high inductance and consequently are least affected by lightning surges.

(7) **Short Circuits:** The low-resistance series circuit of the Type D-5 Meter enables it to carry enormous overloads without damage. Even short circuits can do no permanent harm where fuse protection is provided.

(8) **Accessibility:** The unit construction of the motor element permits the removal of the entire element from the front. Should repairs be necessary this does away entirely with the necessity of disconnecting the meter and removing it from the switchboard.

Prices on application.

SANGAMO WATTHOUR METERS

Direct Current

MERCURY FLOTATION, TYPE D-5



Service Type Meter
Three-Wire



Service Type Meter
Two-Wire

The Sangamo Mercury Motor Meters have now been on the market over 25 years and the results obtained with these meters in all classes of direct current service more than justify the confidence we have felt in the principle of operation used in them.

These meters are now built in both two-wire and three-wire types, for all capacities and voltages. Bulletin fully describing both types will be sent on request.

One hundred amperes and over externally shunted.

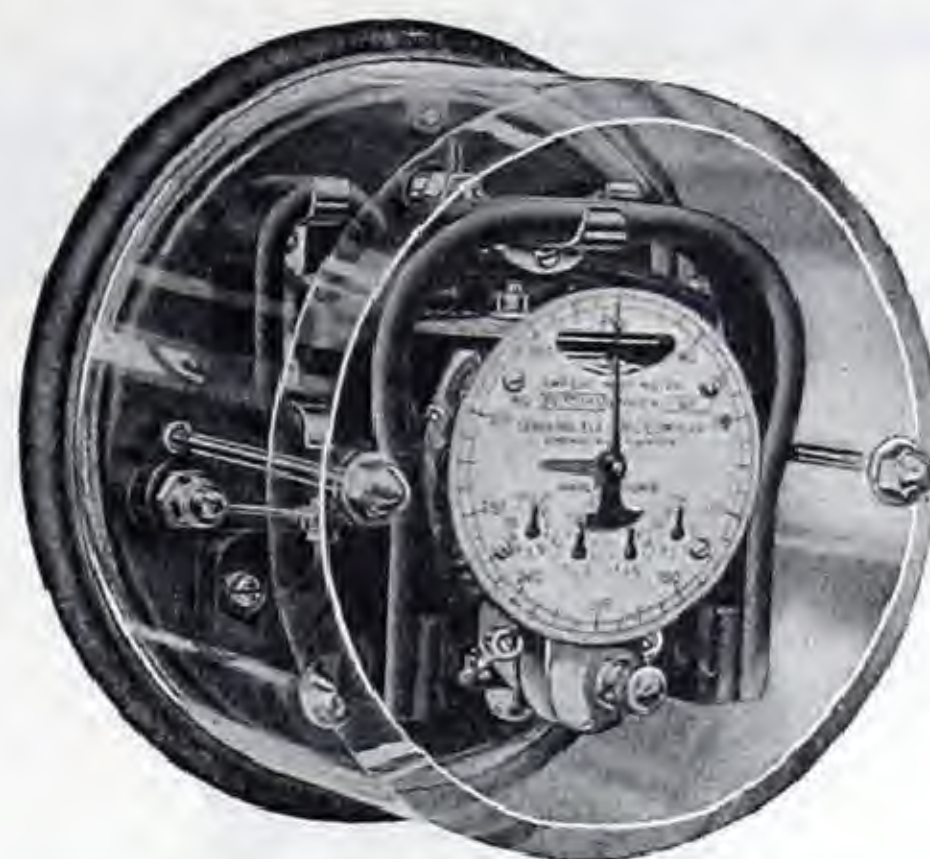
Pocket type shunts regularly supplied with meters of 100, 150 and 200 amperes capacity. Box type shunts will be furnished in these sizes, without extra charge, and regularly in larger capacities up to and including 400 amperes. Open type shunts will be supplied in capacities 100 to 400 amperes, if desired, and regularly in all capacities 500 amperes and larger, complete with 5 foot cables. If longer cables are required on open or box type shunts add following net prices for each shunt:

For two-wire meters, pressed steel case with full glass front is standard, and will be furnished, unless otherwise ordered. Pressed glass case furnished without extra charge.

Three-wire meters supplied with pressed aluminum case only.

The buyers in the Canadian market seeking motors, controllers and other power apparatus, will find in the Northern Electric Company one source of supply whatever the requirements may be. Through the Power Apparatus Specialists, located in the principal cities of Canada, at the command of you and your consulting engineers, for aid in the selection of the proper equipment, the Northern Electric Company stands ready to serve you upon call.

SANGAMO AMPEREHOUR METERS



Sangamo List H Switchboard-Type Amperehour Meter

Amperehour meters are employed for so many different purposes and the requirements are so varied that a description of all types would be lengthy and possibly confusing. The principal field for amperehour meters is in connection with storage-battery operation whereby the meter indicates at all times the condition of the battery. Trains may be provided with contacts for stopping and starting the charge, or both. Amperehour meters may also be used for simple measurement of energy in terms of amperehours. One meter only is illustrated, but various types can be furnished and the company will be glad to make recommendations on receipt of the data covering proposed installations. Two of the types are:

(1) List B: This meter may be furnished with or without a resistor which provides a predetermined overcharge for the battery and is ordinarily employed in storage-battery control work.

(2) List H: This meter is furnished with a train having totalizing circles and is ordinarily employed merely for totalizing amperehours over a period of time, though a resistor can be supplied, when required.

SANGAMO SHUNTS

Sangamo Shunts, for the operation of large-capacity switchboard meters and direct-current indicating instruments, are so well and favourably known that no detailed description or comment is necessary. During the past 30 years the Sangamo Electric Company has built many of the most notable shunts in the country, among them the great 60,000-ampere shunt at Niagara Falls, which is the largest in the world. Many shunts of 10,000, 15,000, 20,000 and 25,000-ampere capacity have been built. Most of these are employed with Sangamo Meters, though some are used with ammeters or wattmeters.

Prices on application.

SANGAMO METERS

Amperehour Meters

TYPE N

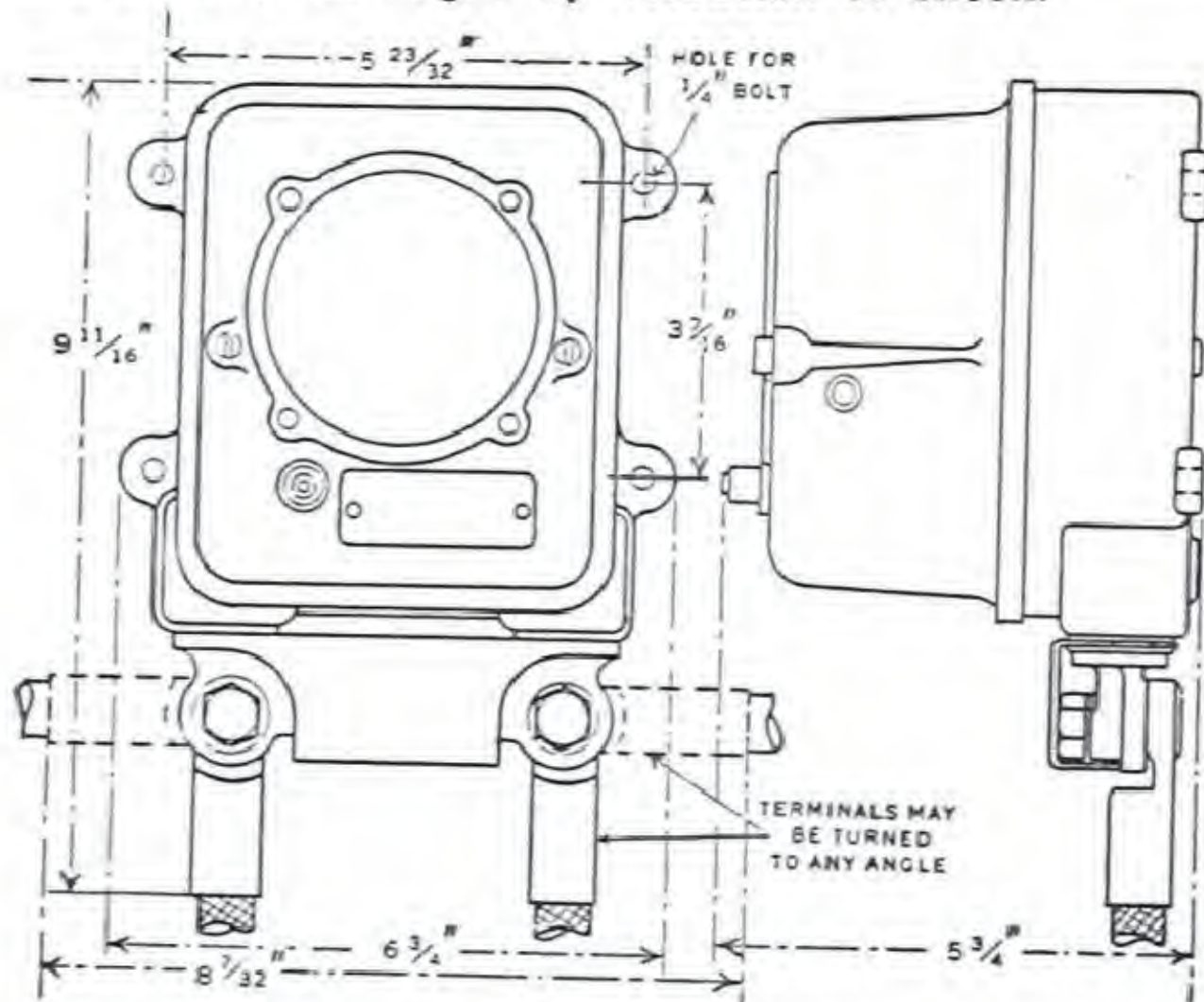


Sangamo Type NT Amperehour Meter

Amperehour meters are extensively used with every type of storage battery installation, being employed not only to indicate the state of charge of the battery, but also to terminate the charge automatically when the battery is full. They measure the product of current any time without regard to voltage, and thus provide an accurate means of determining the amperehours put into or taken out of a battery. There are many fields where a measurement of the current in amperes over a period of time, that is, amperehours, is preferable to energy measurement in watt-hours.

General Advantages of Design and Performance

The type N meter is the simplest form of mercury-motor meter, comprising a single copper disk rotating in a mercury chamber which is located between the pole tips of two large permanent magnets. The only exposed moving parts are the shaft and a small counterweight. All of the parts, which are few in number, are substantial in design and simple in assembly. A moisture-proof steel case affords a maximum of protection to the meter proper, which has no delicate parts to be shaken loose or damaged by vibration or shock.



Dimensions of Sangamo Type NT Amperehour Meters
Sangamo Type NT Amperehour Meter for Motive Power Service

The type NT meter shown above is designed for use on electric automobiles, trucks, mine locomotives, industrial tractors, etc., where severe conditions of operation are likely to be encountered. The meter should be permanently installed in the battery circuit on the vehicle, so that all of the discharge current will pass through the meter and consequently be registered on the dial. A movable red indicating hand is furnished on the train, which is intended to be located at the point where the battery should be recharged. The operator can always tell, by comparing the position of the moving black hand and the stationary red hand, what remaining capacity is available before the battery should be put on charge.

SANGAMO METERS

Amperehour Meters

(Continued)

TYPE N



Sangamo Circuit Breaker, for use with Sangamo Amperehour Meters, to cut off charge when meter hand actuates contact.

Sangamo Circuit Breaker

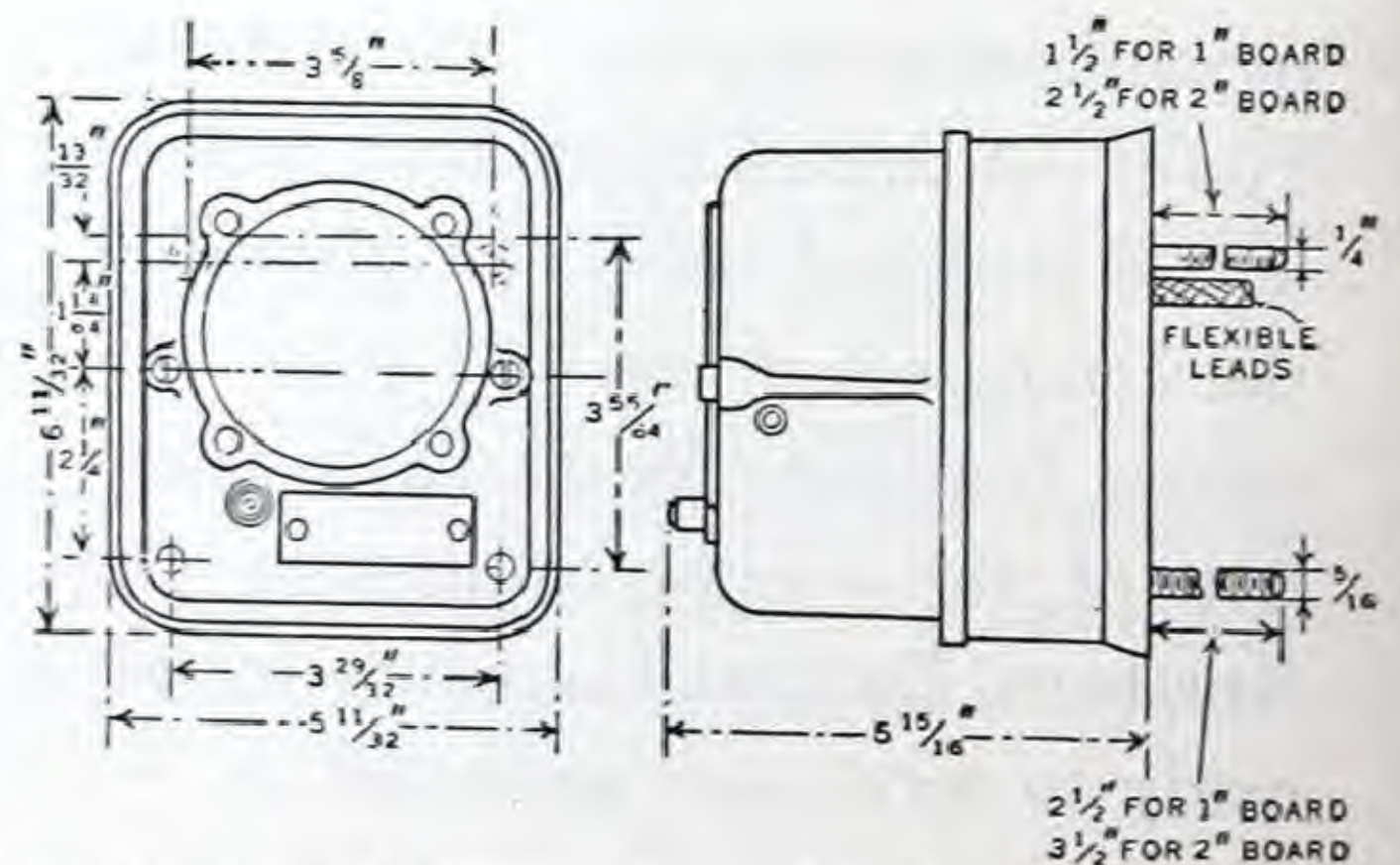
The Sangamo Circuit Breaker shown is widely used in connection with Sangamo Type N Amperehour Meters. It is especially designed for controlling battery charging circuits for use in this connection. It is usually furnished to open when the coil is energized due to contact being made in the meter or elsewhere, but it is also manufactured in the no-voltage release type in which the energized coil of the circuit breaker holds the armature in the closed position so long as there is sufficient voltage.

In ordering circuit breakers the type and the operating voltage should be specified. Standard ranges are 4-8 volts, 9-18 volts, 19-42 volts, 43-94 volts and 95-250 volts. The order should also state whether a slate base or back-connected breaker is required.

SANGAMO TYPE NF AMPEREHOUR METER FOR SWITCHBOARD MOUNTING



The type NF meter is intended for stationary installation, being back-connected for switchboard mounting. In capacities up to 30 amperes the shunt is inside the meter, but in the higher capacities it is mounted across the studs back of the switchboard. Charging panels should be equipped with type NF meters in preference to other types. It is also particularly adapted for use on control panels, interlocking signal towers, telephone switchboards, farm lighting plant panels, electro-plating panel boards, and any particular service where the meter can be conveniently mounted on a switchboard.



Dimensions of Sangamo Type NF Amperehour Meters

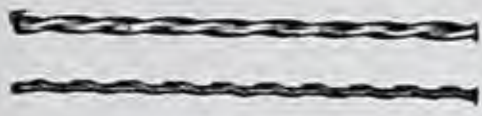
LEAD METER SEALS



Lead Seals



Electric Meter Seals



Wire

Lead and wire seals, while not so effective as the cast iron seals, are used by water, gas and electric companies in sealing their meter dials. These seals are made to give all possible protection. The lead is poured around a bent wire, not a straight one. Leads are made in $\frac{5}{16}$ -in., $\frac{3}{8}$ -in. and $\frac{1}{2}$ -in. sizes. The wires are of copper, tinned and bright iron, in single strand, two-ply, three-ply and four-ply. Leads and wire can be furnished separately or attached in any length your requirements demand.

Length Wire	Size Seal	Size Wire	Type Wire	List Price Per 1000
4"	$\frac{5}{16}$ "	4 ply	Tin	\$2.68
6"	$\frac{5}{16}$ "	4 ply	Tin	2.88
8"	$\frac{5}{16}$ "	4 ply	Tin	3.12
10"	$\frac{5}{16}$ "	4 ply	Tin	3.33
12"	$\frac{5}{16}$ "	4 ply	Tin	3.70
4"	$\frac{5}{16}$ "	4 ply	Copper	2.76
6"	$\frac{5}{16}$ "	4 ply	Copper	2.96
8"	$\frac{5}{16}$ "	4 ply	Copper	3.20
10"	$\frac{5}{16}$ "	4 ply	Copper	3.50
12"	$\frac{5}{16}$ "	4 ply	Copper	3.82
4"	$\frac{7}{16}$ "	4 ply	Tin	2.96
6"	$\frac{7}{16}$ "	4 ply	Tin	3.32
8"	$\frac{7}{16}$ "	4 ply	Tin	3.42
10"	$\frac{7}{16}$ "	4 ply	Tin	3.68
12"	$\frac{7}{16}$ "	4 ply	Tin	3.98
4"	$\frac{7}{16}$ "	4 ply	Copper	3.08
6"	$\frac{7}{16}$ "	4 ply	Copper	3.26
8"	$\frac{7}{16}$ "	4 ply	Copper	3.50
10"	$\frac{7}{16}$ "	4 ply	Copper	3.78
12"	$\frac{7}{16}$ "	4 ply	Copper	4.12

New Type Padlock Seals and Sealing Links



Brass	\$62.85
Aluminum	53.90
Zinc coated Steel	44.90
Extra Links	18.00

MORRILL LEAD SEAL PRESSES



Morrill Presses can be furnished with name, initials or number, but are not equipped to engrave monograms.

Size	List Price
6"	\$6.40
8"	6.70
10"	7.05

HALL METER RECORD BOOKS



The Hall Loose Leaf Meter Book is made in two sizes Nos. 100 and 200.

No. 100 is designed to hold 100 meter sheets.

No. 200 will accommodate 200 sheets.

No. 100C consists of a No. 100 cover and 100 sheets.

No. 200C comprises a No. 200 cover and 200 sheets.

Size of leaf is 5 x 8 $\frac{1}{2}$ inches.

List No.	Description	List Price
100	Cover only.....	\$2.35
200	Cover only.....	2.63
100C	Cover and 100 sheets....	3.00
200C	Cover and 200 sheets....	3.94
	Loose leaves per M.....	6.56
	Loose leaves per 100....	.84
	Indices, per set.....	2.81

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WESTON TESTING INSTRUMENTS

Model 45 Portable D.C. Instruments



Sturdy, dependable instruments for rugged service. Accurate within $\frac{1}{2}$ of 1 per cent. Shielded from external magnetic fields; permanent magnet moving coil type.

Housed in polished hardwood cases, with hinged covers and carrying handles.

Voltmeters, ammeters and milliammeters are 8 x 8 x $4\frac{3}{4}$ inches; scale length, $5\frac{3}{16}$ inches; approximate weight, 9.9 pounds.

VOLTMETERS

Ranges	Scale Divs.	List Price Each	Ranges	Scale Divs.	List Price Each
*0.2-0-2.8	150	\$96.00	150/3	150	\$104.00
1.5	150	96.00	150/15	150	104.00
3	150	96.00	150/75	150	104.00
5	100	96.00	300/150	150	110.40
15	150	96.00	600/150	150	123.20
150	150	96.00	600/300	150	123.20
300	150	102.40	750/150	150	129.60
600	120	115.20	150/15/3	150	112.00
750	150	121.60	300/150/3	150	118.40
15/3	150	104.00	750/300/150	150	137.60

*Scale adapted for use in connection with cadmium test on storage batteries.

AMMETERS

Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each
			25	125	\$107.20	300	150	\$109.20
1.5	150	\$107.20	50	100	107.20	500	100	114.00
3	150	107.20	75	150	107.20	750	150	118.40
5	100	107.20	100	100	107.20	1000	100	128.00
10	100	107.20	150	150	107.20	1500	150	142.40
15	150	107.20	200	100	107.20			

MILLIAMMETERS

Range	Scale Divs.	Resis. Ohms	List Price Each	Range	Scale Divs.	Resis. Ohms	List Price Each
1.5	150	360	\$97.60	100	100	0.50	\$ 96.00
3	150	210	97.60	150	150	0.35	96.00
7.5	150	28	96.00	300	150	0.17	96.00
15	150	3.3	96.00	750	150	0.07	100.00
30	150	1.67	96.00	1000	100	0.05	107.20
75	150	0.70	96.00	1500	150	0.03	107.20

VOLT-AMMETERS

Volts	Amperes	Scale Divisions	List Price Each
350	350 MA	140	\$128.00
*30/3	30/3/0.3/0.03	150	168.00
†150/30/3	30/3/0.3	150	160.00
150/15/1.5	15/1.5/.15	150	160.00
*150/15/3	15/1.5/.15	150	160.00

*Conforms with A.R.A. specifications.

†Designed especially for railway use. All ranges protected by replaceable fuses.

WESTON TESTING INSTRUMENTS

Model 155 Portable A.C. Instrument



Movable iron type. Length of scale, $5\frac{1}{4}$ in. Black walnut case without cover, leather carrying handle.

Power consumption: Voltmeters at 115 volts, 6.5 watts; at 115 volts, 25 or 60 cycles, 6.5 volt-amperes. Ammeters at 5 amperes, 1.1 watts; at 5 amperes, 25 cycles, 1.1 volt-amperes; at 5 amperes, 60 cycles, 1.4 volt-amperes.

VOLTMETERS

Dimensions: to 300 volts, 7 x $7\frac{1}{8}$ x $3\frac{1}{4}$ inches; above 300 volts, $7\frac{3}{4}$ x $8\frac{3}{4}$ x 4 inches. Weight, to 300 volts, 4 pounds; above 300 volts, 5 pounds.

Voltmeters are self-contained up to and including 750 volts. Higher ranges may be obtained by using Models 311 or 457 portable potential transformers, in conjunction with a 150-volt instrument.

Range	Single Range Res. Ohms	Scale Divisions	List Price Each
30	150	150	\$92.80
50	415	100	92.80
75	625	150	92.80
125	1670	125	92.80
150	2000	150	92.80
250	4150	125	97.60
300	5000	150	99.20
500	8333	100	107.20
600	10000	120	112.00
750	12500	150	118.40

Double Range

150/75	1250/625	150	100.80
300/150	5000/2500	150	107.20
600/150	10000/2500	150	120.00
600/300	10000/5000	150	120.00
750/150	12500/2500	150	126.40
750/300	12500/5000	150	126.40

Triple Range

450/300/150	7500/5000/2500	150	123.20
600/300/150	10000/5000/2500	150	128.00
750/300/150	12500/5000/2500	150	134.40

Voltmeters to be used on 500 cycles add \$6.40 to above prices.

AMMETERS

Dimensions: up to 300 amperes 7 x $7\frac{1}{8}$ x $3\frac{1}{4}$ inches; above 300 amperes, $7\frac{3}{4}$ x $8\frac{3}{4}$ x 4 inches.

Range	Approx. Res. Ohms.	Single Range Inductance Henries	Scale Div.	List Price Each
1	1.15	0.00244	100	\$89.60
2	0.287	0.00057	100	89.60
3	0.128	0.00027	150	89.60
5	0.0435	0.000091	100	89.60
10	0.0127	0.000023	100	89.60
15	0.0066	0.000011	150	96.00
25	0.0032	0.0000033	125	96.00
50	0.00117		100	99.20
75	0.00085		150	99.20
100	0.00047		100	104.00
150	0.00034		150	108.80
200	0.00034		100	113.60
250	0.000172		125	118.40
300	0.000172		150	123.20
400	0.000054		80	136.00
500	0.000054		100	136.00

Double Range

1/.5	1.15/4.6	100	113.60
2/1	0.34/1.36	100	113.60
5/2.5	0.052/0.218	100	113.60
10/5	0.012/0.045	100	113.60

Single and double range model 155 milliammeters are available. Prices on application.

WESTON TESTING INSTRUMENTS

Model 430 Portable D.C. Instruments



Permanent magnet moving coil type. Accurate within three-quarters of one per cent. Unshielded from external magnetic fields.

Voltmeters are available at a standard sensitivity of 1,000 ohms per volt in single and triple ranges.

Ammeters and milli-am-meters are regularly made with single and triple ranges, self-contained up to and in-cluding 50 amperes.

Dimensions: $5\frac{1}{16} \times 6\frac{1}{32} \times 3\frac{1}{2}$ inches; scale length, 4 inches. Approximate weight, $3\frac{1}{2}$ pounds.

VOLTMETERS

Range	Scale Divs.	List Price Each	Range	Scale Divs.	List Price Each
3	150	\$68.80	30/7.5/3	150	\$ 84.80
15	150	68.80	75/30/7.5	150	84.80
50	100	68.80	150/15/3	150	84.80
150	150	68.80	300/150/3	150	91.20
300	150	75.20	500/100/10	100	100.80
600	120	88.00	750/300/7.5	150	106.95
750	150	94.40	750/300/150	150	106.95
1000	100	102.40	.....	...	....

Above ranges also available with a sensitivity of 5,000 ohms per volt at an increase in price.

AMMETERS

Range	Scale Divs.	List Price Each	Range	Scale Divs.	List Price Each
1	100	\$68.80	15/3/0.15	150	\$84.80
1.5	150	68.80	15/3/1.5	150	84.80
3	150	68.80	25/2.5/0.5	100	84.80
5	100	68.80	25/5/2.5	100	84.80
7.5	150	68.80	25/10/2.5	100	84.80
15	150	68.80	25/10/5	100	84.80
30	150	68.80	30/3/1.5	150	84.80
50	100	68.80	30/6/3	150	84.80
5/0.5/0.05	100	84.80	30/15/3	150	84.80
5/2.5/0.5	100	84.80	50/5/0.5	100	84.80
10/1/0.1	100	84.80	50/10/2	100	84.80
10/2.5/1	100	84.80	50/20/5	100	84.80
10/5/1	100	84.80	50/25/10	100	84.80

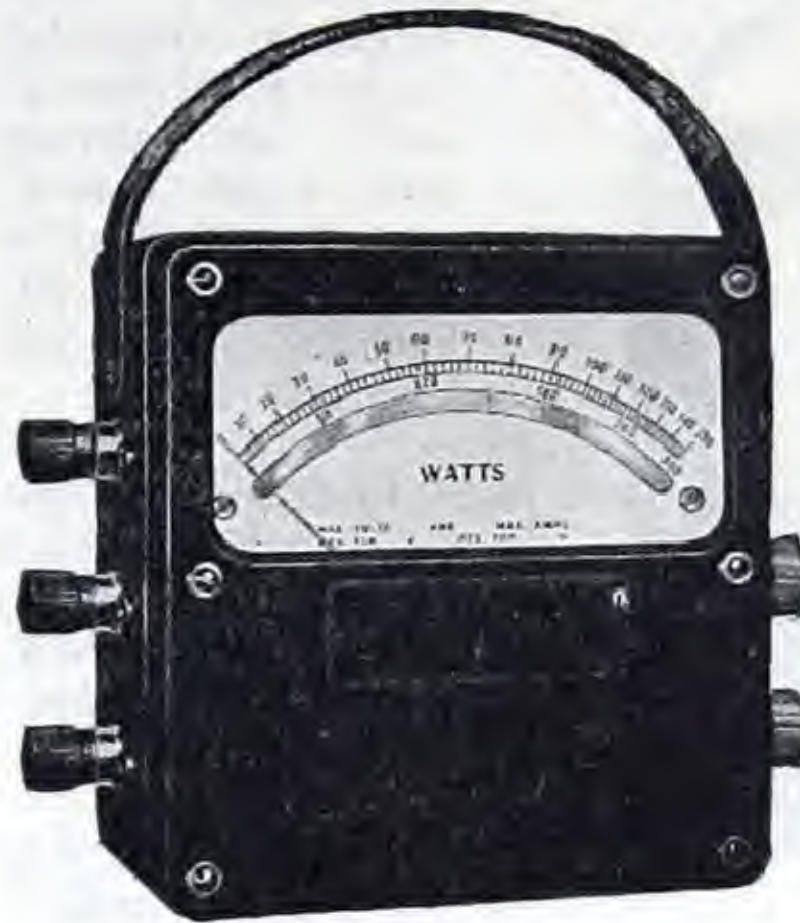
MILLIAMMETERS

Range	Approx. Res. Ohms	Scale Divisions	List Price Each
1	92	100	\$ 70.40
1.5	69	150	70.40
3	12.4	150	70.40
7.5	3.4	150	68.80
15	1.4	150	68.80
30	0.88	150	68.80
75	.....	150	68.80
150	.....	150	68.80
300	.....	150	68.80
750	.....	150	72.80
0.75/0.15/0.03	.....	150	112.00
3/0.3/0.03	.....	150	112.00
15/1.5/0.15	.....	150	104.00
30/7.5/3	.....	150	86.40
150/15/1.5	.....	150	86.40
150/30/7.5	.....	150	84.80
1500/150/15	.....	150	84.80
3000/300/30	.....	150	84.80
3000/750/150	.....	150	84.80

Leather case for single or triple range ammeter, milli-ammeter or microammeter, \$12.00; for single range volt-meter, \$12.00; for triple range voltmeters, \$12.80.

WESTON TESTING INSTRUMENTS

Model 432 Portable D.C. and Single Phase Wattmeters



Electrodynamometer type wattmeter, shielded from external magnetic fields, and accurate within one-half of one per cent. Double voltage and single and double current ranges are self-contained up to 300 volts and 50 amperes. Potential ranges up to 750 volts are available by using external mul-tipliers; higher ranges re-quire the use of potential transformers. Current ranges can be extended

beyond 50 amperes by using a 5-ampere instrument in con-junction with either Model 327, 328 or 461 current trans-formers.

Potential ranges have maximum voltage capacities as shown in the range listing. The maximum capacity of the current ranges is 50 per cent greater than the normal rated current capacity.

These instruments are accurate on all commercial fre-quencies up to 133 cycles per second. The phase angle is negligible on such frequencies. They may be used on d.c. and checked in comparison with d.c. standards. Temperature error is less than 1 per cent for 25 degrees C. change in tem-perature.

As the working error is negligible, they may be left in circuit continuously without appreciable effect on the ac-curacy.

Power consumption: Potential side, at 115 volts, 1.2 watts; at 115 volts, 25 or 60 cycles, 1.2 volt-amperes. Current side, at 5 amperes, .67 watt; at 5 amperes, 25 cycles, .73 volt-ampere and at 5 amperes, 60 cycles, .98 volt-ampere.

Dimensions: $6\frac{1}{2} \times 5\frac{1}{4} \times 3\frac{1}{2}$ inches; scale length, $3\frac{1}{16}$ inches; weight $3\frac{1}{4}$ pounds.

Volts		Amperes		Watts		Scale Divs.	List Price Each
Normal	Max.	Normal	Max.	Low Range	High Range		
75/150	100/200	1	1.5	75	150	75†	\$112.00
150/300	200/400	1	1.5	150	300	75†	118.40
75/150	100/200	2	3	150	300	75†	112.00
150/300	200/400	2	3	300	600	60†	118.00
75/150	100/200	5	7.5	375	750	75†	112.00
150/300	200/400	5	7.5	0.75 kw	1.5 kw	75†	118.40
75/150	100/200	10	15	0.75 kw	1.5 kw	75†	112.00
150/300	200/400	10	15	1.5 kw	3 kw	75†	118.40
75/150	100/200	20	30	1.5 kw	3 kw	75†	116.80
150/300	200/400	20	30	3 kw	6 kw	60†	123.20
75/150	100/200	50	75	3.75 kw	7.5 kw	75†	121.60
150/300	200/400	50	75	7.5 kw	15 kw	75†	128.00

Approx. Res. Ohms: †Low range, 5500; high range, 11000.

‡Low range, 11000; high range, 22000.

Double current with range changing switch available at an extra charge. Prices upon application.

Leather case for Model 432, \$12.00.

Y-BOXES FOR MODEL 432 WATTMETERS

For use on Balanced 3 Phase, 3 Wire Circuits

Normal Volt. of Instru- ment	Y-Box Multi- plying Constant	Normal Line Volt. with Y-Box	Maximum Volt. with Y-Box	Box		List Price Each
				Type	No.	
75	3	150	170	5	1	\$38.40
150	3	300	340	5	2	38.40
150	4	400	450	5	2	38.40
150	5	500	550	5	3	38.40
150	6	600	650	5	3	38.40

WESTON TESTING INSTRUMENTS

Model 433 Portable A.C. Instruments



Shielded from external magnetic fields. Electromagnetic or moving iron type instruments contained in bakelite cases with leather carrying handles.

Instruments can be left in circuit continuously without overheating, therefore no contact key is used.

Dimensions: $5\frac{1}{16}$ x $6\frac{1}{32}$ x $3\frac{1}{2}$ inches;

scale length, $3\frac{13}{16}$ inches. Weight $2\frac{1}{2}$ pounds.

VOLTMETERS

Self-contained for ranges shown. Higher ranges obtained by using multipliers or Model 311 or 457 potential transformer in conjunction with a 150 volt instrument; for use on frequencies up to 133 cycles per second.

Range	Res. Ohms	Scale Div.	List Price Each	Range	Res. Ohms	Scale Div.	List Price Each
10	80	100	\$65.60	10/5	40/20	100	\$73.60
15	168	150	65.60	20/10	160/80	100	73.60
20	224	100	65.60	30/15	336/168	150	73.60
30	425	60	65.60	60/30	850/425	60	73.60
50	1140	100	65.60	150/15	3000/300	150	73.60
60	1370	60	65.60	150/75	5300/2650	150	73.60
75	2660	75	65.60	300/150	22000/11000	150	80.00
100	3500	100	65.60	450/300/150	33000/22000/11000	150	96.00
125	4400	125	65.60				
150	5300	150	65.60	700/300/150	44000/22000/11000	150	100.80
250	18200	50	70.40				
300	22000	60	72.00	750/300/150	55000/22000/11000	150	108.80

For Model 433 Voltmeters to be used on 500 cycles, add \$6.40 to prices shown. Leather case for single or double range voltmeters, \$12.00; for triple range, \$12.80.

WESTON TESTING INSTRUMENTS

Model 433 Portable A.C. Instruments

AMMETERS

For use on frequencies up to 500 cycles per second, except triple range ammeters which have self-contained transformers limiting use to a.c. with frequencies up to 133 cycles.

Range	Approx. Res. Ohms	Inductance Henries	Scale Divs.	List Price Each
1	1.13	0.00095	100	\$62.40
1.5	0.476	0.00044	150	62.40
2	0.282	0.00025	100	62.40
3	0.119	0.00011	60	62.40
5	0.053	0.000038	100	62.40
7.5	0.02	0.000017	75	62.40
10	0.014	0.0000084	100	62.40
15	0.007	0.0000036	150	68.80
25	0.003	0.0000013	50	68.80
30	0.002	0.000001	60	68.80
50	0.0005	0.0000003	100	72.00
2/1	0.28/1.13		100	63.20
5/2.5	0.053/0.212		50	63.20
10/5	0.0135/0.054		100	63.20
20/10	0.0033/0.0135		100	89.60
3/1.5/0.75			150	140.80
5/2.5/1			50	140.80
7.5/3/1.5			150	140.80
10/5/1			50	140.80
10/5/2.5			50	140.80
15/7.5/1.5			150	140.80
20/5/2			100	140.80
30/7.5/3			150	140.80
50/20/5			100	140.80
50/20/10			100	140.80

Triple range ammeters operate through self-contained multi-range transformers, therefore they cannot be used on direct current.

Leather case for single, double or triple range ammeters, \$12.00.

MILLIAMMETERS

Range	Res. Ohms	Scale Div.	List Price Each	Range	Res. Ohms	Scale Div.	List Price Each
15	1850	150	\$62.40	250	16.4	50	\$62.40
30	460	60	62.40	300	10.9	60	62.40
75	211	75	62.40	400	6	80	62.40
100	123	100	62.40	500	3.85	100	62.40
150	49	150	62.40	600	2.5	60	62.40
200	29.5	100	62.40	750	2	75	62.40

Milliammeters are available in double range combinations.

Leather case for milliammeter, \$12.00.

The Buyers in the Canadian market seeking motors, controllers and other power apparatus, will find in the Northern Electric Company one source of supply whatever the requirements may be. Through the Power Apparatus

Specialists, located in the principal cities of Canada, at the command of you and your consulting engineers, for aid in the selection of the proper equipment, the Northern Electric Company stands ready to serve you upon call.

WESTON TESTING INSTRUMENTS

Model 280 Portable D.C. Instruments



Permanent magnet moving coil type. Accurate within 1 per cent. For use where miniature portable precision instruments are required for d.c. testing. Voltmeters and voltameters have resistances of approximately 100 ohms per volt. Dimensions: $4\frac{1}{4} \times 4\frac{3}{8} \times 1\frac{1}{2}$ inches; scale length, $2\frac{11}{16}$ inches. Weight, 1.1 lbs.

VOLTMETERS

Range	Scale Divs.	List Price Each	Range	Scale Divs.	List Price Each
1.2	60	\$40.00	400/40	40	\$64.00
1.5	75	40.00	350/35	70	64.00
3	60	40.00	25/10/2.5	50	46.40
5	50	40.00	30/3/1.5	60	46.40
7.5	75	40.00	30/15/3	60	46.40
10	50	40.00	50/5/2.5	50	46.40
15	75	40.00	50/25/5	50	46.40
20	40	40.00	100/25/2.5	50	46.40
30	60	40.00	100/50/5	50	46.40
*35	70	68.80	150/15/1.5	75	46.40
50	50	40.00	150/15/3	60	46.40
60	60	40.00	150/30/3	60	46.40
75	75	40.00	150/60/3	60	46.40
100	50	40.00	150/75/3	75	46.40
120	60	40.00	.....	..	...
150	75	40.00	.....	..	...

A special voltmeter with a resistance of 32,000 ohms and provided with a double scale reading volts and ohms.

MILLIVOLTMETERS

Range	Scale Divs.	List Price Each	Range	Scale Divs.	List Price Each
50	50	\$40.00	300	60	\$40.00
75	75	40.00	400	40	40.00
100	50	40.00	500	50	40.00
150	75	40.00	600	60	40.00
200	40	40.00	750	75	40.00
250	50	40.00	...	..	...

AMMETERS

Range	Scale Divs.	List Price Each	Range	Scale Divs.	List Price Each
1	50	\$40.00	5/2.5/0.25	50	\$46.40
1.5	75	40.00	10/1/0.1	50	46.40
2	40	40.00	10/1/0.5	50	46.40
3	60	40.00	10/5/0.5	50	46.40
5	50	40.00	10/2.5/1	50	46.40
7.5	75	40.00	15/3/0.15	60	46.40
10	50	40.00	15/3/1.5	60	46.40
15	75	40.00	25/2.5/0.5	50	46.40
20	40	40.00	25/5/2.5	50	46.40
25	50	40.00	25/10/2.5	50	46.40
30	60	40.00	25/10/5	50	46.40
*50	50	51.20	30/3/1.5	60	46.40
100	50	51.20	30/6/3	60	46.40
150	75	51.20	30/15/3	60	46.40

*Provided with external shunt having a drop of 50 M.V.

MILLIAMMETERS

Range	Approx. Resis.	Scale Divs.	List Price Each	Range	Approx. Resis.	Scale Divs.	List Price Each
1.5	27	75	\$41.60	300	0.33	60	\$40.00
3	18	60	41.60	500	0.2	50	40.00
5	12	50	40.00	750	0.13	75	40.00
10	10	50	40.00	30/15/3	..	60	48.00
20	1.5	40	40.00	50/10/1	..	50	48.00
25	1.2	50	40.00	50/10/5	..	50	46.40
30	1.2	60	40.00	50/25/5	..	50	46.40
50	2.0	50	40.00	125/25/5	..	50	46.40
75	1.33	75	40.00	150/15/1.5	..	75	48.00
100	1.00	50	40.00	150/75/15	..	75	46.40
50	0.66	75	40.00	600/120/30	..	60	46.40
50	0.4	50	40.00	....	..	..	....

WESTON TESTING INSTRUMENTS

Model 280 Portable D.C. Instruments

VOLT-AMMETERS

Volts	Amperes	Scale Divs.	List Price Each
30/3/1.5	30/3/1.5	60	\$68.80
30/15/3	15/3/0.15	60	68.80
30/3/1.5	30/3/0.3	60	68.80
50/5/2.5	10/1/0.1	50	68.80
50/5/2.5	10/5/0.5	50	68.80
50/25/2.5	25/2.5/0.5	50	68.80
*60/30/6	6/0.6/0.03	60	68.80
150/15/1.5	15/1.5/0.15	75	68.80
150/15/1.5	15/1.5/0.3	60	68.80
150/15/1.5	30/3/1.5	60	68.80
150/15/1.5	30/15/1.5	60	68.80
*150/15/3	15/1.5/0.15	60	68.80
150/15/3	15/3/1.5	60	68.80
150/15/3	30/3/1.5	60	68.80
150/15/3	30/15/3	60	68.80
150/15/3	30/3/0.3	60	68.80
150/15/3	30/15/1.5	60	68.80
150/30/3	30/15/1.5	60	68.80
150/30/3	30/.6/.06	60	68.80
150/60/3	30/.6/.06	60	68.80

*This instrument is particularly adapted for railway signal and automatic train control tests.

Model 280 leather case, price, \$4.80.

Model 540 Portable Fused 6-Range Volt-Ammeter for D.C. Only



Permanent magnet moving coil type. Accurate within 1 per cent. Housed in bakelite case with hinged cover and leather carrying strap.

Voltage ranges protected by single fuses located in a cap. All ranges fused for protection from overloads. Each current range protected by individual fuse mounted in special compartment covered by hinged back. Ranges are brought out through selector switch to 3 binding posts. The instrument can be connected to circuit so that both current and voltage readings can be taken by turning switch without changing connections.

Line is closed at all times when connecting to ammeter binding post. Dimensions: $3\frac{5}{16} \times 4\frac{7}{8} \times 2\frac{1}{2}$ inches; scale length $2\frac{11}{16}$ inches. Weight, 2 pounds.

Volts	Amperes	Scale Divisions	List Price Each
30/3	15/1.5/0.15/0.03	60	\$80.00
30/3/1.5	30/3/0.03	60	80.00
60/30/6	6/0.6/0.03	60	80.00
150/15/1.5	15/1.5/0.15	75	80.00
150/15/3	15/1.5/0.15	60	80.00
150/15/3	15/1.5/0.3	60	80.00
150/15/3	30/3/0.3	60	80.00
150/15/3	30/15/3	60	80.00
150/30/3	30/3/0.3	60	80.00
150/30/3	30/0.6/0.06	60	80.00

When ordering, give range of instrument and quantity of fuses desired for each range.

Weston replacement fuses should be used to give full protection and insure the accuracy of the instrument. All voltage fuses and current fuses up to and including 60 milliamperes may be obtained for \$0.80 each. All current fuses from 100 milliamperes up to and including 30 amperes are \$0.25 each. Minimum charge on any order, \$1.20 net.

WESTON SWITCHBOARD INSTRUMENTS

Models 151, 156, 261 Switchboard A.C. Instruments



Accurate within 1 per cent. Magnetically shielded, movable iron type. Model 261 forms a part of a complete matched line including voltmeters, ammeters, wattmeters, power factor meters, frequency meters and synchroscopes, details of which will be furnished upon request. Prices cover instru-

ments finished in black. Models 151 and 156 have cast iron cases; Model 261, pressed steel. Regularly supplied in surface type back connected cases. Flush type voltmeters in models 151 and 156, at no extra cost. Flush type ammeters with range of 5 amperes or less supplied without extra charge, but for ranges above 5 amperes an extra charge of \$9.20 each will be made.

Dimensions and Weights:	Models		
	151	156	261
Size at Base, Inches	9 ⁹ / ₁₆	7 ¹ / ₄	9 ⁵ / ₈
Projection from Panel, Inches	3 ³ / ₂	3 ⁷ / ₂	4
Length of Scale, Inches	6 ¹ / ₂	5 ³ / ₂	6 ¹ / ₂
Approximate Weight, Pounds	10	8	9

AMMETERS

Amperes	Scale Divisions		Models		
	151-261	156	151	156	261
1	100	50	\$73.60	\$56.00	.....
2	100	40	73.60	56.00	.....
5	50	50	73.60	56.00	\$73.60
10	100	50	73.60	56.00	.....
15	75	75	80.00	62.40	.....
20	100	40	80.00	62.40	.....
25	50	25	80.00	62.40	.....
30	60	30	80.00	62.40	.....
40	40	40	83.20	65.40	.....
50	50	50	83.20	65.40	.....
75	75	75	83.20	65.40	.....
100	100	50	84.80	70.40	.....
150	75	75	92.80	75.20	.....
200	100	40	97.60	80.00	.....
250	50	25	102.40	84.80	.....
300	60	30	107.20	89.60	.....
400	40	40	120.00	102.40	.....
500	50	50	120.00	102.40	.....

Ranges slightly higher or lower than 5 amperes as required when maximum scale value is somewhat larger or smaller than the rated primary capacity of the current transformer, can be supplied at no extra cost.

VOLTMETERS

For use on frequencies up to 133 cycles per second. Available for 500 cycle service at an extra cost of \$6.40. With external resistors for ranges above 300 volts.

Volts	Scale Divisions		Models		
	151-261	156	151	156	261
75	75	75	\$76.80	\$59.20	\$76.80
100	100	50	76.80	59.20	76.80
130	65	65	76.80	59.20	76.80
150	75	75	76.80	59.20	76.80
250	50	25	81.60	64.00	81.60
300	60	30	53.20	65.60	83.20
500	50	50	91.20	73.60	91.20
600	60	60	96.00	78.40	96.00
750	75	75	102.40	84.80	102.40

WESTON SWITCHBOARD INSTRUMENTS

Model 252 D.C. Instruments



Accurate within 1 per cent. Permanent magnet moving coil type; magnetically shielded. Harmonizes with Models 260, 343, 355, 356, 368 and 400. Furnished in pressed steel case, dull black finish. Surface type, back connected. Model 252, with suitable exploring coils, can be used as an electric resistance thermometer.

Information on request.

Ammeters provided with external shunts. Voltmeters self-contained up to 300 volts; sensitivity approximately 80 ohms per volt. Voltmeters may be provided with a second but lower range at \$8.80 extra. Diameter at base, 7¹/₂ inches; projection from panel, 4 inches; length of scale, 5³/₂ inches. Approximate weight, 9 pounds.

Range	Scale Div.	Am-meters	Volt-meters	Range	Scale Div.	Am-meters	Volt-meters
1	50	\$71.20	...	200	40	\$71.20	...
5	50	71.20	...	250	50	71.20	\$68.80
6	30	71.20	\$62.40	300	30	72.40	68.80
10	50	71.20	62.40	400	40	75.20	...
15	30	71.20	62.40	500	50	78.00	...
25	50	71.20	62.40	600	30	80.80	81.60
50	50	71.20	62.40	750	30	84.80	88.00
75	30	71.20	62.40	1000	50	94.40	...
80	40	71.20	...	1200	60	99.20	...
100	50	71.20	...	1500	30	108.80	...
120	60	71.20	62.40	2000	40	115.20	...
130	65	71.20	62.40	2500	50	129.60	...
150	30	71.20	62.40	3000	30	142.40	...

Model 260 A.C. Instruments

Accurate within 1 per cent. Movable iron type; magnetically shielded. Surface type back connected case of pressed steel, dull black finish. This instrument forms a part of a complete matched line including voltmeters, ammeters, wattmeters, power factor meters, frequency meters and synchroscopes. Details furnished on request.

Size of base, 7¹/₂ inches; projection from panel, 4¹/₂ inches; length of scale 5³/₂ inches. Weight, 8 lbs.



AMMETERS

Ammeters are for use on frequencies up to 500 cycles per second. Model 260 ammeter listed in one range only; employed generally with current transformers.

Price, Model 260 Ammeter.....\$56.00

VOLTMETERS

For use on frequencies up to 133 cycles per second. For 500-cycle service, \$6.40 extra. With external resistors for ranges above 300 volts.

Volts	Scale Div.	List Price Each	Volts	Scale Div.	List Price Each
75	75	\$59.20	300	30	\$65.60
100	50	59.20	500	50	73.60
130	65	59.20	600	60	78.40
150	30	59.20	750	75	84.80
250	25	64.00	...	...	...

WESTON SWITCHBOARD INSTRUMENTS

Model 24, 57 and 251 D.C. Instruments



Permanent magnet moving coil type; magnetically shielded. Accurate within 1 per cent. Model 251 harmonizes with Models 167, 214, 215, 216, 226 and 261 instruments. Prices cover instruments finished in dull black. Models 24 and 57 have cast iron cases; Model 251, pressed steel. Regularly supplied in surface type, back connected

cases. Flush type in Models 24 and 57 can be supplied at no extra cost.

	Models		
	24	57	251
Dimensions and Weights:			
Size at Base, Inches.....	7 1/4	9 9/16	9 5/8
Projection from Panel, Inches....	3 3/8	4 1/8	4
Length of Scale, Inches.....	5 3/8	6 1/2	6 1/2
Approximate Weight, Pounds....	9	14	11

AMMETERS

Models 24 and 57 for 75 amperes or less supplied with self-contained shunts. External shunt type may be obtained at no extra cost. All ranges in Model 251 with external shunts.

Models				Models			
Amps.	Div.	24	57-251	Amps.	Div.	24	57-251
1	50	\$71.20	\$80.80	250	50	\$71.20	\$88.80
5	50	71.20	80.80	300	60	72.40	90.00
10	50	71.20	80.80	400	40	75.20	92.80
15	75	71.20	80.80	500	50	78.00	95.60
25	50	71.20	80.80	600	60	80.80	98.40
50	50	71.20	80.80	750	75	84.80	102.40
75	75	71.20	80.80	1000	50	94.40	112.00
80	40	71.20	80.80	1200	60	99.20	116.80
100	50	71.20	80.80	1500	75	108.20	126.40
130	65	71.20	80.80	2000	40	115.20	132.80
150	75	71.20	80.80	2500	50	129.60	147.20
200	40	71.20	80.80	3000	60	142.40	160.00

VOLTMETERS

Have a sensitivity of approximately 80 ohms per volt. Self-contained up to 750 volts. Models 24 and 57 have normal indices operated from outside of case.

Models				Models			
Volts	Div.	24	57-251	Volts	Div.	24	57-251
6	60	\$62.40	\$80.00	130	65	\$62.40	\$80.00
10	50	62.40	80.00	150	75	62.40	80.00
15	75	62.40	80.00	250	50	68.80	86.40
25	50	62.40	62.40	300	60	68.80	86.40
50	50	62.40	80.00	600	60	.....	99.20
75	75	62.40	80.00	750	75	.....	105.60
120	60	62.40	80.00	...	.....	.....	.....

Wattmeters, Power Factor Meters, Frequency Meters and Synchroscopes

These instruments, representing a complete line of conventional switchboards, are available in designs matching the voltmeters and ammeters listed above.

Prices on application.

WESTON SWITCHBOARD INSTRUMENTS

Model 610 Switchboard D.C. Instruments



Permanent magnet moving coil type; magnetically shielded. Accurate within 1 per cent. Harmonizes with all Model 610 instruments. Flush type, back connected. Encased in pressed steel, dull black finish. Model 610 has 2 Mazda 6-volt, No. 40T-3, lamps that provide indirect full scale illumination free from shadows. Lamps are operated from an independent circuit that may be replaced

by removing 4 screws which hold the bakelite front. Size at base, 4 x 4 1/2 inches; projection from panel, 7/8 inch; scale length, 3 1/2 inches. Weight, 2 pounds.

Scale Range	Div.	Am-meters	Volt-meters	Scale Range	Div.	Am-meters	Volt-meters
1	50	\$71.20	...	200	40	\$ 71.20	....
5	50	71.20	...	250	50	71.20	\$68.80
6	30	...	\$62.40	300	30	72.40	68.80
10	50	71.20	62.40	400	40	75.20	....
15	30	71.20	62.40	500	50	78.00	....
25	50	71.20	62.40	600	30	80.80	81.60
50	50	71.20	62.40	750	30	84.80	88.00
75	30	71.20	62.40	1000	50	94.40	....
80	40	71.20	...	1200	60	99.20	....
100	50	71.20	...	1500	30	108.80	....
120	60	...	62.40	2000	40	115.20	....
130	65	71.20	62.40	2500	50	129.60	....
150	30	71.20	62.40	3000	30	142.40	....

Model 610 Switchboard A.C. Instruments

Identical in construction with Model 610 D.C. instruments, described above. Power consumption: Voltmeters on 115 volts, 3 watts; on 25 or 60 cycles, 3 volt-amperes. Ammeters on 5 amperes, 1.1 watts; on 25 cycles, 1.1 volt-amperes; on 60 cycles, 1.4 volt-amperes.

Size at base, 4 x 4 1/2 inches; projection from panel, 7/8 inch; scale length, 3 1/2 inches. Weight 2 pounds.



AMMETERS

For use on frequencies up to 500 cycles per second. Listed in one range only; employed generally with current transformers; price shown covers instruments for currents up to 10 amperes with scales figured to correspond to transformers with which employed.

Price, Model 610 A.C. instruments..... \$56.00

VOLTMETERS

For use on frequencies up to 133 cycles per second. For 500-cycle service, \$6.40 extra. With external resistors for ranges above 300 volts. For ranges between 300 and 750 volts a type 12 No. 1 resistance box mounted on studs at rear of instrument, is provided.

Volts	Scale Div.	List Price Each	Volts	Scale Div.	List Price Each
75	75	\$59.20	300	30	\$65.60
100	50	59.20	500	50	73.60
130	65	59.20	600	60	78.40
150	30	59.20	750	75	84.80
250	25	64.00	...	..	...

WESTON SWITCHBOARD INSTRUMENTS

Model 502 D.C. Instruments



Accurate within 1 per cent. Permanent magnet moving coil type; magnetically shielded. Harmonizes with Models 496, 497, 498, 499, 500 and 501 instruments. With pressed steel case, dull black finish. Surface type, back connected cases. Flush type can be supplied at \$6.40 extra. This instrument, with suitable exploring coils, can be used as an electric resistance thermometer; information on application.

Voltmeters have a sensitivity of approximately 100 ohms per volt and are self-contained up to 750 volts. Voltmeters may be provided with a second but lower range, \$9.20 extra.

Size at base, $5\frac{3}{4}$ x 6 inches; projection from panel, $4\frac{1}{2}$ inches. Weight, 8 pounds.

Range	Scale Div.	Am-meters	Volt-meters	Range	Scale Div.	Am-meters	Volt-meters
1	50	\$71.20	...	200	40	\$ 71.20	...
5	50	71.20	...	250	50	71.20	\$68.80
6	30	...	\$62.40	300	30	72.40	68.80
10	50	71.20	62.40	400	40	75.20	...
15	30	71.20	62.40	500	50	78.00	...
25	50	71.20	62.40	600	30	80.80	81.60
50	50	71.20	62.40	750	30	84.80	88.00
75	30	71.20	62.40	1000	50	94.40	...
80	40	71.20	...	1200	60	99.20	...
100	50	71.20	...	1500	30	108.20	...
120	60	...	62.40	2000	40	115.20	...
130	65	71.20	62.40	2500	50	129.60	...
150	30	71.20	62.40	3000	30	142.40	...

Model 496 Switchboard A.C. Instruments

Accurate within 1 per cent. Movable iron type; magnetically shielded. Surface type back connected case pressed steel, dull black finish. For flush type, add \$6.40. Power consumption: Voltmeters on 115 volts, 6.8 watts; on 25 or 60 cycles, 6.8 volt-amperes. Ammeters on 5 amperes, 1.1 watts; on 25 cycles, 1.1 volt-amperes; on 60 cycles, 1.4 volt-amperes. Size at base, $5\frac{3}{4}$ x 6 inches; length of scale, $5\frac{1}{8}$ inches; weight, 6 pounds.



AMMETERS

For use on frequencies up to 500 cycles per second. Listed in one range only; employed generally with current transformers; price shown covers instrument for currents up to 10 amperes with scales figured to correspond to transformers with which employed.

Price, Model 496 Ammeters.....\$56.00

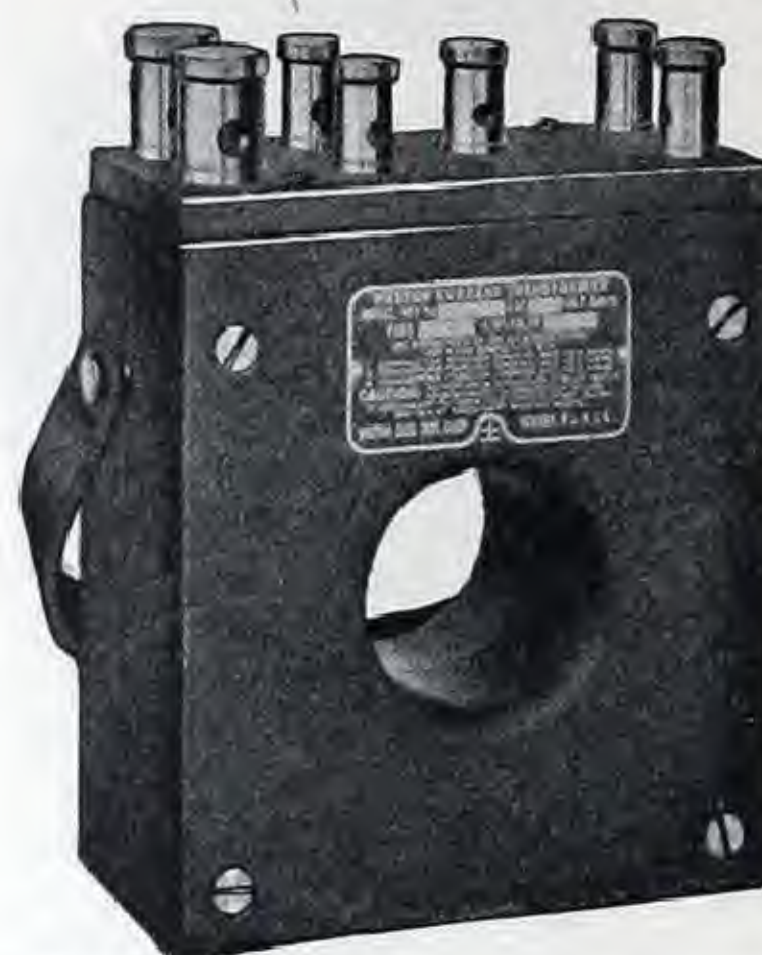
VOLTMETERS

For use on frequencies up to 133 cycles per second. For 500-cycle service, \$6.40 extra. Model 496 requires an external resistor for all ranges.

Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each
75	75	\$59.20	300	30	\$65.60
100	50	59.20	500	50	73.60
130	65	59.20	600	60	78.40
150	30	59.20	750	75	84.80
250	25	64.00	...	...	...

WESTON CURRENT TRANSFORMERS

Model 461 Portable Multi-Range Current Transformers



Meets the demand for a compact, rugged, portable current transformer embracing primary current ranges from 10 to 800 amperes inclusive. Contained in black bakelite case. Four self-contained primary ranges of 10, 20, 50 and 100 amperes. Connections are made to binding posts and with one turn of the wire through the core opening a range of 800 amperes

results; with 2 turns, 400 amperes; with 4 turns, 200 amperes, etc. The secondary current rating at normal primary current is 5 amperes. Short-circuiting switch is provided for secondary winding to prevent damage if the secondary circuit should be opened while current is on primary. Maximum secondary burden is 5 amperes.

When ordering correction curves state model, type and serial number of instruments to be used.

Dimensions: $6\frac{5}{8}$ x $7\frac{1}{8}$ x $2\frac{3}{4}$ inches. Weight, $7\frac{1}{4}$ pounds.

List Price, Model 461 Transformer.....\$117.60

Leather case for Model 461, add \$14.40.

Model 457 Portable Potential Transformers

A compact, light weight, portable transformer, performing with a high degree of accuracy. Contained in a black walnut case with hinged cover, lock and leather carrying case.



Range-changing switch enables the ratio of primary ranges of 4 to 1 to be easily selected. Designed for maximum secondary burden of 25 volt-amperes at 115 volts and frequencies from 50 to 150 cycles per second. Ratio accuracy is within one half of one per cent from 0 to 25 volt-amperes secondary burden which is sufficient for use with Models 155, 433, 329 or 432 without the use of correction curves. If correction curves are desired, state model and serial number of instruments to be used, and frequency or frequencies at which curves are to be made. If more than one curve is required with different combinations of instruments, list combinations.

Dimensions: $8\frac{5}{16}$ x $5\frac{3}{4}$ x $5\frac{1}{8}$ inches. Weight, $11\frac{1}{2}$ pounds.

FREQUENCY CYCLES—50 TO 150

Normal Volts	Maximum Volts	List Price Each
2300/575 to 115	{3000/750 to 150 at 60 Cy. 2500/625 to 125 at 50 Cy.}	\$232.00
3000/750 to 100	3750/937.5 to 125	232.00

WESTON TESTING INSTRUMENTS

Model 564 Volt-Ohmmeters



This instrument consists of a Model 301 with four 1000 ohms per volt voltage ranges of 600/300/30/3 and resistance ranges of either 0-100,000 and 0-1,000 ohms or 0-1,000,000, 0-100,000 and 0-1,000 ohms. A self-contained 4½-volt C battery is provided for potential. A pair of 50-inch test leads is shipped with each Model 564. Changes in poten-

tial of the self-contained battery can be readily compensated for by short circuiting the pin jacks X-X and adjusting the pointer to the zero ohm position by turning the voltage adjuster located at the top of nameplate.

All voltage ranges are brought out to pin jacks. A toggle switch connects the meter in circuit as a voltmeter or ohmmeter. The instrument sensitivity, when used as an ohmmeter, may be changed by a toggle switch from 1 to 100 milliamperes when using the 100,000 or 1,000 ohm scale. When using the 1,000,000-100,000-1,000 ohm instrument, the sensitivity may be changed from .1 or 1 to 100 milliamperes. This simplifies checking up trouble in high or low resistance circuits.

List Price, Model 564, 0-1,000,000 Ohms Ins't. \$56.80

List Price, Model 564, 0-100,000 Ohm Ins't. 48.00

Model 663 Volt-Ohmmeters



This instrument is capable of measuring very high and very low resistances. A super-sensitive instrument requiring only 50 microamperes for full scale deflection makes this ohmmeter possible. This instrument is connected into the circuit network by means of a control switch which selects the desired range of 6 available ohmmeter ranges, or as a milliammeter or voltmeter for d.c. and voltage measurements. Resistance measurements from .1 ohm to 10 megohms; voltage measurements to 1000 volts and current measurements to 100 milliamperes are available.

The scale of the indicating instrument is marked 0-1000 ohms, 0-2.5-5-10 volts and milliamperes. Following ranges are available: 0-5-25-250-2500-25,000-250,000 ohms center scale; 0-200-1,000-10,000-100,000-1,000,000-10,000,000 ohms full scale; 0-2.5-10-100-250-500-1,000 volts full scale, 1000 ohms per volt; 0-1-5-25-100 milliamperes full scale at 500 millivolts.

List Price, Model 663 Less Carrying Case. \$96.00

For carrying case, add \$8.00.

WESTON TESTING INSTRUMENTS

Model 330 Portable A.C. Voltmeter



Iron core dynamometer type. Accurate within 1 per cent at 60 cycles, 2 per cent at 25 to 100 cycles. Contained in a mottled red and black bakelite case with hinged cover and leather carrying handle.

Low ranges, combined with an unusually high sensitivity, are possible in this type voltmeter. For use wherever current drain caused by instrument must be limited to a low voltage. Although the high sensitivities of the copper oxide type voltmeter are not possible with this meter, nevertheless its accuracy is

unaffected by wave form and variations in frequencies over relatively wide limits.

Ranges are changed by use of a self-contained range selector switch. To assure accurate readings and eliminate parallax errors, a knife-edge pointer and mirror scale are used.

Dimensions: 3½ x 4⅞ x 1⅞ inches; scale length, 2⅞ inches. Weight 1¾ pounds.

Ranges	Sensitivity Ohms per Volt	Scale Div.	List Price Each
150/15	20	75	\$88.00
10/5/1	20	50	88.00
25/5/1	20	50	88.00
*25/5/2.5	70	50	96.00
**125/25/12.5	20	50	96.00
15/7.5/1.5/.75	12	75	96.00
125/25/5/1	20	50	96.00
150/30/15/1.5	20	75	96.00
150/50/10/1	20	50	96.00

*For measuring voltage drop across operating coil on main relay of network protectors; for 60 cycle service.

**Conforms with A.R.A. specifications.

WESTON STUDENT GALVANOMETERS

Model 375 Student Galvanometers

For student use in school laboratories and wherever a d.c. galvanometer of extreme sensitivity is not essential. Permanent magnet moving coil type. Has a sensitivity of approximately 22 microamperes per division; resistance, about 23 ohms. Scale is zero-center within 60 divisions; calibrated 30-0-30 in millimeter divisions. As a galvanometer for portable use instrument is mounted in 45 degree angle base; also without base for mounting in apparatus or on panels.



Dimensions: with mounting base, 3¾ x 3¾ x 3¾ inches; without mounting base—Case, 3¼ inches; body, 2⅞ inches. Scale length, 2⅞ inches.

List Price, Model 375 With Mounting Base. \$20.80

If desired without mounting base, deduct \$4.80 from price shown.

WESTON TESTING INSTRUMENTS


**Model 489 D.C.
Portable Instruments**

For all-around checking purposes. Models 489 and 528 double range meters and Model 528 single range meter have binding posts. All triple ranges have pin jacks. Accurate within 2 per cent. Model 489 D.C.—Permanent magnet moving coil type; encased in black bakelite; silver etched dial, $2\frac{3}{8}$ in. long, with black markings.

Size: $3\frac{2}{3} \times 3\frac{5}{32} \times 1\frac{29}{32}$ in.
Weight, 11 oz.

VOLTMETERS

Double Range			Triple Range		
125 Ohms Per Volt			1000 Ohms Per Volt		
Ranges	Div.	Each	Ranges	Div.	Each
150/7.5	75	\$21.60	750/250/10	75/50	\$37.60
200/8	40	24.40	.....	.....	.....
1000 Ohms Per Volt					
200/8	40	26.00	.....	.....	.....
250/50	50	26.80	.....	.....	.....

AMMETERS

Single Range			Double Range		
Ranges	Div.	Each	Ranges	Div.	Each
1	50	\$21.60	10/1	50	\$24.80
10	50	21.60	15/3	75/60	24.80
30	60	21.60	30/3	60	24.80

MILLIAMMETERS—DOUBLE RANGE

Ranges	Approx. Res. Ohms	Scale Divisions	List Price Each
150/15	0.7/4.1	75	\$21.60
150/30	0.7/2.6	60	21.60

VOLT-MILLIAMMETERS

Ranges	Resistance 2 Ma. Range	Scale Div.	List Price Each
200/8 V., 2 Milliamperes	15 Ohms	40	\$30.00

Leather case for Model 489, \$5.60.

Model 528 Portable A.C.

Movable iron type; mottled red and black bakelite case. Unshielded from external magnetic fields. Dimensions: $3\frac{2}{3} \times 3\frac{5}{32} \times 2\frac{1}{8}$ inches; scale length, $2\frac{1}{32}$ inches.

VOLTMETERS

Ranges	Approx. Res. Ohms	Scale Divisions	List Price Each
150/15	7,350/735	30	\$21.60
300/150	31,600/15,800	30	30.00
600/150	100,000/25,000	30	37.20
600/300	100,000/50,000	30	37.20
150/15/3	8,700/150/30	30/30	26.40
150/8/4	10,000/80/40	30/40	26.40
300/8/4	43,000/80/40	30/40	34.80

AMMETERS

Ranges	Res. Ohms	Scale Div.	List Price Each
1	0.204	50	\$21.60
3	0.0249	30	21.60
5	0.0108	50	21.60
10	0.0067	50	21.60
15	0.003	30	21.60
20	0.0025	40	21.60
30	0.0016	30	24.80
50	0.0014	50	24.80

MILLIAMMETERS

Ranges	Res. Ohms	Scale Div.	List Price Each
15	2000	30	\$21.60
25	690	25	21.60
50	175	50	21.60

Model 539 Portable Current Transformers

Primary ranges: 2, 5, 10 and 20 amperes, self-contained primary; maximum of 200 amperes inserted primary. For use with Model 528 ammeters.

Price, Model 539, each \$44.80.

WESTON PANEL INSTRUMENTS

Model 476 $3\frac{1}{4}$ -Inch Panel Instruments

Movable iron type for a.c. only. Accurate within 2 per cent.

Voltmeters indicated thus (*) are supplied with external multiplier box; (†) are self-contained, 4 binding post instruments; (‡) 4 binding post instrument self-contained, for 150/8/4 volts; (§) 3 binding post instrument self-contained for 100/4 volts.

A.C. VOLTMETERS

Volts	Approx. Ohms Per Volt	List Price Each
1.5	3	\$14.40
2	4	14.40
3	6	14.40
5	10	14.40
8	10.5	14.40
10	14	14.40
15	14	14.40
20	26	14.40
25	26	14.40
30	26	14.40
50	52	14.40
100	105	16.00
130	105	16.80
150	105	18.00
250	167	23.20
300	167	26.40
400	167	28.80
500	167	31.20
*600	167	34.40
*750	167	37.60
*1000	167	44.80
†150/8/4	67/10/10	25.60
†150/15/3	67/10/10	25.60
†300/8/4	143/10/10	28.80
†750/150/16/8/4	67/67/10/10/10	33.00
§1000/200/16/8/4	50/50/10/10/10	40.00

External spool resistors for 750/16 volt ranges; external spool resistors (7) for 1000/200/16/8 volts.

A.C. AMMETERS

Amps.	Approx. Resis.	List Price Each	Amps.	Approx. Resis.	List Price Each
1	.203	\$14.40	10	.0058	\$14.40
1.5	.082	14.40	15	.00219	14.40
2	.05	14.40	20	.00162	14.40
3	.024	14.40	30	.00070	14.40
5	.01	14.40	50	.00057	14.40

A.C. MILLIAMMETERS

Milli-amperes	Approx. Resis.	List Price Each	Milli-amperes	Approx. Resis.	List Price Each
15	2000	\$14.40	100	28	\$14.40
25	690	14.40	250	4.7	14.40
50	175	14.40	500	1.1	14.40

CONDENSER METER

Reads capacity in microfarads. Movable iron type; accurate within 3 per cent when used on voltage for which they are adjusted. Supplied with an external box. 15-1.5 microfarads, 30 divisions.

List Price, Condenser Meter each \$46.40

WESTON SWITCHBOARD INSTRUMENTS

Models 267, 269, 271, 273 D.C. Fan Shaped Instruments



Permanent magnet moving coil type; magnetically shielded. Accurate within 1%. In surface type, pressed steel case with back connections, dull black finish. Model 269, with bakelite case, \$5.60 extra. When a bakelite case is used, instrument is not shielded.

Dimensions and Weights

Model No.	267	269	271	273
Width, In.	4 3/8	5 5/8	7 7/8	9 5/8
Height, In.	3 3/8	4 1/8	6 1/4	7 13/16
Projection, In.	1 3/8	1 3/8	1 3/4	2 1/8
Scale Length, In.	2 1/2	4	6	7 1/2
Weight, Lbs.	1	1 1/2	4	5

AMMETERS

Scale Divs.		Models					
267-269-		271	273	267	269	271	273
Amps.							
1	50	100	\$34.80	\$44.40	\$61.60	\$79.20	
1.5	75	75	34.80	44.40	61.60	79.20	
2	40	100	34.80	44.40	61.60	79.20	
3	60	60	34.80	44.40	61.60	79.20	
5	50	50	34.80	44.40	61.60	79.20	
10	50	100	34.80	44.40	61.60	79.20	
15	75	75	34.80	44.40	61.60	79.20	
20	40	100	34.80	44.40	61.60	79.20	
25	50	50	34.80	44.40	61.60	79.20	
30	60	60	34.80	44.40	61.60	79.20	
50	50	50	44.40	44.40	61.60	79.20	
75	75	75	44.40	52.00	61.60	79.20	
100	50	100	44.40	52.00	61.60	79.20	
150	75	75	44.40	52.00	61.60	79.20	
200	40	100	44.40	52.00	61.60	79.20	
300	60	60	44.80	53.20	62.80	80.40	
400	40	40	47.60	56.00	65.60	83.20	
500	50	50	50.40	58.80	68.40	86.00	
750	75	75	57.20	65.20	75.20	92.80	
1000	50	100	66.80	73.20	84.80	102.40	
1500	75	75	81.20	87.60	99.20	116.80	
2000	40	100	87.60	94.00	105.60	123.20	
3000	60	60	113.20	121.20	132.80	150.40	

Models 267 and 269 have self-contained shunts up to and including 30 and 50 amperes respectively; above these ranges they are provided with external 100 mv. shunts. Models 271 and 273 are supplied with external 50 mv. shunts. Prices include these shunts.

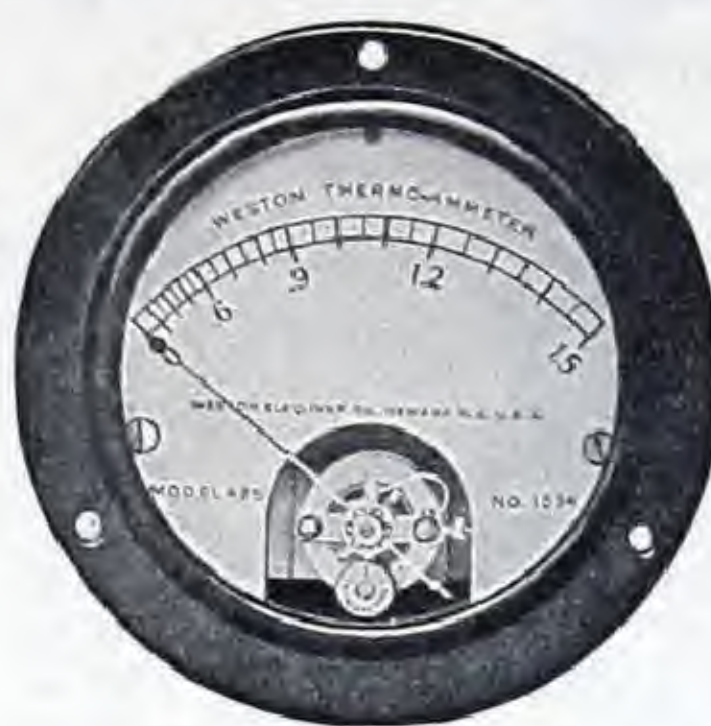
MILLIAMMETERS

Scale Divs.		Models					
267-269-		271	273	267	269	271	273
Milli-amps.							
1	50	100	\$36.40	\$46.40	\$54.40	\$72.00	
1.5	75	75	36.40	46.40	54.40	72.00	
3	60	60	36.40	46.40	54.40	72.00	
5	50	50	34.80	44.80	52.80	70.40	
10	50	100	34.80	44.80	52.80	70.40	
15	75	75	34.80	44.80	52.80	70.40	
20	40	100	34.80	44.80	52.80	70.40	
25	50	50	34.80	44.80	52.80	70.40	
50	50	50	34.80	44.80	52.80	70.40	
75	75	75	34.80	44.80	52.80	70.40	
100	50	100	34.80	44.80	52.80	70.40	
150	75	75	34.80	44.80	52.80	70.40	
200	40	100	34.80	44.80	52.80	70.40	
250	50	50	34.80	44.80	52.80	70.40	
300	60	60	34.80	44.80	52.80	70.40	
500	50	50	34.80	44.80	52.80	70.40	

Model 267 ranges above 50 milliamperes are shunted and have a drop of approximately 100 millivolts; Model 269 above 25 milliamperes, 100 millivolts; Model 271 above 25 milliamperes, 50 millivolts; and Model 273 above 20 milliamperes, 50 millivolts.

WESTON PANEL INSTRUMENTS

Model 425 3 1/4-Inch Panel Instruments



Thermocouple for a.c. including radio frequencies. Accurate within 2 per cent. Bakelite case should be specified for ammeters and milliammeters when used on circuits above 300 volts when it is not possible to connect instrument in grounded side of line. Bakelite case supplied at no additional cost.

Power consumption thermocouple ammeters, 1 to 4 amperes inclusive, varies from .2 to .4 watt per ampere approximately; 5 amperes and above, .15 watt per ampere.

Ammeters		Milliammeters		
Amperes	List Price Each	Milli-amperes	Resis. Ohms	List Price Each
1	\$25.60			
1.5	25.60			
2	25.60	*10	100	\$80.00
2.5	25.60	*20	26.5	80.00
3	25.60			
4	25.60	*50	5	80.00
5	25.60			
6	25.60	†120	5.2	28.80
8	25.60			
10	25.60	250	1.8	28.80
15	25.60			
20	25.60	500	1.3	28.80

*Vacuum couple type. †For horizontal or not more than 45 degrees mounting; all others for vertical mounting.

GALVANOMETER

Accurate within 2 scale divisions. For horizontal or 45 degree mounting. 115 milliamperes, 5.2 ohms.

List Price, Model 425 Galvanometer.....each \$28.80

Model 600 Small Panel Microammeters

Permanent magnet moving coil type. Regularly furnished in flush type bakelite case. Also available with flush metal case. Scales are hand calibrated and have a basic accuracy of 2 per cent, except in rectifier type where percentage accuracy is about 5 per cent due to inherent properties of rectifier.

Rectifier instruments can be made with high sensitivity, and for many laboratory and field measurements; voltmeters with a resistance as high as 10,000 ohms per volt can be had. Such instruments can be used for power level measurements across high resistance loads and for any position where extremely small energy drain is required. Similarly, d.c. instruments may be supplied in this model with sensitivities as high as 30,000 ohms per volt.



D.C. MICROAMMETERS

Range		Resis. Ohms	Scale Divs.	List Price Each	Range		Resis. Ohms	Scale Divs.	List Price Each
30	2000	60	\$41.60		200	65	50	\$22.80	
50	2000	50	37.60		300	55	60	22.80	
75	1750	75	37.60		500	30	50	22.80	
100	1300	50	33.60		...	...	...	...	...

RECTIFIER TYPE A.C. MICROAMMETERS

*100	3700	50	\$41.60	250	2300	50	\$30.80
200	2500	40	30.80	...	...	...	...

*Despite its low range, this instrument is subject to a temperature error of but 1% per degree centigrade.

WESTON SWITCHBOARD INSTRUMENTS

Models 267, 269, 271, 273 D.C. Fan Shaped Instruments

VOLTMETERS

For description and dimensions of these voltmeters, see preceding column.

Scale Divs.		Models					
267-269-		271	273	267	269	271	273
Volts							
3	60	60		\$34.80	\$44.80	\$52.80	\$70.40
8	40	80		34.80	44.80	52.80	70.40
10	50	100		34.80	44.80	52.80	70.40
15	75	75		34.80	44.80	52.80	70.40
20	40	100		34.80	44.80	52.80	70.40
25	50	50		34.80	44.80	52.80	70.40
30	60	60		34.80	44.80	52.80	70.40
50	50	50		34.80	44.80	52.80	70.40
75	75	75		34.80	44.80	52.80	70.40
100	50	100		34.80	44.80	52.80	70.40
130	65	65		34.80	44.80	52.80	70.40
150	75	75		34.80	44.80	52.80	70.40
200	40	100		36.00	47.60	55.60	73.20
250	50	50		40.00	50.00	57.60	75.20
300	60	60		43.20	53.20	59.20	76.80
600	60	60		*50.40	*60.40	*72.00	89.60

Approximate resistance of voltmeters in ohms per volt: Model 267, 100; Model 269, 100; Model 271, 100; and Model 273, 100.

*Supplied with external resistor.

Millivoltmeters are also available in fan shaped instruments. Prices on application.

WESTON PANEL INSTRUMENTS

Model 301 3 1/4-Inch Panel Instrument



D.C. Model, permanent magnet moving coil type. Accurate within 2 per cent.

A.C. Model, Rectifier type. High sensitivity a.c. instruments obtained by using a full wave copper oxide rectifier with a d.c. movement. Excellent damping even scale characteristics and high overload capacity.

D.C. VOLTMETERS

Approximate resistance in ohms per volt: 3 to 40 volts, 62; 300-500 volts, 666; 600 to 2,000 volts, 62, above 2,000 volts, 100.

Range	Scale Divs.	Price Each	Range	Scale Divs.	Price Each
3	60	\$14.40	150	75	\$18.00
5	50	14.40	200	40	20.80
8	40	14.40	300	60	26.40
10	50	14.40	500	50	31.20
15	75	14.40	1000	50	45.60
20	40	14.40	1500	75	58.40
30	60	14.40	2000	40	72.00
50	50	14.40	3000	60	97.60
100	50	16.00	.....	..	.....

Resistance, 1000 Ohms per Volt.

50	50	19.20	200/8	40	24.00
100	50	20.00	200/50	50	24.00
200	40	22.40	500/100	50	25.20
300	60	24.00	750/250/10	75-50	28.00
500	50	27.60	750/250/100/		
1000	50	33.60	50/10/5	75/50	36.00

WESTON PANEL INSTRUMENTS

Model 301 3 1/4-Inch Panel Instruments

D.C. AMMETERS

Self-contained up to 50 amperes inclusive drop 50 MV±5 per cent.

Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each
1	50	\$14.40	20	40	\$14.40
1.5	75	14.40	30	60	14.40
2	40	14.40	50	50	14.40
3	60	14.40	2-0-2	40	14.40
5	50	14.40	5-0-5	50	14.40
10	50	14.40	10-0-10	40	14.40
15	75	14.40	20-0-20	40	14.40

D.C. MILLIAMMETERS

Milliammeters above 30 MA are shunted, drop approximately 100 MV.

Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each
1	50	\$16.00	50	50	\$14.40
1.5	75	16.00	100	50	14.40
2	40	16.00	150	75	14.40
3	60	16.00	200	40	14.40
5	50	14.40	300	60	14.40
10	50	14.40	500	50	14.40
15	75	14.40	150/15\$	75	22.40
20	40	14.40	150/30\$	60	22.40
30	60	14.40	.....	..	.....

D.C. MICROAMMETERS

These instruments are adjusted for use in horizontal or 45 degree position.

Range	Scale Div.	List Price Each	Range	Scale Div.	List Price Each
200	40	\$22.80	500	50	\$22.80

*Supplied with external resistor.

†Self-contained for low voltage, external box for other ranges. ‡Spool resistors supplied for all but low ranges. §Double range milliammeters are 3 binding post type, self-contained.

OHMMETERS

These ohmmeters are independent of battery voltage.

Ohm Scale	Battery Volt.	Rheostat Ohms	List Price Each
0-1000	1.5	100	\$16.80
0-10,000	4.5	250	16.80
0-100,000	4.5	400	21.60
0-500,000	15	400	21.60
0-2,000,000	90	400	24.00

RECTIFIER TYPE VOLTMETERS

Volts	Scale Div.	1000 Ohms Per volt	*2000 Ohms Per Volt
1	50	.....	\$30.80
1.5	75	.....	30.80
3	60	\$27.20	30.80
5	50	27.20	30.80
15	75	27.20	30.80
50	50	27.20	31.60
100	50	27.90	34.40
150	75	30.40	36.80
300	60	32.00	.....

RECTIFIER TYPE MILLIAMMETERS

Milli-amperes	Scale Div.	List Price Each	Milli-amperes	Scale Div.	List Price Each
0.5†	50	\$30.80	2	40	\$24.00
1	50	24.00	5	50	22.40

A.C. MICROAMMETERS

Use in horizontal or 45 degree position.

†500 Microamperes, 50 Scale Division, \$30.80.

Bakelite cases should be specified for ammeters and milliammeters when used on circuits above 300 volts when it is not possible to connect the instrument in grounded side of line. Bakelite case supplied at no additional cost.

WESTON TESTING INSTRUMENTS

Model 614 Foot-Candle Meters



With this meter any user of light can analyze lighting conditions and determine the correct illumination for each particular and individual purpose.

This instrument is calibrated directly in terms of tungsten filament standard lamps. Requires no batteries, voltage or lamps; has indefinite life with permanent calibration.

Operating equipment consists of an indicating instrument, a 3-way toggle switch and a Photronic photo-electric cell all mounted on a bakelite panel. Scale reads directly in foot-candles and has 3 ranges: 0-50, 0-250 and 0-500 which are controlled by the 3-way toggle switch. The Photronic photo-electric cell or light target is hinged so that it can be lifted from the horizontal to the vertical position.

The instrument is always ready for instant use. To measure illumination on a horizontal plane it is only necessary to open cover, hold instrument in horizontal position with the cell or light target lying in its socket and then take the readings. The toggle switch simplifies switching to any of the 3 meter ranges so as to give a good scale deflection for any value of light intensity within maximum range of instrument.

Housed in black bakelite carrying case with a hinged cover and strap handle. Length case, 7 inches; height, 3½ inches; width, 2¼ inches. Weight 1.8 pounds.

List Price, Model 614 Complete.....\$64.00

Model 603 Portable Direct Reading Illumination Meters

The Photronic cell in this foot-candle meter is instantaneous in its response to light variations; colour response closely approximates that of the human eye. Calibration of scale is permanent. Size, 8¼ x 8¾ x 4½ inches; weight, 7 pounds.



3-RANGE TYPE

Consists of an accurate indicating instrument mounted in carrying case and a searching unit or light target with a 6-foot cable permanently attached to instrument. Three ranges, 0-10, 0-50 and 0-250 foot-candles are selected by means of a 3-position switch.

List Price, Model 603 3-Range Type.....\$152.00

6-RANGE TYPE—FOR STREET LIGHTING WORK

Similar to 3-range type. Six ranges: 0-1, 0-2.5, 0-5, 0-25, 0-100 and 0-500 foot candles. Readings as low as .02 foot-candles are possible on the 0-1 foot-candle range. All ranges are selected through a 6-position switch on instrument panel.

List Price, Model 603 6-Range Type.....\$480.00

SIGHT METERS



THE USES OF THE SIGHT METER ARE UNLIMITED

It should take its place with the thermometer in the home, office, store, factory and school.

It is indispensable for checking intensities of artificial light on dull days when natural light fails.

It is invaluable in checking the usefulness of present artificial lighting installations.

Sight Meter will check the maintenance of fixtures. It may indirectly prescribe a thorough washing of shades, etc.

It will act as the keenest judge in giving a decision on the practicability of the foreign vs. the Mazda lamp.

It may be that the condition of walls and ceilings is retarding proper reflection of light—Sight Meter can tell you about this.

Unconsciously, you may be paying for light without getting full value from it due to worn out bulbs. Sight Meter tells when lamps should be replaced.

It checks and recommends proper standards of lighting for practically every type of factory work whereby increased production is realized. Costs are lowered and errors and spoilage decreased.

In the office it will help materially in the locating of desks and files so as to most effectively utilize available light.

And with the Sight Meter the merchant may easily and quickly determine the attention-compelling light intensities on his merchandise displays.

The Sight Meter renders a lifetime of useful and beneficial service. It effects considerable savings and is so moderate in cost that no one should allow seeing to be compromised. Its educational value is tremendous. A demonstration proves its desirability.

Each Sight Meter consists of a Photronic photo-electric cell activating a jewelled microammeter enclosed in a dust-tight black bakelite moulded case. No batteries or outside current supply are needed. With suitable care, the life of the instrument is indefinite. It is corrected to the visible eye curve, constant for temperatures from 0° F. to 95° F. Accurate within close tolerances and dependable in service. Adjustment of pointer to 0 reading is provided by turning a screw on face of meter.

Complete instrument weighs 8 oz. Is 4⅝" long; 2⅝" wide; 1⅝" high. Packed one to a cardboard box; five to a carton; one hundred to a wooden case.

Shipping weights: box 24 oz.; carton 4 lb.; case 70 lb.

Type 1 Sight Meter, 50 f.c. scale.

Type 2 Sight Meter, 100 f.c. scale.

Prices on application.

WESTON EXPOSURE METERS



CINE EXPOSURE METER
MODEL 627

Model 627 is very small and compact—but it gives the correct cine exposure, instantly and correctly.

No motion camera enthusiast should be without this dependable little guide to sharper and clearer pictures. It assures uniformly good results for those prized pictures where the opportunity for a retake is gone forever.

Its hinged cover affords complete protection—when swung back it becomes a convenient handle. Sight through the notch on top of the case and read the f stop number to be used, right on the scale. Then set your camera to this f stop, that's all there is to it.

Price on application.



UNIVERSAL EXPOSURE METER
MODEL 617 TYPE 2

For novice or expert this meter operates perfectly for any kind of film, any lens or aperture, under artificial or daylight, for action or still pictures.

Simply sight the meter at the scene, note its brightness reading, then by a turn of the exposure dial you have the proper f stop and shutter settings for your camera. It makes good photographers, as far as exposure is concerned, out of everyone because all guess-work is banished and the photographer's mind is left free to produce artistic effects.

Furthermore, it provides a simple, direct means for pre-determining the density of the finished negative.

It has no battery, is always ready for instant service, and long exposure to direct sunlight does it no harm.

Outfit includes carrying case and shoulder strap.

Price on application.

WESTON EXPOSURE METERS



STUDIO EXPOSURE METER
MODEL 628

This meter is for professional and commercial photographers for taking pictures in studios, homes, churches, industrial plants, etc. It provides a ready means of determining exposures ranging from 1/800 of a second to eight minutes based upon brightness values ranging from 1/10 of a candle per square foot to 1000.

Two Photronic Cells and appropriate exposure dials are connected to the indicator by a flexible cable which permits measurements at points otherwise inaccessible.

It is enclosed in an oak carrying case—weighs 7.2 lbs. and measures 7 $\frac{3}{4}$ " x 9 $\frac{3}{4}$ " x 4 $\frac{3}{4}$ ".

Price on application.

WESTON SMOKE ALARM



MODEL 708 SMOKE ALARM

The Model 708 Smoke Alarm is a simplified indicating device for signalling boiler firemen when smoke conditions become excessive. It is entirely self-operating and is easy to install. A beam of light is focused through the smoke stack to a Photronic Cell. This cell generates current in proportion to the amount of light which reaches it. When smoke above a predetermined density level passes up the stack it dims the light beam and the corresponding reduction in cell current generated permits a relay to operate an alarm or signal light. The complete Smoke Alarm consists of a Photronic Cell, a Light Source and a Relay Panel. The Light Source and Cell are mounted opposite each other on the stack and the Relay Panel is located in the boiler room. When excessive smoke dims the light beam the alarm signals for about 30 seconds and continues to signal at 30 second intervals until conditions are corrected. Any electric alarm system, either visual, audible, or both may be used with the Model 708.

Price on application.

WESTON RELAYS

MODEL 634

Model 634 is a small relay of fair sensitivity for use on circuits where close selectivity is not required. It has a single set of silver contacts capable of handling 30 milliamperes at 4.5 volts direct current. This relay is surface mounting with three rear terminals, the movable contact and the positive side of the operating coil being connected to a common terminal. The current value at which it operates may be adjusted within a range of about 10% of the operating value.

Price on application.

Sensitive Relays



Model 30



Model 534

MODEL 30

The Model 30 Relay has been made for a great number of laboratory and industrial applications during its thirty years of existence. It is a precision type of permanent magnet, movable coil relay with platinum-iridium contacts which do not oxidize or tarnish in ordinary atmosphere. The magnetic system is so designed as to insure positive and reliable contact pressure. It controls non-inductive circuits up to 200 milliamperes at 6 volts, direct current. It is front connected with five binding posts—two for the coil circuit, one for the movable contact and one for each of the two stationary contacts.

Although it is designed for switchboard mounting, Model 30 may be used as a portable instrument. It is not shielded. Where shielding is required, Model 546 is recommended.

Model 30 is regularly made as voltage and current relays, adjusted to operate in the horizontal position unless otherwise ordered. Special relays can be made, such as the differential type for maintaining the current or voltage balance between two circuits.

Price on application.

MODEL 534

Weston Model 534 Relays are suitable for many commercial uses where a smaller and lower priced device than Model 30 is required. Because of the small size they cannot be made self-contained except for somewhat restricted high range values. They have a lower torque and their accuracy is limited to about one-half that of Model 30. Model 534 is made as non-indicating relays in both flush and surface types—the flush type can also be made with an indicating scale. The surface type has a Bakelite case, is unshielded and is adapted for either switchboard or portable use. The flush type is enclosed in a cast-iron case which shields it from the influence of external magnetic fields and is intended for switchboard use.

These relays are of the permanent magnet, movable coil type with platinum-iridium contacts which do not oxidize in ordinary atmosphere. They control non-inductive circuits up to 200 milliamperes at 6 volts, direct current. Surface type Model 534 relays are adjusted in the horizontal position unless otherwise specified.

Price on application.

WESTON RELAYS



MODEL 630

POWER RELAY

In many industrial processes a relay circuit delivering minute power is used to control a secondary circuit of large power. This is accomplished by means of a sensitive relay which, upon its operation, actuates a power relay. Best operation is assured if these two devices, whose functions are closely inter-related, are considered as a unit. The model 630 Power Relay is designed especially for use with Weston Sensitive Relays, thus realizing the capabilities of both to the fullest extent. These power relays will handle as many as four circuits of one kilowatt each and may be used for the direct control of industrial processes or for operating large contactors transmitting power for heavy machinery.

Prices on application.



Model 613



Model 704

MODEL 613 TIME DELAY RELAYS

In industrial control problems it is often necessary to have a reasonable time lag between the action of the relay that initiates the operation and the final power relay that actually causes the operation to take place. The Model 613 Time Delay Relay was designed to provide this delay in a simple, reliable manner.

The relay is a compensated thermal type in which the stationary contact is mounted on bi-metallic material the same as the movable contact. This compensates for changes in ambient temperature since both strips will deflect the same amount at the same temperature conditions. The contacts are platinum iridium and are capable of handling 25 watts at 110 volts or under.

The operating coil is wound for 6 volt operation either a.c. or d.c. and is designed to function properly when used with Weston Sensitive Relays.

Price on application.

TOGGLE RELAY—MODEL 704

In a great many relay applications for process control and other purposes, the energy drain of a power relay on the control circuit is objectionable. The Model 704 Toggle Relay has been especially designed to take care of such problems.

When the Model 704 operates it throws a toggle which makes contact and closes the main control circuit and at the same time disconnects the Model 704 relay coil entirely from the control circuit. At the same time it transfers the circuit from one contact of the operating relay to the other so that when contact is made in the other direction the Toggle Relay may close the other side and open the first.

Ranges and prices upon application.

WESTON RELAYS



MODEL 705

Weston Sensitrol relays satisfy the long-felt need for reliable and inexpensive contact making indicators to operate alarm devices in electrical circuits.

These permanent magnet movable coil type relays function directly from the low energy produced by photo cells, thermocouples, resistance thermometers and similar generators of minute power. Values as low as 1 millivolt and $2\frac{1}{2}$ microamperes will effect their operation and their contacts will handle 50 milliamperes at voltages up to 110 a.c. or d.c.

Sensitrol relays are made with three different types of contacts as follows:

1. Single Fixed Contact Type—In this type the stationary contact has a fixed position. These relays may be adjusted to make contact on increasing or decreasing values.
2. Single Adjustable Contact Type—In this type the stationary contact may be adjusted to any desired operating value over either the lower or upper half of the scale. The magnetic contact and an index are fastened to a common arm which may be moved to the desired operating point by means of a knob on the front of the case.
3. Double Adjustable Contact Type—This type has two adjustable stationary contacts—one for high and one for low values. Each has the same arrangement of contact and index assembly as described above for the Single Adjustable Contact Type.

Price on application.

Northern Electric Power Apparatus Specialists in 16 cities across the country assure Power users of a reliable source of information and assistance at all times.

WESTON RADIO INSTRUMENTS

WESTON RADIO TEST EQUIPMENT

The perfection of standard test equipment, designed to anticipate and compensate for the rapidly changing demands of the industry, relieves the serviceman of a costly replacement burden. The Weston Selective Set Analyzer, employing the new Weston method of Selective Analysis, has practically banished analyzer obsolescence. Inexpensive Socket Selectors provide a practical means of modernizing equipment and in effect, insure the serviceman's investment in modern analyzers and set-servicers. Several of the most widely used radio instruments are described within these pages. Others, including specialized laboratory equipment, are more fully described in a special radio bulletin, available upon request.

Model 666
Type IA

MODEL 666 SOCKET SELECTORS

The separation of the tube socket, cord and tester plug from the analyzer proper, as embodied in the Selective Analyzers described above permits an excellent method of testing and practically eliminates obsolescence of the test equipment. Analyzers no longer must be replaced because of tube changes. A low cost adapter or socket selector is all that is required.

Model 666 Socket Selectors also provide a most practical and inexpensive means for modernizing any analyzers not equipped to handle 6 and 7 prong tubes without affecting the original operation of the analyzer.

Price on application.

MODEL 440 GALVANOMETER AND
MICROAMMETER

The Model 440 Galvanometer is a supersensitive, double pivoted movable coil type instrument having such characteristics that it may be used to considerable advantage in place of the suspended coil, reflecting type galvanometer in many kinds of service such as for Wheatstone Bridge work, low resistance potentiometers, insulation or high resistance testing and thermocouple work.

It is made in two case types—one for use as a portable instrument (surface type) and the other (flush type) for inserting into sets such as potentiometers, bridges, etc. Both types have aluminum cases finished in dull black.

Price on application.

WESTON RADIO INSTRUMENTS

MODEL 665 SELECTIVE ANALYZERS

Types 1 and 2



The Model 665 is available in two types. Type 1, the "Rotary Switch Model," is illustrated. The Rotary Switch is incorporated in Type 1 for a more rapid selection of ranges. The Model 666 Type 1-A Socket Selector, which serves to bring the tube socket connections to the analyzer circuit, or the Model 666 Type 2 Capacity Unit, may be mounted on either analyzer in precisely the same manner.

Both Model 665 Analyzers have the following broad list of a-c and d-c voltage ranges: 1,000-500-250-100-50-25-10-5-2.5-1, all with a sensitivity of 1000 ohms per volt. The current ranges of the Type 1 Analyzer are 500-250-100-50-25-10-5-2.5-1 milliamperes, d-c only. The current ranges of the Type 2 Analyzer are the same except that measurements may be taken up to 1000 milliamperes, d-c only. Resistance readings may be made from 1 ohm to 1 megohm. The customary analyzer grid test, including both high and low grid tubes, can be made. The a-c ranges, for ordinary a-c measurements as well as for output readings, are obtained through the use of a copper oxide full wave bridge type rectifier.

The indicating instrument, a Model 301 type, is mounted in a Standardized Service Unit bakelite panel. The assembly is supplied in a sturdy pressed steel case attractively finished in black. A leatherette carrying case can be provided to accommodate the Model 665 Analyzer, (Type 1 or Type 2), and a Model 666 1-A Socket Selector.

WESTON RADIO INSTRUMENTS



Model 699



Model 375

MODEL 699 GALVANOMETER

The Model 699 is the latest addition to the group of Weston double pivoted movable coil type galvanometers. It has a sensitivity midway between the Model 375 Student Galvanometer and the Model 440 High Sensitivity Galvanometer, making it most suitable for many laboratory applications where medium sensitivity is required.

MODEL 375 STUDENT GALVANOMETER

The Model 375 Galvanometer is suited for general use wherever a direct current Galvanometer of high sensitivity is not essential but where extreme durability and moderate cost are factors.

It is regularly supplied in the 45° mounting base, as illustrated, but is also available without the base for mounting in special apparatus.

WESTON ELECTRIC SPEED INDICATORS



Type C

Type A

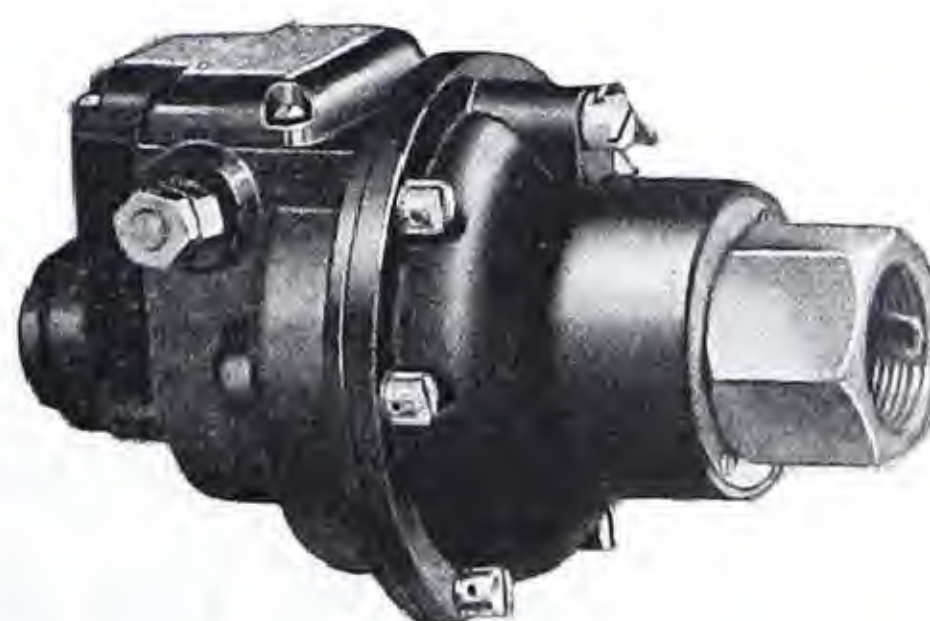
Practically all branches of industry, including the fields of land, marine and aerial transportation, have found innumerable uses for Weston tachometers. Their applications are particularly adaptable to those industries in which time is an important element in the manufacturing process. Whether the problem be one of elapsed time in the development of motion picture film, or the measurement of the rotational speed of centrifugal machines, Weston Speed Indicators may be relied upon to give dependable service combined with a high degree of accuracy.

Weston Speed Indicators consist of a magneto or generator which is connected directly to an indicating instrument calibrated in revolutions per minute, miles per hour, or any unit desired. The magneto, which is mounted at or near the rotating shaft or outlet, generates a voltage directly proportional to its driven speed. One or more indicating instruments may be located at any point remote from the generator.

This electric tachometer has no complicated moving parts and may be easily adapted to machines and devices where the installation of more bulky and complicated apparatus would be impossible. It follows variations in speed smoothly and instantly without jumping. When properly installed and adjusted, the life of the Weston Tachometer is exceptionally long and very little lubrication or attention of any kind is required.

Price on application.

WESTON AVIATION INSTRUMENTS



MODEL 544 MAGNETO-GENERATOR

Although the electric tachometer, or speed indicator, was primarily designed for the measurement of rotational speeds in more basic industries, its applications in the field of aeronautics best exemplify its utility. The Model 544 Magneto-Generator, attached directly to a tachometer outlet on airplane motors, generates a voltage directly proportional to the speed of the motor. This motor speed, expressed in revolutions per minute, can be read on an indicating instrument located in the cockpit panel. Model 544 is necessarily small, compact and light in weight. Various other applications of the electric tachometer have proved their worth in the marine, transportation and industrial fields.

WESTON INDUSTRIAL ANALYZER



MODEL 639, TYPE 1, INDUSTRIAL ANALYZER

The Model 639 Industrial Analyzer is the ideal test equipment for public utility field servicemen, plant maintenance and efficiency men, electrical contractors and particularly those doing alternating current testing, checking or installation work. It is a self-contained unit, designed to analyze industrial loads by measuring current, voltage and power in single and polyphase circuits as well as power factor in 3-phase circuits. A thorough analysis of plant load conditions with the Model 639 quickly detects overloaded or underloaded motors, indicating that relocating transformers or interchanging motors will effect considerable savings. It combines in its strong oak carrying case for Weston Model 610 instruments: a Voltmeter, Wattmeter, Power Factor Meter and Ammeter.

Only a few simple connections are necessary to place the Model 639 in circuit and the maze of interconnecting wires necessary when individual meters are used, is eliminated. The ammeter is equipped with an adjustable pointer stop which allows the maximum value of starting currents to be quickly determined. The stop enables the operator to set the pointer at the anticipated value of the starting current. The proper setting is that point at which the pointer makes only a perceptible movement as the transient current passes. Ordinary portable ammeters, without the pointer stop feature, do not permit the accurate measurement of these starting currents.



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WESTON INSTRUMENTS



Power Level Indicator.



Hour Counter

POWER LEVEL INDICATORS DB METERS

Instruments for indicating the power level in a line carrying voice or audio frequency current have been used in several applications for many years. Today such indicators are found on nearly every power level panel, where they are used for the control of power levels and the efficient monitoring of circuits. Maximum efficiency of a circuit can only be had when the level is kept as high as is consistent with the overload and other limiting characteristics of the system as a whole. The instrument used for this purpose is known as a Power Level Indicator and is usually supplied with a scale reading in decibels. For this reason it is often called a DB (decibel) Meter.

DATA REQUIRED FOR ORDER OR FURTHER INFORMATION

To insure obtaining the proper instrument, as much information as possible should be given when placing an order. A typical example follows:

Model No.,	Line Impedance,
Case Style,	Internal Resistance,
Case Finish,	Adjustment Level at "O" on scale,
Scale,	Pointer action.
Power Level,	

Prices and ranges on application.

WESTON HOUR COUNTER FOR THE MEASUREMENT OF ELAPSED TIME

A great deal of modern electrical equipment incorporates units which have a rather definite life in hours of operation and which it is desirable to replace at the end of the indicated life rather than wait for complete failure to require replacement. Running such devices to failure frequently results in interruptions to service which might assume serious proportions in certain types of equipment at times when it is most inconvenient and embarrassing.

DESCRIPTION

The Weston Model 691 Hour Counter is offered as a compact integrating device for such control. It consists of a special ball-bearing self-starting synchronous motor, drawing less than 2 watts, connected through high grade cut gears to an indicating train on the face of the instrument. The dial type indicating train runs to 9,999 hours and repeats.

APPLICATIONS

One of the most important applications is in conjunction with devices using vacuum tubes. On medium and high powered radio transmitters one Hour Counter is used to each transmitter unit, and a log is kept of the elapsed time. Records are made when each tube is placed in service and the tubes replaced after some predetermined period of use.

This counter is also applicable to any equipment whatever, where a contact may be made on a circuit closed for the period during which elapsed time is to be totaled. The Model 691 may well be used for the integration of running time on any electrically operated machine, or by subtraction, the idle time for the machine.

Price on application.

L. & N. TEST SETS



No. 5300 TYPE S PORTABLE TESTING SET

A portable Wheatstone Bridge, complete with galvanometer and battery for ordinary resistance measurements in laboratory or field, and equipped with connections for locating faults by Murray or Varley Loop and by Fisher's methods, and for locating opens by capacitance methods with the use of a buzzer or induction coil and a telephone receiver. Galvanometer is a sturdy replaceable unit with coil protecting clamp. Sensitivity is such that one volt impressed through one megohm causes a deflection of one scale division. Inclosed battery is flashlight type, easily replaced. Strong oak case $8\frac{7}{8}$ by $7\frac{3}{8}$ by 4 inches. Weight 8 pounds.

	List Price
5300 Type S Portable Testing Set.....	\$90.00
5301 Leather Carrying Case for above.....	15.00
5412 Buzzer for use with above.....	10.00
9872 Telephone Receiver with Head Band.....	5.50

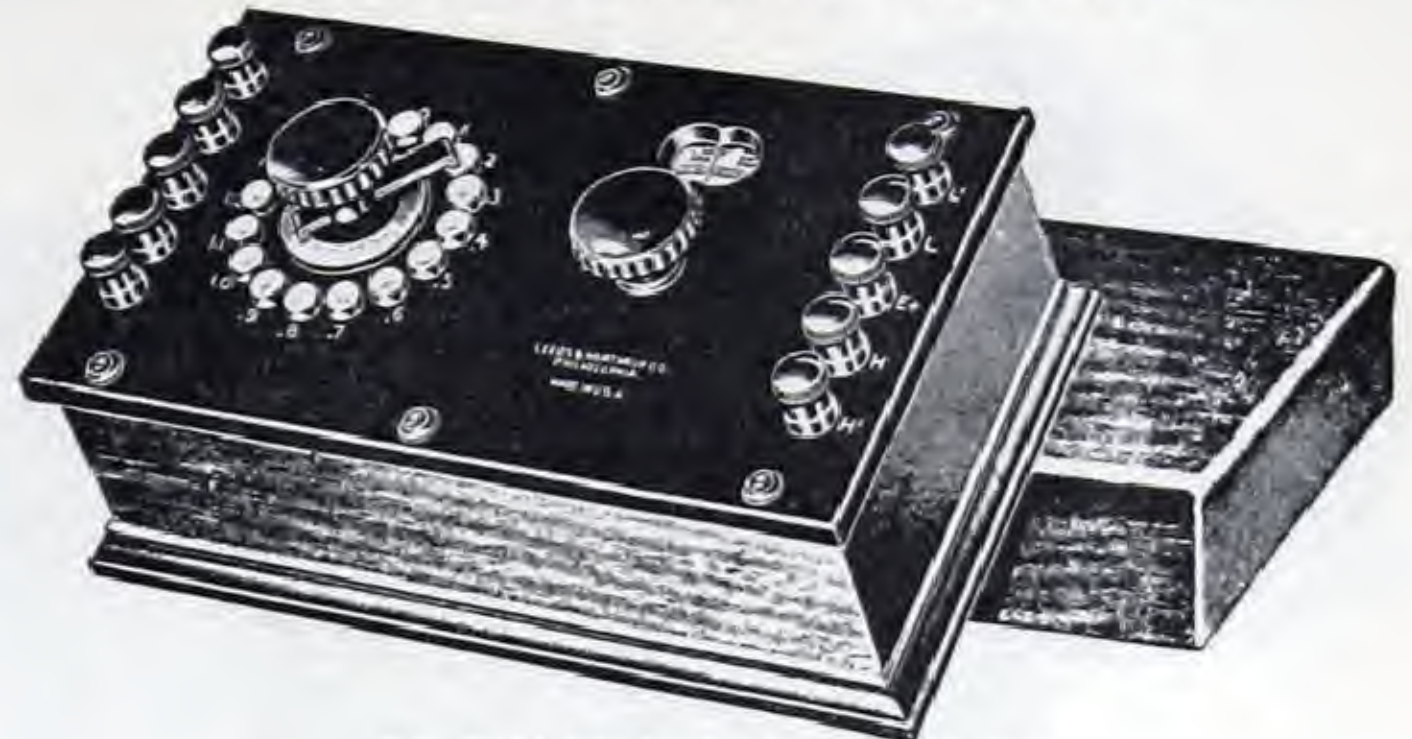


No. 5430 TYPE U PORTABLE TESTING SET

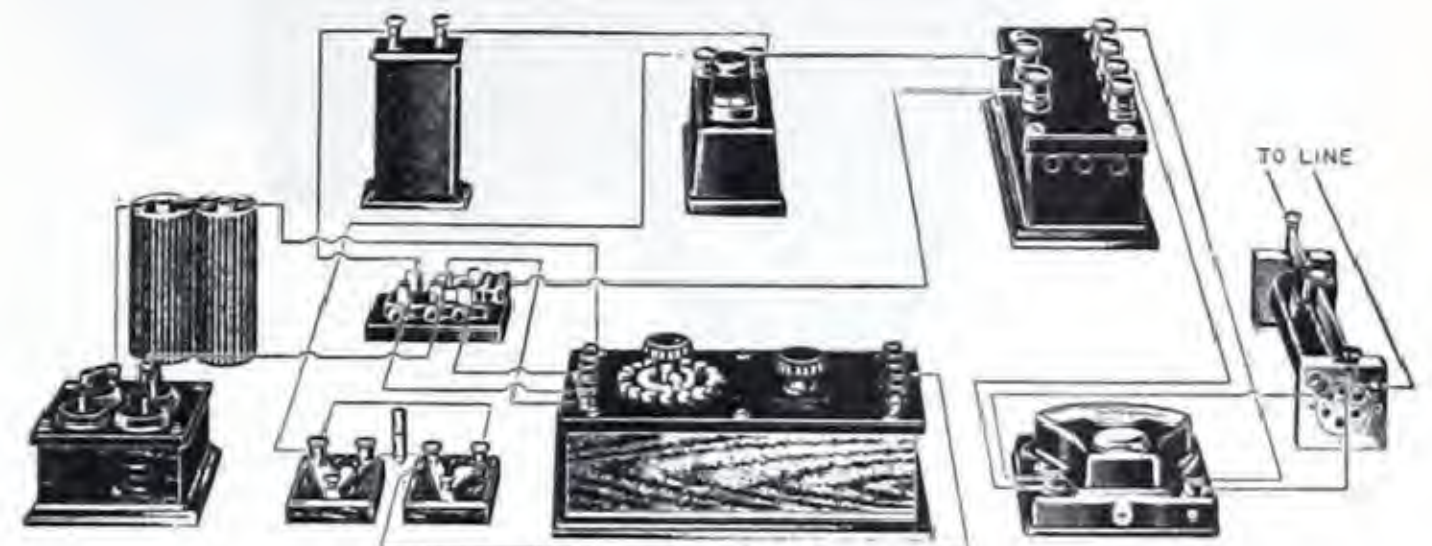
An improved portable Wheatstone Bridge for measuring resistance, locating faults by Murray, Regular Varley and Three-Varley Loop Tests and other methods, locating opens by capacitance methods, picking out faulty wires in a cable, and other uses. Designed for convenience and reliability, embodying numerous features recommended by telephone engineers. All contacts enclosed. Dial switch has positioning stop and knob is under-cut so that a lineman wearing gloves can operate it. Special ratio values simplify Varley calculations. Three position shunt in galvanometer circuit. Single key closes both galvanometer and battery circuits. Galvanometer is sturdy replaceable unit with protecting clamp. Sensitivity one megohm. Uses a flashlight type of battery. Strong oak case $8\frac{3}{4}$ by $7\frac{3}{8}$ by $5\frac{3}{4}$ inches with protecting corners and removable lid. Weight 8 pounds.

	List Price
5430 Type U Portable Testing Set.....	\$125.00

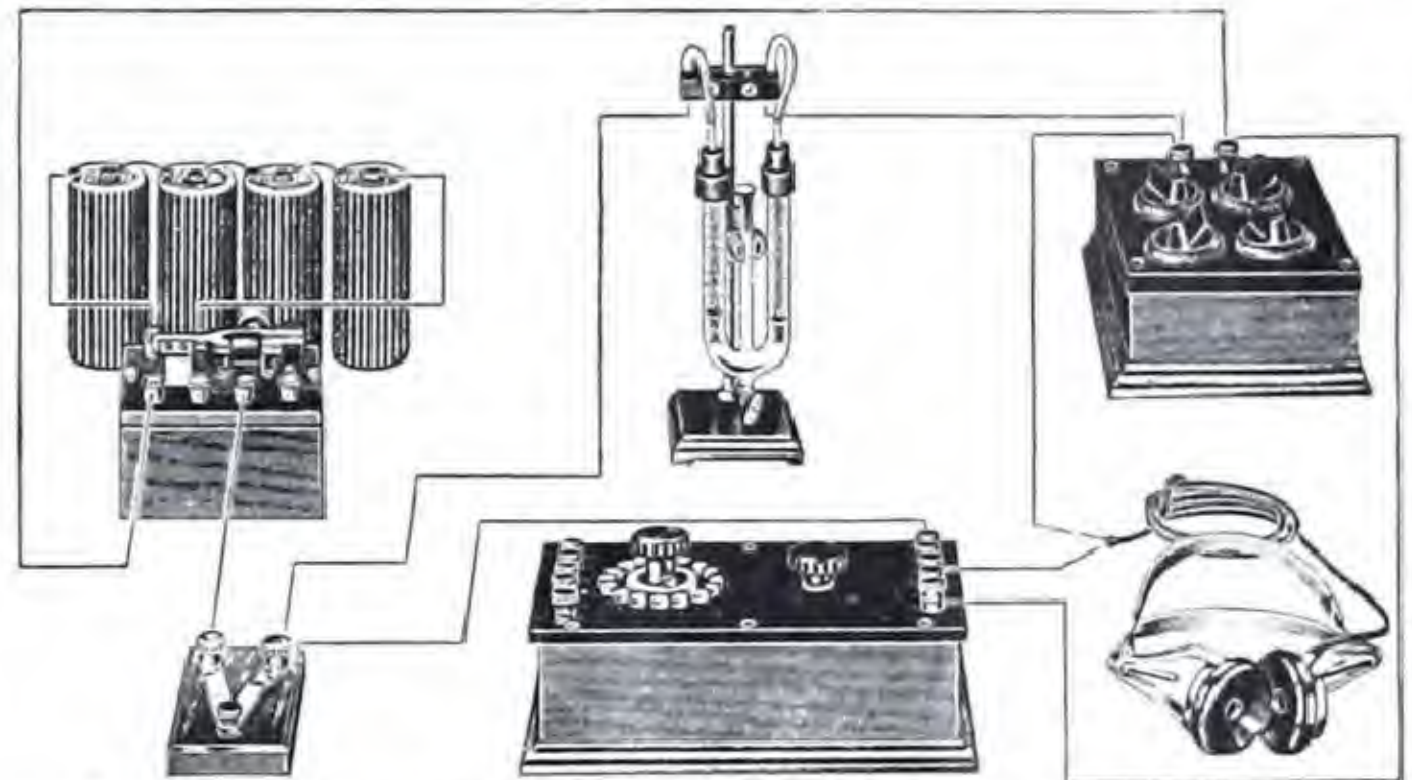
POTENTIOMETER OUTFITS



No. 7651 Students' Potentiometer



Students' Potentiometer assembly for voltage measurements



Students' Potentiometer assembly for electrolytic conductivity measurements

Other assemblies available for temperature and also for hydrogen-ion measurements.

7651 Students' Potentiometer.

Ranges, 0 to 1.6 volt and 0 to 16 millivolts. 15 coil switch and slide wire of 100 divisions. Guaranteed limit of error of coil adjustment 0.04 per cent, of slide wire calibration 0.5 division. Separate connections to slide wire and end coils for Kohlrausch bridge. Potentiometer current required 0.01 ampere. Polished bakelite top plate. Polished mahogany case with cover. Dimensions, $6\frac{1}{4}$ x 8 x $13\frac{1}{2}$ inches. Weight, 8 lbs.

- 4360 0.1 Ohm Standard resistor, capacity 15 amperes.
- 7581 Volt Box, ranges 15, 150, 300 volts.
- 4776 4-Dial Resistance Box, 9 (0.1 + 1 + 10 + 100) ohms.
- Limit of error 0.1 per cent except 0.1 ohm dial which is 1 per cent.
- 9856 Microphone Hummer.
- Delivers 1000-cycle current. Requires 6 volts d.c.
- 4912 Students' U Type Cell, without stand and clamp.
- 4911-a Stand and Clamp, for No. 4912 Cell.
- 2239-a Type P Galvanometer.
- Sensitivity 0.014 microampere, period 8 sec., coil resistance 115 ohms, external critical damping resistance 10,000 to 100,000 ohms.
- 2239-c Type P Galvanometer.
- Sensitivity 1.5 microvolts, period 14 sec., coil resistance 35 ohms, external critical damping resistance 165 ohms.
- 2320-a Portable-Type Pointer Galvanometer.
- Sensitivity 5 microamperes per mm., period 3 sec., coil resistance 20 ohms, external critical damping resistance 50 ohms.
- 2320-c Portable-Type Pointer Galvanometer.
- Sensitivity 1 microampere per mm., period 3 sec., coil resistance 250 ohms, external critical damping resistance 950 ohms.
- 2320-d Portable-Type Pointer Galvanometer.
- Sensitivity 0.5 microampere per mm., period 3 sec., coil resistance 1000 ohms, external critical damping resistance 2400 ohms.
- 2171 Telescope, Arm, and Straight Scale.
- For 2239 Galvanometer.
- 7308 Standard Cell.
- 3292 Double-Pole, Double-Throw Switch.
- 2126 Tripod Base, for Type P Galvanometer.
- 4198-a 10,000 Ohm Protective Resistance.
- 4199-a 100 Ohm Resistance Unit, Mounted.
- 4199-b 300 Ohm Resistance Unit, Mounted.
- 9872 Telephone Receiver, double, with head-band.
- 7687 Hydrogen Electrode, Hildebrand type.
- 7697 Calomel Electrode Vessel, Hildebrand type.
- 3702 Single Contact Key.

Prices on application.

"QUEEN" INDUCTIVE FAULT FINDER]

No. E-3118

This instrument is a simple, self-contained and inexpensive cable set used for locating crosses, grounds, split pairs, wet spots, etc., by means of an exploring coil. Designed and used by a large Bell Telephone Company, to whom has been supplied 2000 instruments in the past few years. Indispensable to all users of telephone and telegraph cables including telegraph and signal departments of railroads. This simple device may be regarded as a "vernier" to the location made with a Wheatstone bridge, and should be placed in the hands of every test-man using a bridge set and is also recommended when no bridge sets are used. Its results depend only on the ability of a man to "listen" and does not involve any mathematical formula. It is also arranged to give a trouble tone and has an extra sounder for connecting through a spare pair in the cable to establish communication between the test man and the wire chief or test table.

List No.	Description	List Price Each
E3118	"Queen" Inductive Fault Finder.....	\$30.00

"QUEEN" DIAL DECADE PORTABLE TEST SET

A revised design offering the most complete and compact bridge set for the measurement of resistance and the location of line and cable faults.

Resistances wound with manganin wire with double silk insulation adjusted to 1/20 of 1% in ratio arms and 1/10 of 1% in rheostat.

Battery is of commercial type obtainable at any supply store and quickly inserted without soldering.

Switches arranged for quickly setting connections for Murray and Varley loop testing. Can be balanced with telephone for resistance of protective grounds and location of opens in cables.

Now regularly made with single ratio arm, but can be supplied at same price with double ratio arm.

Model E-3150 "Queen" Dial Decade Portable Test Set.....

\$90.00

THE NEW "QUEEN" DIAL DECADE PORTABLE TEST SET

E-3108

This set is the same as E-3150, except it has an Ayrton shunt for the galvanometer with shunting powers of 1, 0.1, 0.01 and 0.001 to protect the galvanometer against excessive unbalance and to permit the use of the instrument for insulation testing by the direct deflection method. The instrument can be used as a dial resistance box and for every need for which a Wheatstone bridge is applicable in the laboratory, workshop or field, this instrument will give a maximum of service at a low cost.

List No.	Description	List Price Each
E-3108	New Dial Decade Portable Testing Set...	\$115.00
E-3109	Sole leather carrying case with strap.....	15.00
E-3110	Flexible contact clutches for clamping to large size conductors.....	10.00

"QUEEN" DIAL DECADE PORTABLE TEST SET

This test set is the same as E-3108 except it includes a 0.3 M.F. Standard Condenser and a 10 M.H. Standard Inductance, thereby enabling capacities and inductances to be measured by the bridge method. This set can also be used as a Potentiometer for calibrating direct current ammeters and voltmeters when used with a standard cell and standard low resistances.

The very wide range of electrical measurements this instrument offers makes it a testing laboratory within itself. The ideal test set for electrical engineers, engineers of tests, light and power plants, educational and commercial laboratories, in fact all who are interested in electrical measurements. Complete directions and diagrams accompany each instrument.



List No.	Description	List Price Each
E-3105	"Queen" Decade Portable Testing Set (Dial form).....	\$160.00
E-3115	Sole leather carrying case for E-3105.....	15.00
E-3120	Flexible contact clutches for gripping to heavy conductors.....	10.00
E-3125	Low resistance standards for currents up to 5 amperes.....	60.00
E-3130	Low resistance standard for currents up to 150 amperes.....	100.00
E-3135	Standard cadmium cell, with certificate..	15.00

"QUEEN" GROUND RESISTANCE TESTER and DIRECT READING OHMMETER

An accurate, direct reading and easily operated tester for measuring the resistance of ground connections and driven grounds.

Indispensable to every public utility, including power, telephone, telegraph, railway and municipal electrical systems.



No. E-3117

The importance of maintaining within allowable limits, the resistance of ground terminals is now receiving widespread attention. Ground connections should be measured frequently, so as to insure the required protection.

This ground resistance tester is a direct reading ohmmeter on the Wheatstone bridge principle, thereby giving a uniform scale with maximum accuracy throughout its entire range. It is balanced by a telephone receiver. The use of the bridge rheostat in the form of a slide permits measure-

ments to be made with facility and speed. Current for operating supplied by dry batteries contained in the instrument, of a type obtainable at any electrical supply store and can be quickly replaced without soldering.

The successful use of the instrument does not require any special training in electrical measuring instruments so that routine measurements, as well as the original installation test, can be made by the construction man.

This tester was designed originally to conform to Pennsylvania Railroad specifications G. S. T.-3001, to whom has been supplied a number of instruments for use throughout their system.

The method of use is the "three ground test," which requires the determination of the combined resistance of the ground under investigation and of two auxiliary grounds which are connected in series with it and with each other.

A Direct Reading Ohmmeter of High Accuracy and Wide Range for Ordinary Resistance Measurements

To increase the usefulness of this tester, there are incorporated multipliers of 10 and .1 in the bridge arms, permitting its use as a general purpose ohmmeter for ordinary resistance measurements, from a fraction of an ohm to 2700 ohms. This feature will make the instrument of special interest to those who have need for general resistance measurements in addition to ground resistances, as, for example, the signal departments of the railroads, etc.

Scales				
Multiplier	Range	Single Scale Division	Readable to	
Low.....	.1 0-27 ohms	.1 ohm	.05 ohm	
Direct....	1 0-270 ohms	1 ohm	.5 ohm	
High.....	10 0-2700 ohms	10 ohms	5 ohms	

Binding posts and switches are arranged so that an external galvanometer can be connected to the instrument, as some may prefer a galvanometer for balancing in place of the telephone when measuring ordinary resistances. When used for ground resistances a telephone is necessary and is included.

E-3117 "Queen" Ground Resistance Tester.....\$80.00

E-8058 "Queen" Portable Galvanometer..... 18.00

For use with E-3117. A high-grade pivot and jewel galvanometer as used in our highest grade testing sets.

"QUEEN" STANDARD POTENTIOMETER



E-3040 with lid in position, showing binding posts on back of instrument.

POINTS OF EXCELLENCE

A single turn of slide wire for the last setting without sacrifice of range or accuracy.

A convenient arrangement of the switches, keys, regulating rheostats and scale for the slide wire is superior to any other domestic or foreign makes.

The intermediate switch rotated one-half turn is the equivalent of ten complete turns of slide wire on other forms of potentiometer. Each one of the ten resistances in this intermediate switch is equal in fall of potential to a single turn of wire; therefore in this improved design the tedious operation of rotating a contact through ten revolutions in order to cover the complete last setting of potential is avoided.

All parts except binding posts are mounted flat on the top of the instrument, thereby making it exceedingly easy to read all the settings and to manipulate the regulating rheostat. The keys are of a type characterized by ease of manipulation.

Resistance of circuit is intermediate, thereby combining the advantages of the high and low resistance types without their disadvantages.

Current is 0.002 ampere, thereby permitting a long series of measurements without necessity to readjust current.

Direct reading with any Standard Cadmium Cell.

Standardization of the current in the potentiometer can be instantly checked by closing a key.

WIDE RANGE MEASUREMENT

Low Scale 0.1811 volt down to 0.000001 volt, direct indicated steps of 0.000002 volt. The single scale division of the slide can be easily estimated to 0.5 or 0.000001 volt (1 microvolt).

High Scale 1.811 volts down to 0.00001 volt by direct indicated steps of 0.00002 volt. The single scale division of the slide can easily be estimated to 0.5 or 0.00001 volt (10 microvolts).

The High Scale can be extended to 18.11 volts without the use of an external multiplier but with a multiplier or volt box the range can be extended for any maximum, and by means of standard low resistances currents can be measured to 6000 amperes.

ACCURACY

For all measurements utilizing 2 or more 0.1 volt coils in the main switch, the accuracy is 0.01% or better. It is to be noted by using the 10 fixed resistances in the intermediate switch in place of a 10 turn slide, inaccuracies of such a long wire are avoided, since these fixed resistances can be adjusted to a high degree of accuracy to be not only their nominal value but to be like each other, a vital factor in potentiometer design. We, therefore, reduce all of our errors to a single turn of slide or the last 0.01 volt setting which is divided into 500 parts plus 50 additional parts for overlap.

List No.	Description	List Price
E-3040	"Queen" Standard Potentiometer. Design unchanged.....	\$225.00
E-3044	"Queen" Simplified Potentiometer. Design unchanged.....	60.00
E-3044L	"Queen" Simplified Potentiometer. Design unchanged.....	60.00
E-3044C	"Queen" Simplified Potentiometer. Design unchanged.....	65.00
E-3044CL	"Queen" Simplified Potentiometer. Design unchanged.....	65.00

PORTABLE POTENTIOMETERS

The almost universal use of thermo-couples in industrial temperature measurements has likewise developed the potentiometer from a strictly laboratory standardizing instrument to an every-day measuring instrument for accurately measuring the low milli-volts developed by thermo couples and for checking pyrometer indicators.

The portable potentiometers listed are standard instruments as they include a standard cell for checking the standardizing current. Accuracy is $\frac{1}{2}\%$ of the range and scales can be read to $\frac{1}{4}\%$.

The compensator range given in the listings refers to an adjustment setting in the instrument corresponding to the cold end of the thermo couple, thereby making the reading direct without need to allow for the cold end correction.

List No.	List Price
E-3070—Portable Potentiometer, Indicator.....	\$120.00
Range 0-17 Millivolts, Compensator 0-1.	
E-3071—Portable Potentiometer Indicator.....	120.00
Range 0-70 millivolts. Compensator 0-5.	
E-3072—Portable Potentiometer Indicator.....	125.00
Range and Compensator as specified.	
E-3073—Portable Double-Range Potentiometer Indicator.....	145.00
Ranges 0-17 and 16-68 millivolts. Compensation 0-1 and 0-5 millivolts. Either compensator may be used with either range.	
E-3074—Double-Range Portable Potentiometer Indicator.....	155.00
Range as specified.	
Compensators as specified.	

RESISTANCE BOXES AND STANDARDS



No. E-1172

These plug boxes offer a wider range of service than similar boxes now on the market. The blocks are reamed out for travelling plugs, a pair being included and which can be used independently of the regular plugs. The feature of the travelling plug permits potential tap-offs and connections for derived circuits in a number of electrical measurements. The accuracy is $1/10\%$.

List No.	List Price
E-1170 Plug Resistance Box.....	\$25.00
12 coils, total 1100 ohms. 1, 2, 2, 5, 10, 20, 20, 50, 100, 200, 200, 500 ohms.	
E-1172 Plug Resistance Box.....	30.00
16 coils, total 1110 ohms. 1, 2, 2, 5, 10, 20, 20, 50, 100, 200, 200, 500, 1000, 2000, 2000, 5000 ohms.	

"QUEEN" RESISTANCE BOXES



No. E-1044



No. E-1043-S

The coils are thoroughly aged by heat treatment and allowed to remain in stock for a number of months before being adjusted to their final values, thereby insuring a coil whose resistance is unchanging with time. The same care is observed in the preparation of the resistances in our lowest priced instruments as used in our precision standards.

In our dial decade bridges and boxes we use ten individual coils per decade, so that the decades can be intercompared. The use of ten coils per decade in place of five as in other makes gives our bridges and boxes an advantage. In case of a burn out coil, a jumper can be placed over the defective coil, and by allowing for it, the decade is still serviceable, whereas in a system using but five coils per decade the entire decade is rendered useless when a coil becomes inoperative. Another advantage of our decades is they read to a maximum of 1 instead of 9 as in other makes.

The binding posts for the main connections are substantial brass instrument posts. Fine wires can be gripped under the head or large wires are securely held in the hole.

The tops of our instruments are a high grade, hard rubber and the boxes are mahogany.

“QUEEN” RESISTANCE BOXES

(Continued)

List No.	No. of Dials	Resistance Box Steps	List Price
E-1035	2	10 (0.1+1)	\$ 45.00
E-1036	2	10 (1+10)	42.00
E-1037	2	10 (10+100)	42.00
E-1038	2	10 (100+1000)	42.00
E-1039	3	10 (0.1+1+10)	60.00
E-1040	3	10 (1+10+100)	55.00
E-1041	3	10 (10+100+1000)	65.00
E-1042	4	10 (0.1+1+10+100)	80.00
E-1043	4	10 (1+10+100+1000)	85.00
E-1044	5	10 (0.1+1+10+100+1000)	100.00
E-1045	6	10 (0.1+1+10+100+1000+10,000)	140.00

The above resistance boxes are of our highest grade. Accuracy 1/20% except 0.1 ohm coils which are 1/5%. The sides of the case are perforated sheet brass so that these boxes can be immersed in an oil bath.

SERIES “S”

E-1035S	2	10 (0.1+1)	27.00
E-1036S	2	10 (1+10)	22.00
E-1037S	2	10 (10+100)	22.00
E-1038S	2	10 (100+1000)	22.00
E-1039S	3	10 (0.1+1+10)	35.00
E-1040S	3	10 (1+10+100)	29.00
E-1041S	3	10 (10+100+1000)	29.00
E-1042S	4	10 (0.1+1+10+100)	35.00
E-1043S	4	10 (1+10+100+1000)	35.00
E-1044S	5	10 (0.1+1+10+100+1000)	49.00
E-1045S	6	10 (0.1+1+10+100+1000+10,000)	64.00

The Series “S” resistance boxes are accurate to 1/10% except the 0.1 ohm coils, which are 1/5%.

STANDARD RESISTANCES

For Current Measurements

These Standards are designed for use with the Potentiometer and are of manganin and will carry their full load in the air without the necessity of an oil bath.

	Amperes	
E1321	.1 ohm for currents from 1 to 15	\$40.00
E1322	.01 ohm for currents from 1 to 100	65.00
E1323	.001 ohm for currents from 10 to 300	Price
E1324	.001 ohm for currents from 10 to 500	on
E1325	.00004 ohm for currents from 250 to 1500	appli-
E1326	.00002 ohm for currents from 500 to 2000	cation
E1327	.00001 ohm for currents from 1000 to 3000	
E8058	Portable D'Arsonval Galvanometer with Pointer.....	25.00
E8035	Wall D'Arsonval Galvanometer.....	60.00

Complete with Telescope and Scale and used when higher Galvanometer sensitivity than can be obtained with the pointer type is required.

E8040C	D'Arsonval Galvanometer with combined Lamp and Scale.....	60.00
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This type of Galvanometer is used when a Telescope and scale is not suitable. In commercial work where a constant series of observations is to be taken, this type is less fatiguing.

E3135	Standard Cadmium Cell with certificate...	25.00
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“QUEEN” ACME WHEATSTONE BRIDGE



No. E-1020

A distinctive feature is the reversible Ratio Arms so that this Bridge offers a wider range of measurement and usefulness in the laboratory as compared with any other make. The blocks are reamed out for travelling plugs, a pair being included. The internal connections are shown by means of white lines on the hard rubber top. Keys for the galvanometer and battery circuits are included.

Bridge coils are 1, 10, 100 ohms in one arm, and 10, 100, 1000 ohms in the other. The rheostat values are 1, 2, 2, 5, 10, 20, 20, 50, 100, 200, 200, 500, 1000, 2000, 2000 and 5000 ohms, thus enabling all resistances that come within the range of the Wheatstone Bridge method to be satisfactorily measured with this instrument. The resistances are adjusted to 1/10% in the rheostat and 1/20% in the bridge arms.

List No.	List Price
E-1020 “Queen” Acme Wheatstone Bridge.....	\$50.00

“QUEEN” DIAL DECADE WHEATSTONE BRIDGE



No. E-1022

Rheostat has 4 decades 10 (1+10+100+1000) and a single dial control for Ratio arms. There are 7 multipliers, 0.001, 0.01, 0.1, 1, 10, 100 and 1000. Adjusted to 1/20% in bridge arms and 1/10% in Rheostat.

List No.	List Price
E-1022 “Queen” Dial Decade Wheatstone Bridge.....	\$47.50

"MEGGER" GROUND RESISTANCE TESTER**"Megger" Ground Resistance Tester**

The resistance to earth of all types of ground connections can be tested by a direct reading "Megger" instrument with no adjustments and no calculations.

The "Megger" Ground Resistance Tester is a new, direct-reading electrical instrument for testing the resistance to earth of ground connections such as driven pipes and rods, buried plates, patented grounding devices, water pipes, ground wires and steel structures. It is designed for use by power companies, railroads, industrial plants and telephone and telegraph companies for testing central station, sub-station and distribution grounds, lightning arrester and other protector grounds and for testing the resistance to earth of transmission towers and other structures.

Direct Reading.—The test is made in one operation and with only one reading; the result is indicated directly on a scale which "reads like a Voltmeter."

Most simple to operate.—Connect the "Megger" Ground Tester to the ground under test and also to two reference grounds driven into the earth, or directly to a water system having low resistance to earth. Then turn the crank and read the scale. No adjustments; no calculations; no "balancing."

Free from effects of stray current in the earth.—No adjustments are required to avoid the effects of stray alternating or direct current in the earth or polarization or electrolysis. Satisfactory tests have been made in locations where the difference of potential in the earth, due to stray current, was as much as 50 volts.

Will test variable resistance ground, because it is direct-reading like a voltmeter.

Built in a wide assortment of ranges, from 0 to 3 ohms up to 0 to 3000 ohms full scale, so that all types of ground connections can be tested.

List No.	Range in Ohms	List Price
63003	0- 50 and 0- 10.....	\$277.50
63001	0- 150 and 0- 15.....	277.50
63007	0- 250 and 0- 25.....	277.50
63002	0- 300 and 0- 30.....	277.50
63006	0- 300, 0- 30 and 0- 3.....	296.00
63004	0-1500, 0-150 and 0-15.....	296.00
63005	0-3000, 0-300 and 0-30.....	296.00
63041	Leather Carrying Case.....	26.25
63042	Cushion Travelling Case.....	26.25

THE WEE-MEGGER TESTER
POCKET INSULATION TESTER

In order to keep pace with the development of the electrical industry, Eversheds have produced the wee-Megger-Tester.

Installations are becoming smaller but more numerous, the amount of apparatus to be installed and maintained has vastly increased, and therefore the contractor or maintenance engineer now requires not one but several insulation testers. The price of the wee-Megger-Tester is such that it will be economical to provide every maintenance man, or responsible electrician, with a testing set as a part of his kit of tools.

The instrument consists of an ohmmeter and a hand-driven direct current generator the whole being contained in a single case, the size of which is $5\frac{3}{4} \times 4 \times 2\frac{3}{8}$ inches.

The ohmmeter is of true ratiometer type, with a pressure and current coil rigidly mounted together and carried on spring mounted jewels. The magnet is of cobalt steel. The machine-cut double reduction gear of the generator incorporates a free wheel and the armature runs in roller bearings. The generator handle is made to fold compactly into the instrument when not in use. Special spring plunger type terminals, enabling rapid attachment and disconnection, are provided.

The standard instrument is wound for 500 volts, the range being from 10,000 ohms to 20 megohms and infinity, with one megohm in the centre of the scale, each instrument being separately calibrated. Voltages of 250 and 100 are also obtainable.

The case is moulded in mottled red synthetic resin, with smooth exterior.

The weight is only 3 lbs.

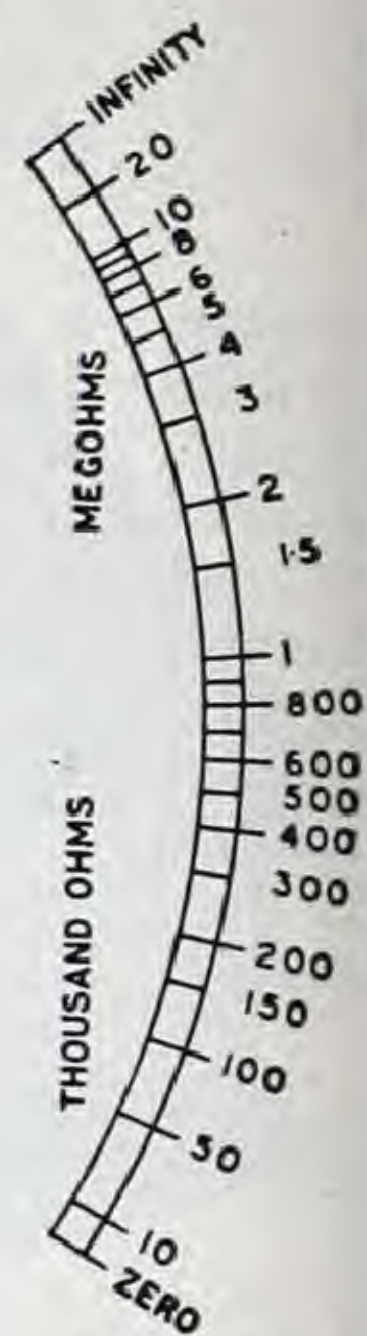
Generator pressure: variable.

List No.	Range in Megohms	E.M.F. at 160 r.p.m.	List Price
70001*	0-5 (Infinity)	100 volts.....	\$63.50
70002*	0-10 (Infinity)	250 volts.....	63.50
70003*	0-20 (Infinity)	500 volts.....	63.50
70101†	0-5 (Infinity)	100 volts.....	65.00
70102†	0-10 (Infinity)	250 volts.....	65.00
70103†	0-20 (Infinity)	500 volts.....	65.00
70201†	0-5 (Infinity)	100 volts.....	67.50
70202†	0-10 (Infinity)	250 volts.....	67.50
70203†	0-20 (Infinity)	500 volts.....	67.50
70291	Metal carrying case.....		1.50
70292	Leather carrying case.....		4.00

*Without carrying case.

†In metal carrying case.

‡In leather carrying case.



Scale of wee-Megger-Tester, 500 volts. Full Size.

"MEGGER" TESTING SETS



"Megger" Testing Set

Without attention of any sort, or any maintenance cost whatever, the "Megger" offers years of unfailing service in the detection and diagnosis of insulation faults; it furnishes exact information as to insulation values, reveals changes due to atmospheric or other conditions and provides a recognized test at high pressure. It is the acknowledged court of appeal on all questions concerning insulation.

Diagnosis of Faults.—It is possible by a "Megger" test to discriminate between low insulation due to damp, that due to dust, that due to conducting particles, or the disintegration of insulation under stress.

The type of apparatus or form of insulation which it is required to test is quite immaterial. "Megger" sets may be used for all forms of wiring from bell-circuits to E.H.P. transmission lines, for switchgear, dynamos, motors, arc lamps, instruments and accessories, and for wireless apparatus, including the actual measurement of grid leak and anode resistances. If the purpose for which the instrument is required can be stated when ordering, however, a range giving the maximum degree of accuracy over the most suitable values can be chosen. For routine testing on an intensive basis, motor driven "Megger" Testing Sets which may be run continuously are supplied.

DISTINCTIVE QUALITIES OF THE "MEGGER" TESTING SET

The following are the chief characteristics of the "Megger" Testing Set for measuring insulation resistance:—

- Compactness.—The set is self-contained in one case.
- High Pressure.—It measures insulation under high pressure.
- Direct Reading.—It indicates by direct deflection on a dial.
- Simplicity.—Its use is extraordinarily simple, and measurements can be effected by wholly unskilled persons.
- Speed.—Reading is instantaneous.
- Precision.—Indication is as precise as it is prompt.
- Strength.—The instrument is remarkably robust, so much so that the manufacturer gives a Five Year's Guarantee with it.
- Handiness.—It can be used anywhere under the most unfavorable conditions.

Almost equally important are the features which the "Megger" does not possess. There are no switches, no plugs, no adjustments, no key to tap, no galvanometer to watch. Simply couple two wires to the terminals, turn the handle, and read. The user is not called on to think—the device does it for him.

"MEGGER" TESTING SETS

(Continued)

Variable-Pressure "Megger" Testing Sets

LOW-RANGE

List No.	Volts at 100 revs.	Range in Megohms.	List Price
35001	100	0 to 10	\$179.55
35002	250	0 to 20	189.00
35003	500	0 to 100	220.50

Constant-Pressure "Megger" Testing Sets

LOW-RANGE

List No.	Constant E.M.F. (Volts)	Range in Megohms.	List Price
35006	100	0 to 10	\$207.90
35007	250	0 to 20	217.35
35008	500	0 to 100	252.00
35009	1,000	0 to 200	294.00
35010	2,500	0 to 1,000	357.00

Extra: Any of the above except No. 35010 can be fitted with a switch to divide the scale readings by:

	List Price
10.....	\$18.90
100.....	28.35
10 and 100.....	36.75
Leather case for the above No. 35001 to 35010 incl. ..	26.25
Wood case for the above No. 35001 to 35010 incl.	26.25

HIGH-RANGE

List No.	Constant E.M.F. (Volts)	Range in Megohms.	List Price
35011	500	2 to 1,000	\$294.00
35012	1,000	4 to 2,000	341.25
35013	1,000	4 to 5,000	413.70
35017	2,500	4 to 10,000	420.00

Extras: Any of the above except No. 35017 can be fitted with a switch to divide the scale reading by:

	List Price
10.....	\$28.35
100.....	36.75
10 and 100.....	47.25
Leather case for the above No. 35011 to 35017 incl.	42.00
Wood cushion travelling case for the above No. 35011 to 35017 inclusive.....	26.25

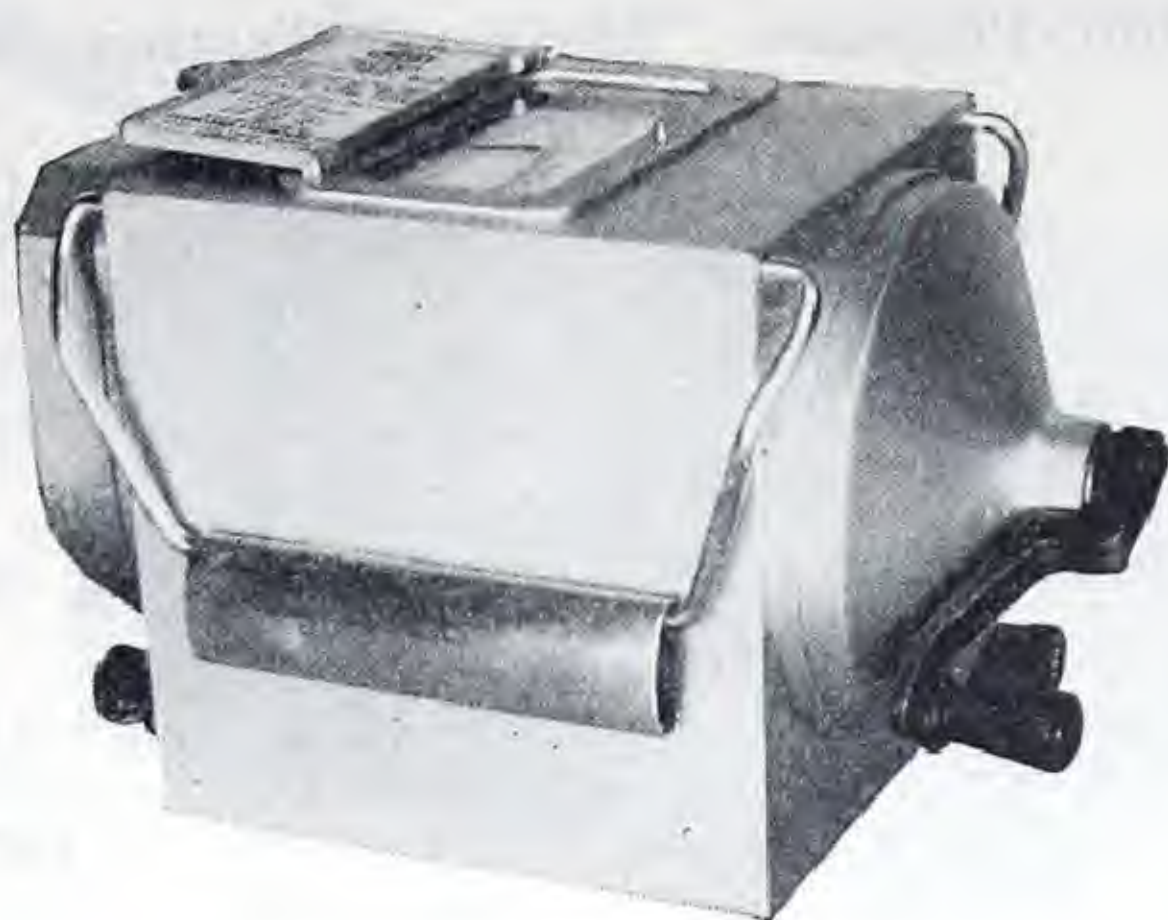
"Bridge-Megger" Testing Sets

List No.	Constant E.M.F. "Megger"	Bridge	Range in Megohms	List Price
35055	500V	250V	0 to 40	\$415.75
35056	250V	125V	0 to 20	415.75
35059	1,000V	250V	0 to 100	457.75
35066	500V	250V	0 to 1,000	552.75
35073	1,000V	500V	0 to 2,000	604.75

Note:—Bridge supplied is a 4 dial resistance box 1-9999 ohms. If a resistance box 0.1-999.9 is required extra price is \$31.00.

The "Megger" component is fitted with a bridge switch to multiply and divide bridge readings by 1-10-100.

	List Price
Leather case for the above "Bridge-Megger" Nos. 35055, 35056, 35059.....	\$26.25
Leather case for the above High-Range "Bridge-Megger" 35066, 35073.....	42.00
Leather case for the above resistance boxes.....	23.10
Wooden cushion travelling case for the above, any size	26.25

"MEG" EARTH TESTER**"Meg" Earth Tester**

During the last few years the question of earthing in connection with electrical systems has received a great deal of attention. Since the primary function for which earthing is designed is to prevent danger, it is necessary that an "earth" to be effective should be of low resistance. It has also been found that if the resistance of the "earthing" of transmission lines is maintained at a low value, the number of interruptions due to lightning are materially reduced, the discharge passing to earth without setting up a "surge."

The importance of actually measuring the value of all earths on a system is therefore obvious and recognising this, Evershed & Vignoles Ltd. developed the "Megger" Earth Tester.

Since the introduction of this instrument, a demand has arisen for an instrument of lighter weight and lower price to enable systematic routine tests to be carried out rapidly and to meet this demand Evershed & Vignoles Ltd. have now developed the "Meg" Earth Tester—an instrument designed on exactly the same principle as the "Megger" Earth Tester—giving direct readings in ohms of the resistance to earth, without calculation or adjustment, the reading being unaffected by soil electrolysis or vagabond currents.

The "Meg" Earth Tester is similar in appearance to the "Meg" Insulation Tester, the ohmmeter and generator being contained in a cast aluminium case. The external dimensions are $5\frac{1}{2}$ ins. x $9\frac{1}{4}$ ins. x $6\frac{1}{4}$ ins. and the instrument weighs less than 8 lbs.

The case is fitted with three terminals, one of which is placed at the generator handle and marked "Earth" and two others at the ohmmeter end of the case marked "P" and "C" respectively.

The instrument has been designed to give as wide a range as possible on a single scale and thus a very open scale at the zero end has been evolved, the scale closing up rapidly to the maximum readings. This feature is illustrated in the facsimile scales shown, Fig. 1 being of the most usual range. The scales are divided into ohm divisions, and it will be noted in Fig. 1 that the readings, zero to 30, are obtainable to within fractions of an ohm.

"MEG" EARTH TESTER

The test is simple to make. The "Earth" terminal should be connected to the earth plate or metal structure, the resistance of which is to be measured and two spikes, one being connected to the "P" and the other to the "C" terminal, driven into the ground each about 50 feet from the earth plate and from each other. The instrument is so designed that the resistance which the temporary testing spikes make with the earth does not materially affect the accuracy of the reading. A water main can be used instead of the spikes in the ground, the "Earth" terminal being connected as previously described and the other terminals joined together by a wire which should then be connected to the water main.

The low price and light weight make the instrument especially suitable as a standard unit in the kit equipment of every overhead transmission and mains engineer. A leather case can be supplied, the strap of which is adjustable for carrying by hand or for slinging from the shoulder.



Fig. 1

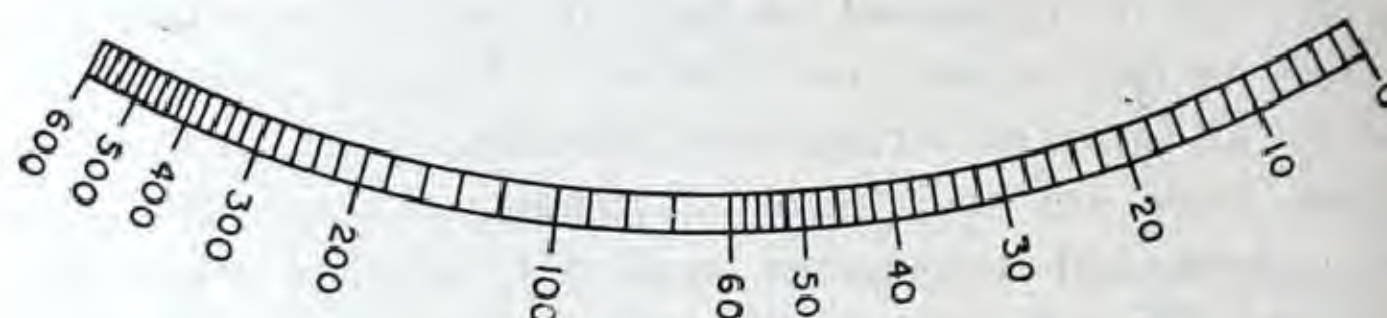


Fig. 2

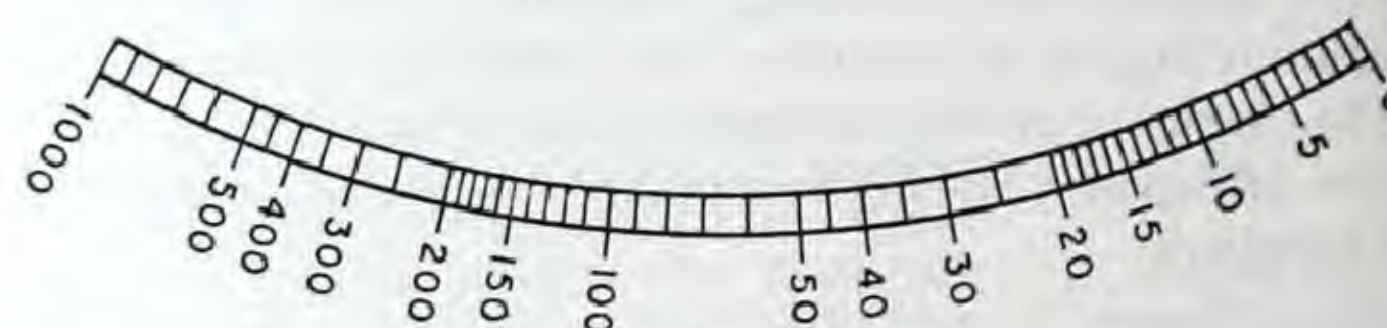


Fig. 3

List No.	Description	List Price
63101	MEG Earth Tester, range 0-300 ohms, scale as Fig. 1.....	\$163.00
63102	MEG Earth Tester, range 0-300 ohms, scale as Fig. 1, with leather case.....	175.00
63103	MEG Earth Tester, range 0-600 ohms, scale as Fig. 2.....	163.00
63104	MEG Earth Tester, range 0-600 ohms, scale as Fig. 2, with leather case.....	175.00
63105	MEG Earth Tester, range 0-1000 ohms, scale as Fig. 3.....	163.00
63106	MEG Earth Tester, range 0-1000 ohms, scale as Fig. 3, with leather case.....	175.00
63141	Leather Case only for above MEG Earth Testers.....	12.00

"MEGGER" CIRCUIT TESTING OHMMETER

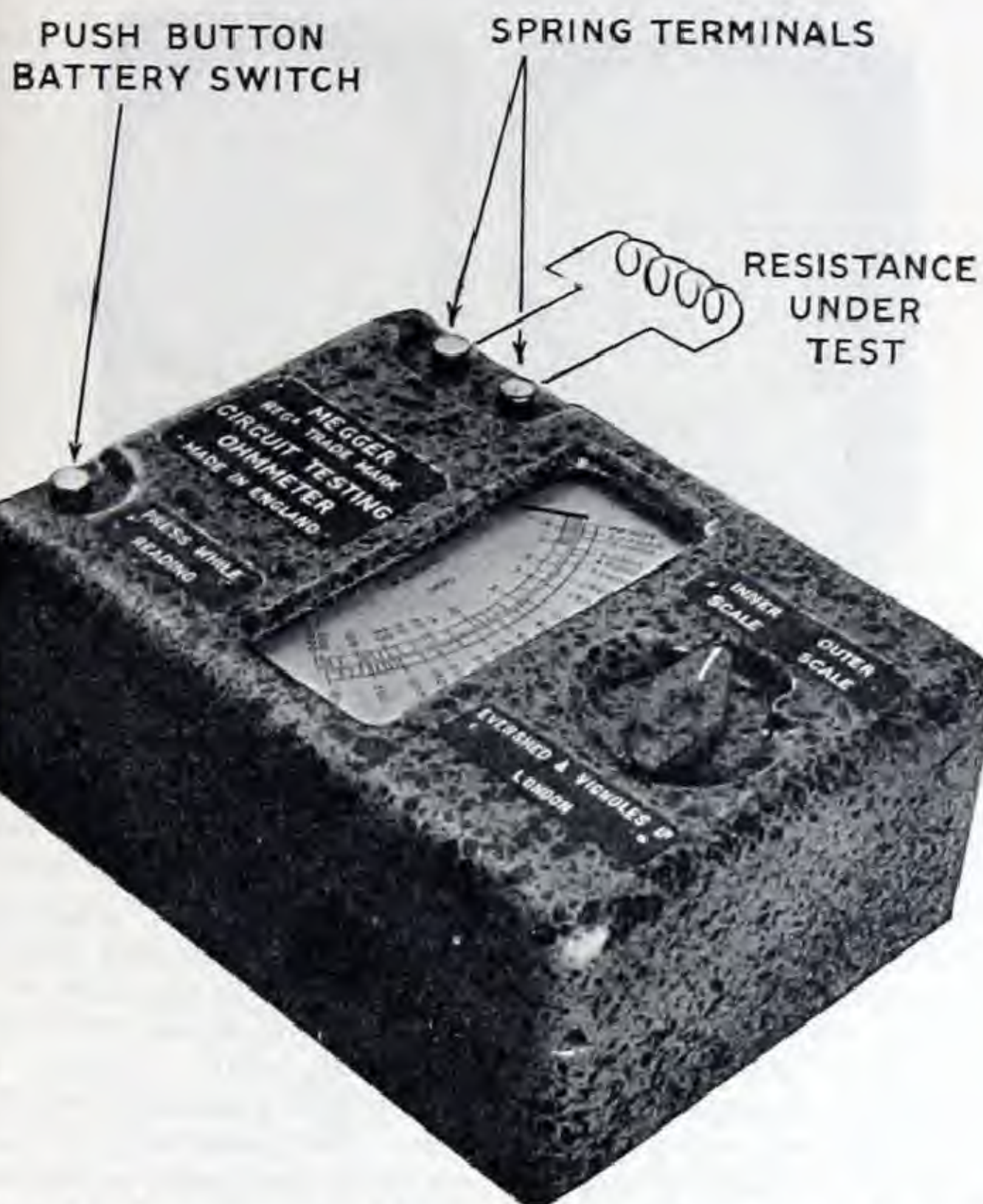


Fig. 1. Instrument with two terminals and press button battery switch

The "Megger" Circuit Testing Ohmmeter is a general utility instrument for measuring conductor resistance, tracing circuits and locating faults in the windings of electrical apparatus.

It is a desirable adjunct to the tool kit of engineers engaged in general plant maintenance, telephone erection, radio installation and repairs and is, in fact, suitable for use by all who wish to test the resistance of circuits up to 200,000 ohms.

The instrument, which weighs 2½ lbs. (.9 kilogramme), consists of an ohmmeter and a small dry battery, the whole being contained in a moulded case of an attractive colour and of such a size, 5⅜ by 4 by 2¼ inches (136 by 102 by 55 mm.), that it can be carried conveniently in an overcoat pocket.

The instrument is supplied with the terminals arranged in either of two ways. In the pattern shown in Fig. 1 there are two spring terminals for the testing leads, and a push button battery switch. This switch is provided to limit the demand on the battery to the period required to take a reading.

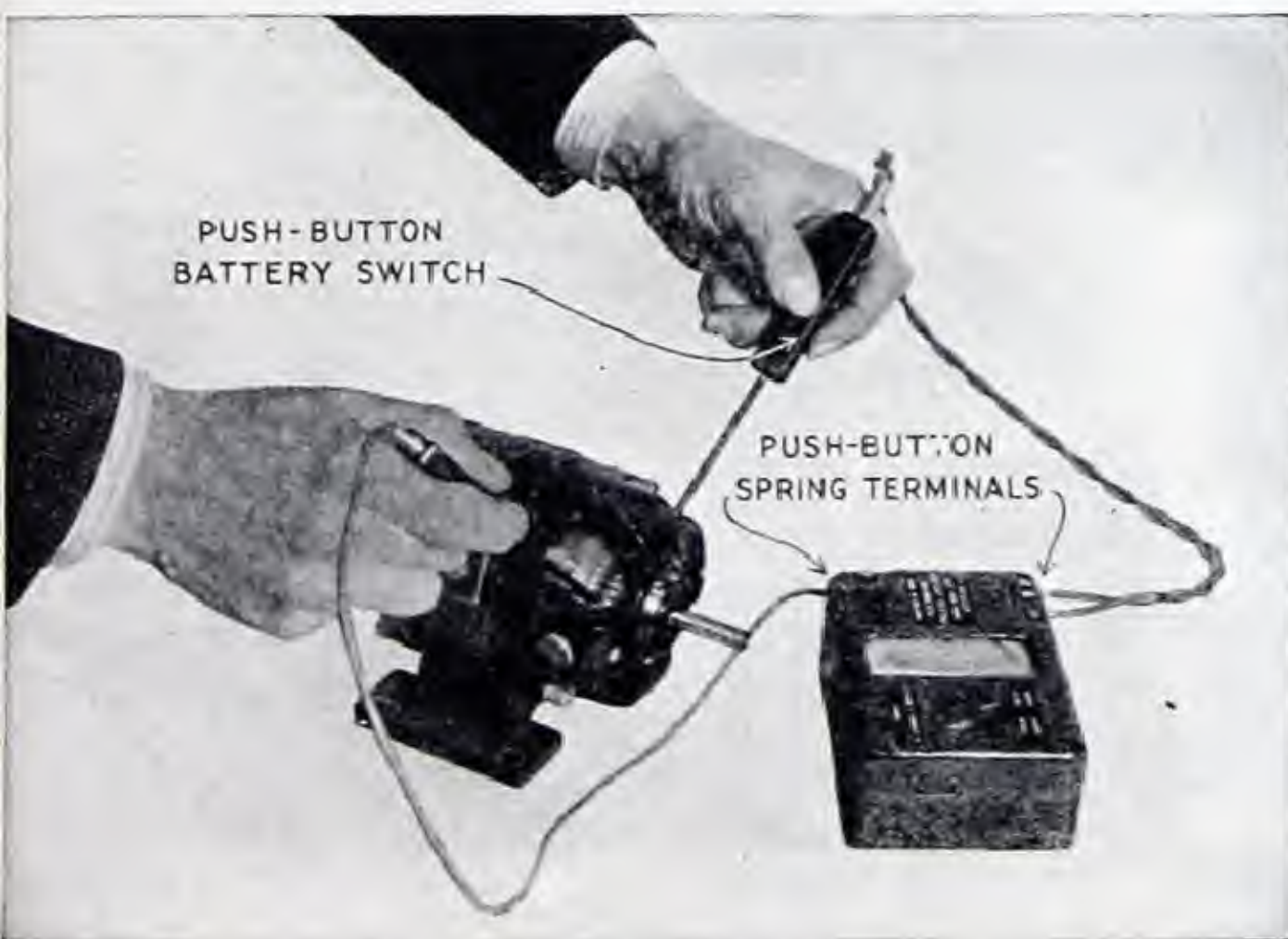


Fig. 2. Instrument with flexible leads and hand spikes for telephone, radio and general work

"MEGGER" CIRCUIT TESTING OHMMETER

(Continued)

In the pattern shown the instrument is supplied complete with testing spikes and leads; three terminals are fitted in the instrument, the battery switch being fitted in the handle of one of the spikes, which is fitted with a twin lead. This type is useful where the terminals across which tests have to be made are difficult of access, as may be the case in radio or telephone work, and it is desirable to have both hands free.

A leather carrying case can be supplied and is strongly recommended for the pattern in which testing spikes are used. This case accommodates the instrument with its connecting leads and spikes, and is arranged so that the instrument may be used in the open position, the carrying strap being round the operator's neck. Readings may then be taken without the instrument being placed on the floor or table, the hands being still free to manipulate the contact spikes.

Each instrument is provided with two scales, a range switch being fitted to select either at will. Four types are available. An examination of these scales will reveal the wide range of resistance covered and the general utility of the instrument.

Each of the four ranges listed can be obtained in the pattern with two terminals and a press button switch incorporated in the instrument, or with three terminals, for use with testing spikes or with leads incorporating a switch.

The lower ranges up to 300 ohms are suitable for measuring the continuity of a circuit and for testing domestic appliances, heating elements, motors, generators, relays, etc., the range selected depending upon the resistance of the apparatus to



Showing utility of carrying case.

be dealt with. The outer scale is in each case ten times the range of the inner. The divisions, while being roughly equal, are more open at the lower end of the scale than the upper, thus enabling any resistance within the range of the instrument to be read with precision.

"MEGGER" CIRCUIT TESTING OHMMETER

(Continued)

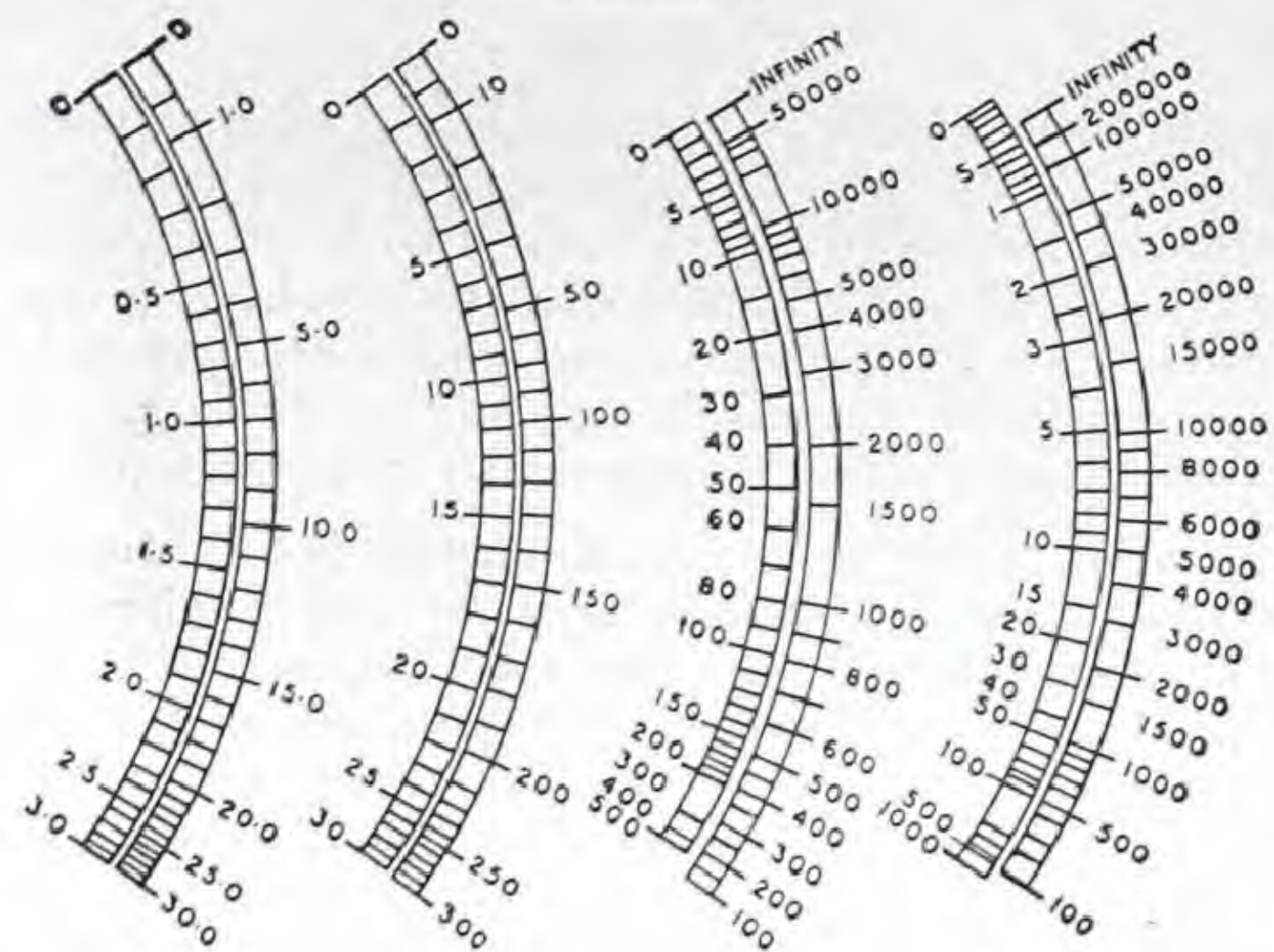


Fig. 4

Fig. 5

Fig. 6

Fig. 7

The higher range instruments, Figs. 6 and 7, reading up to 50,000 and 200,000 ohms, are suitable for measuring the higher resistances encountered in telephone and radio work. In these types the scales are logarithmic in character and the higher scale extends to infinity.

Every instrument is individually calibrated, so that the maximum degree of accuracy is obtained.

The ohmmeter movement is similar to that used in the wee-Megger-Tester, the movement being carried on spring mounted jewels, so enabling freedom and sensitivity to be obtained even after rough treatment.

The readings of the instrument are independent of variations in the voltage of the battery, as the movement is of the double coil, true ohmmeter type, and thus no adjustment of any kind is necessary, the instrument being always ready for use.

The battery is of the standard $4\frac{1}{2}$ -volt flash lamp type obtainable in all parts of the world. It can be replaced by the removal of the cover at the back of the instrument; this cover is held by two screws, which can be turned by using a small coin.

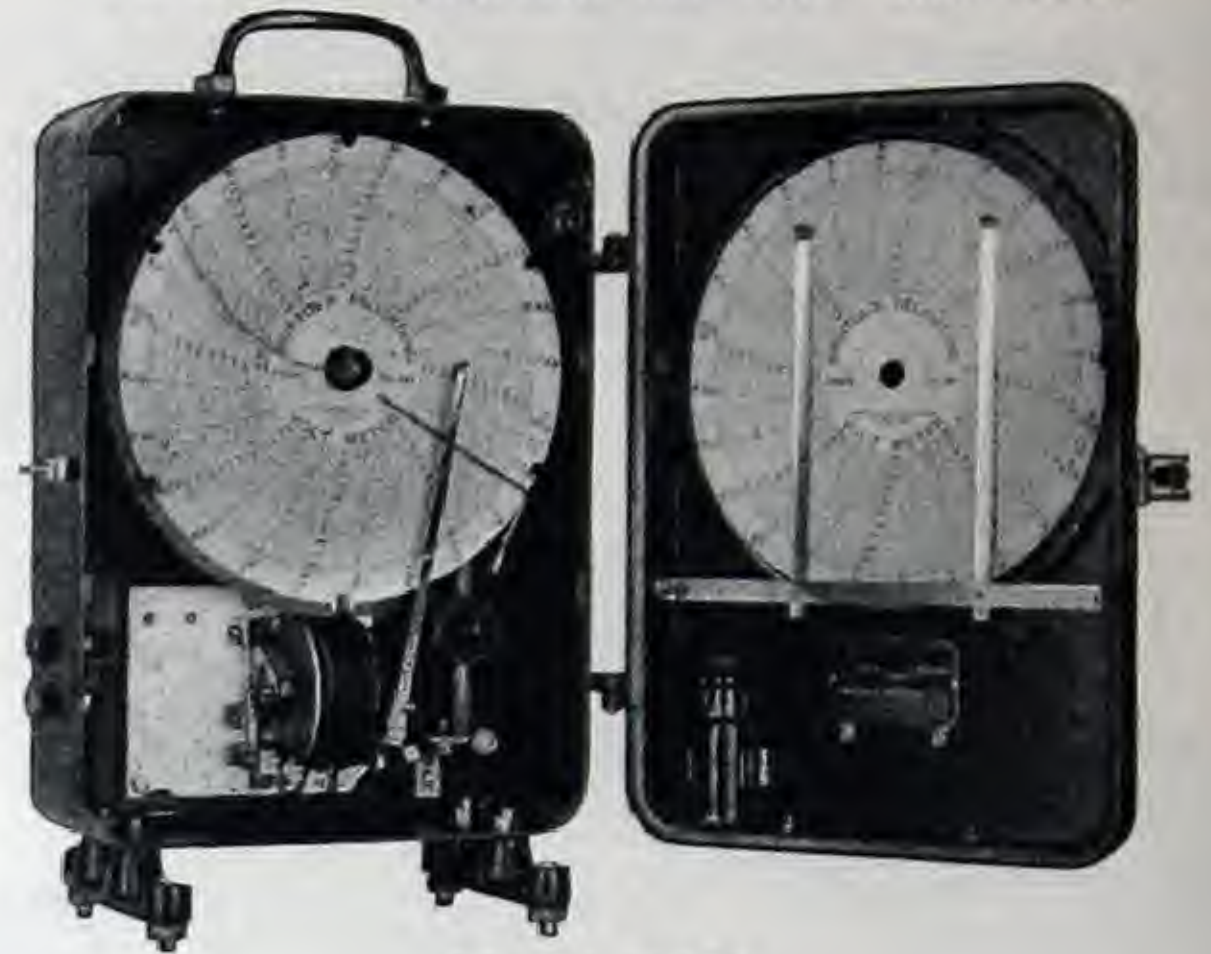
The instruments carry the usual 12 months guarantee.

Ranges and Prices of "Megger" Circuit Testing Ohmmeters

List No.	Range in Ohms.	Description	List Price
14701	0-3	With two terminals and push button.....	\$46.00
14711	0-30	With three terminals and testing spikes, one containing a push button.....	50.00
14702	0-300	With two terminals and push button.....	46.00
14712	0-300	With three terminals and testing spikes, one containing a push button.....	50.00
14741	0-500, 100-50,000 and Inf.	With two terminals and push button.....	46.00
14751	0-500, 100-50,000 and Inf.	With three terminals and testing spikes, one containing a push button.....	50.00
14742	0-1000, 100-200,000 and Inf.	With two terminals and push button.....	46.00
14752	0-1000, 100-200,000 and Inf.	With three terminals and testing spikes, one containing a push button.....	50.00
14791	Pair of testing spikes and leads	Comprising: 1 single spike with lead; 1 single spike with push button and two leads.....	4.00
14795		Special leather case and holder with sling strap, enabling ohmmeter to be used with hands free.....	6.00

BRISTOL'S ROUND CHART RECORDERS

Portable Voltmeters for A.C. and D.C.



Model 522M

Self contained resistance up to 300 volts.

Separate resistance box for over 300 volts.

Bristol's Recording Voltmeters are furnished for any commercial frequency and for a variety of operating voltages.

Portable rectangular cases provide compact mounting installations where space is limited. Increasing and uniform scale characteristic charts are available. Charts are 8" in diameter and can be supplied for daily or weekly rotation. Movements require approximately 35 volt amperes for operation. Ranges of 0-130 volts, 0-250 volts are popular; also 80-130 volts and 90-140 volts. Partial or set up scales provide for uniform charts. Some charts are listed as follows:

Chart No.	Volts Ranges	Clock	List Price
127	0-130	24 hr.	\$113.40
131	0-130	7 da.	142.80
138	0-150	24 hr.	113.40
288	0-150	7 da.	142.80
121	0-250	24 hr.	113.40
299	0-250	7 da.	142.80
118	0-300	24 hr.	113.40
265	80-130	24 hr.	121.80
187	90-140	24 hr.	121.80
186	110-180	24 hr.	121.80
226	175-300	24 hr.	121.80
221	0-500	24 hr.	134.40
134	0-650	24 hr.	134.40
176	0-750	24 hr.	134.40

Portable Ammeters for A.C. and D.C.

Model 622M

Bristol's Recording Ammeters are furnished regularly for 5 amperes for use with transformers on A.C. circuit. They can be used on commercial frequencies from 25-133 cycles without appreciable error. Approximately 6 watts power is required for operation. Oil damper is used. Increasing characteristic charts are available. Charts are 8" in diameter.

Some ranges are as follows:

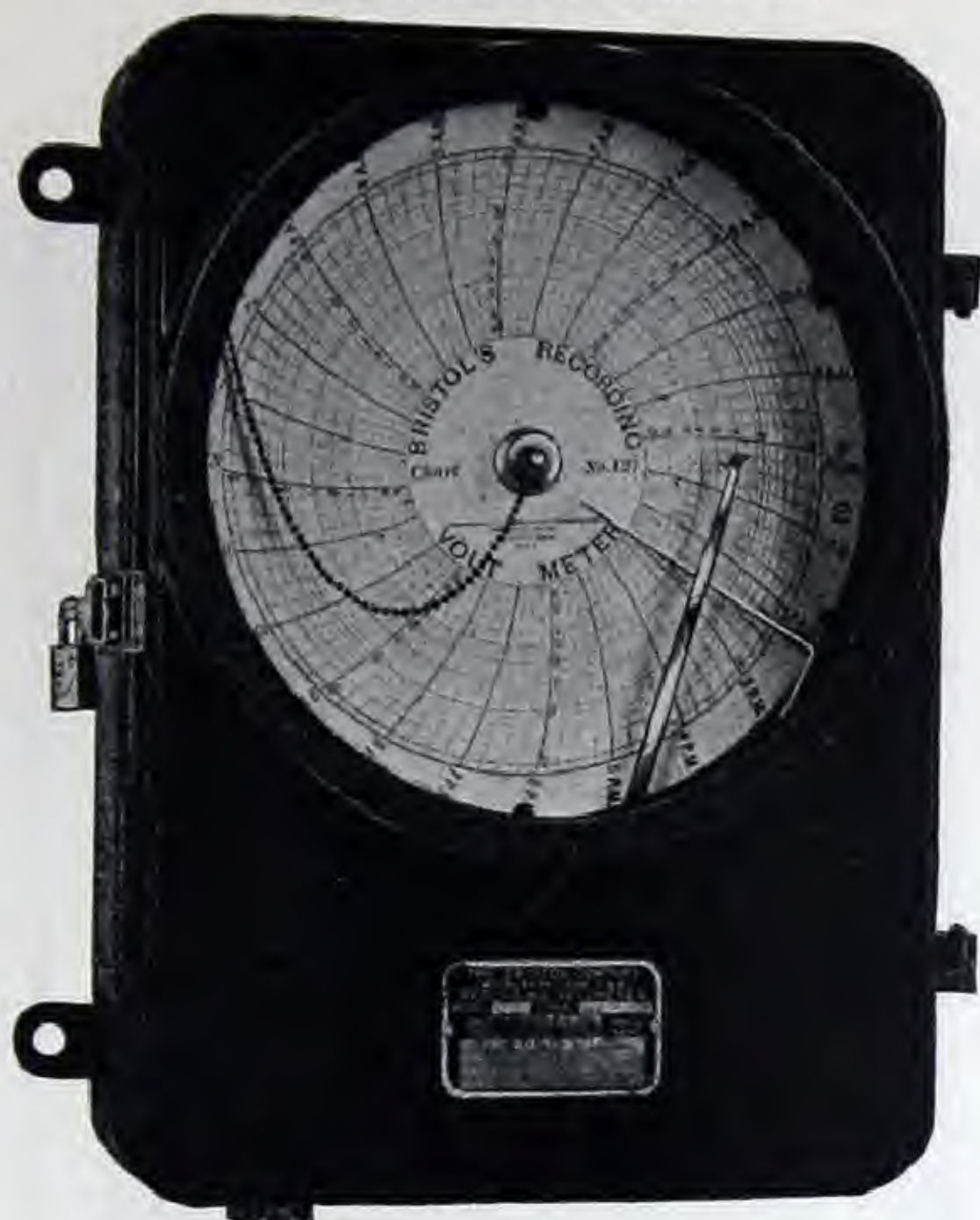
Chart No.	Increasing Scale	Amperes Range
1406	24 hr.	0-5
1469	7 da.	0-5
412	24 hr.	0-10
1474	7 da.	0-10
439	24 hr.	0-25
434	7 da.	0-25
453	24 hr.	0-50
1422	7 da.	0-50
417	24 hr.	0-100
413	24 hr.	0-150
407	7 da.	0-150
1417	24 hr.	0-200
1473	24 hr.	0-200
435	24 hr.	0-250
		0-300

Prices on application.

Triple phase or three separate round chart recorders in one case can be supplied. Prices on application.

BRISTOL'S ROUND CHART RECORDERS

Voltmeters for A.C. and D.C.



Switchboard and Wall Mounting
Specify—Front or Back Connected

Model 540M for wall mounting.

Model 540MF for flush, panel mounting.

Bristol's Recording Voltmeters are furnished for any commercial frequency and for a variety of operating voltages. Models 540M and 540MF cases provide compact mounting installations where space is limited. Increasing and uniform scale characteristic charts are available. Charts are 8" in diameter and can be supplied for daily or weekly rotation. Movements require approximately 35 volt amperes for operation. Range of 0-130 volts, 0-250 volts are popular, also 80-130 volts and 90-140 volts. Partial or set-up scales provide for uniform charts. Some charts are listed as follows:

Chart No.	Volts Range	Clock	Chart No.	Volts Range	Clock
127	0-130	24 hr.	265	80-130	24 hr.
131	0-130	7 da.	187	90-140	24 hr.
138	0-150	24 hr.	186	110-180	24 hr.
288	0-150	7 da.	226	175-300	24 hr.
121	0-250	24 hr.	221	0-500	24 hr.
299	0-250	7 da.	134	0-650	24 hr.
118	0-300	24 hr.	176	0-750	24 hr.

Extra for tap for additional frequency or D.C. adjustment.

Extra for double or triple range 300 volts and under.

Extra for double or triple range over 300 volts.

Transformers recommended for A.C. voltages and quoted on request.

Moisture-proof Model 555 for pole mounting 0-130 volts, increasing scale, 2 speed clock, adjustable lugs for connecting pole alignment, handle.

Other charts with higher range scales available when high ratio transformers are used.

Prices on application.

Ammeters for A.C. and D.C.

Switchboard and Wall Mounting
Specify—Front or Back Connected

Model 640M for wall mounting.

Model 640 MF for flush, panel mounting.

Bristol's Recording Ammeters are furnished regularly for 5 amperes for use with transformers on A.C. circuit. They can be used on commercial frequencies from 25-133 cycles without appreciable error. Approximately 6 watts power is required for operation. Charts are 8" in diameter.

Model 640M or 640MF self-contained for 5 amps. only.

Increasing Scale

Chart No.	Clock	Amperes Range
1406	24 hr.	0-5
1469	7 da.	0-5

Price on application.

BRISTOL'S ROUND CHART RECORDERS

Ammeters

For A.C. and D.C.



Switchboard and Wall Mounting
Specify—Front or Back Connected

Model 635

Bristol's Recording Ammeters are furnished regularly for 5 amperes for use with transformers on A.C. circuit or self-contained to 300 amperes for A.C. or up to 3500 amperes self-contained on D.C. They can be used on commercial frequencies from 25-133 cycles without appreciable error. Approximately 6 watts power is required for operation. Oil Damper is used. Increasing characteristics chart is available. Chart is 8" in diameter.

Some ranges are as follows:

Increasing Scale			Increasing Scale		
Chart No.	Clock	Amperes Range	Chart No.	Clock	Amperes Range
1406	24 hr.	0-5	407	7 da.	0-150
1469	7 da.	0-5	1417	24 hr.	0-200
412	24 hr.	0-10	1473	24 hr.	0-250
1474	7 da.	0-10	435	24 hr.	0-300
439	24 hr.	0-25	488	7 da.	0-300
434	7 da.	0-25	1402	24 hr.	0-500
453	24 hr.	0-50	433	24 hr.	0-1000
1422	7 da.	0-50	1402	24 hr.	0-2000
417	24 hr.	0-100	416	24 hr.	0-2000
413	24 hr.	0-150	1486	24 hr.	0-3000

Prices on application.

Extras and Additions Applicable to:
Models 640M, 640MF and 635 Ammeters.

Other charts with higher range scales available when high ratio transformers are used. Prices without transformers are obtained by reference to 5 ampere list above.

Moisture-proof Model 655 for pole mounting, 5 amperes, increasing scale, 2 speed clock, adjustable lugs for connecting pole alignment and handle.

Extra for Telechron clock. Prices on application

BRISTOL'S ROUND CHART RECORDERS

Frequency Meters



Switchboard and Wall Mounting
Specify—Front or Back Connected

Model 1240M for wall mounting.

Model 1240MF for flush Panel mounting.

Bristol's Recording frequency meters are furnished with 8" charts having a carbon coated surface which provides for a very fine and sensitive record of frequency changes. Charts ranged in cycles are available as follows:

Model No. 1240M or 1240 MF.

Chart No.	Range Cycles	Clock
4312	35-45	24 hr.
4307	55-65	7 da.
4309	55-65	24 hr.

Prices on application

General Data on Bristol's Round Chart Electrical Recorders:

All charts are 8 inches in diameter. Rectangular cases are illustrated but other types are available for particular requirements. Spring motor clocks are regularly furnished and are available in single and two speed types. The latter is desirable for test work, either to include several days' records on one chart or to provide a chart rotation as fast as once an hour.

Telechrons can be furnished if desired for these recorders at no extra charge.

Besides the Voltmeters, Ammeters, Wattmeters and Frequency Meters shown, other electrical recorders are available to record time—known as electrical operation recorders having one to eight pens in 8" size for recording elapsed time.

Bristol Speed or Tachometer Recorders

Speed Recorders—known as Tachometers using a Weston movement and magneto either as a single instrument or in combination as a recorder.

Information supplied on request.

Prices on charts, ink and accessories quoted on request.

BRISTOL'S ROUND CHART RECORDERS

Wattmeters

For A.C. and D.C.
Switchboard and Wall Mounting



Specify—Front or Back Connected

Model 735

Bristol's Recording Round Chart Wattmeters are regularly furnished with 8-inch size charts. Scale graduations are uniform. A variety of charts are available in ranges of watts and kilowatts.

Chart rotations of 24 hour and 7 day are standard but other speeds can be furnished for single or polyphase circuits. Current coils are wound for 5 amperes and potential coils for 100 volts. Higher voltages can be furnished self-contained, but transformers are recommended. Resistance can be furnished to take care of several potentials if desired. Each potential element requires 16 volt amperes and each circuit element 3 volt amperes at 100 volts for operation.

Formulae for calculating K.W. range.

For Single Phase

$$\frac{\text{Rated Amperage} \times \text{Rated Voltage}}{1000} = \text{K.W.}$$

For Polyphase

$$\frac{2 \times \text{Rated Amperage} \times \text{Rated Voltage}}{1000} = \text{K.W.}$$

Wattmeter with Transformers.

(a) Without potential transformers, but with current transformers capacity of instrument x Current Transformers Ratio = K.W. range of chart required.

(b) Without current transformers but with potential transformers, capacity of Instrument x Potential Transformer Ratio = K.W. range of chart required.

(c) With potential and current transformers. Capacity of Instrument x Current Transformer Ratio x Potential Transformer Ratio = K.W. range of chart required.

Note capacity of instrument for polyphase circuit at 100 volts and 5 amperes is 1 k.w. on 200 volts, 2 k.w., etc. On single-phase circuits one-half polyphase value should be used.

Wall or Switchboard type round chart recording wattmeter, polyphase model 735, 8" chart, 1 k.w. capacity at 100 volts and 5 amperes.

Add for 100 and 200 volt potential taps.

Single Phase, 100 volts and 5 amperes.

Add for 100 and 200 volt potential tap.

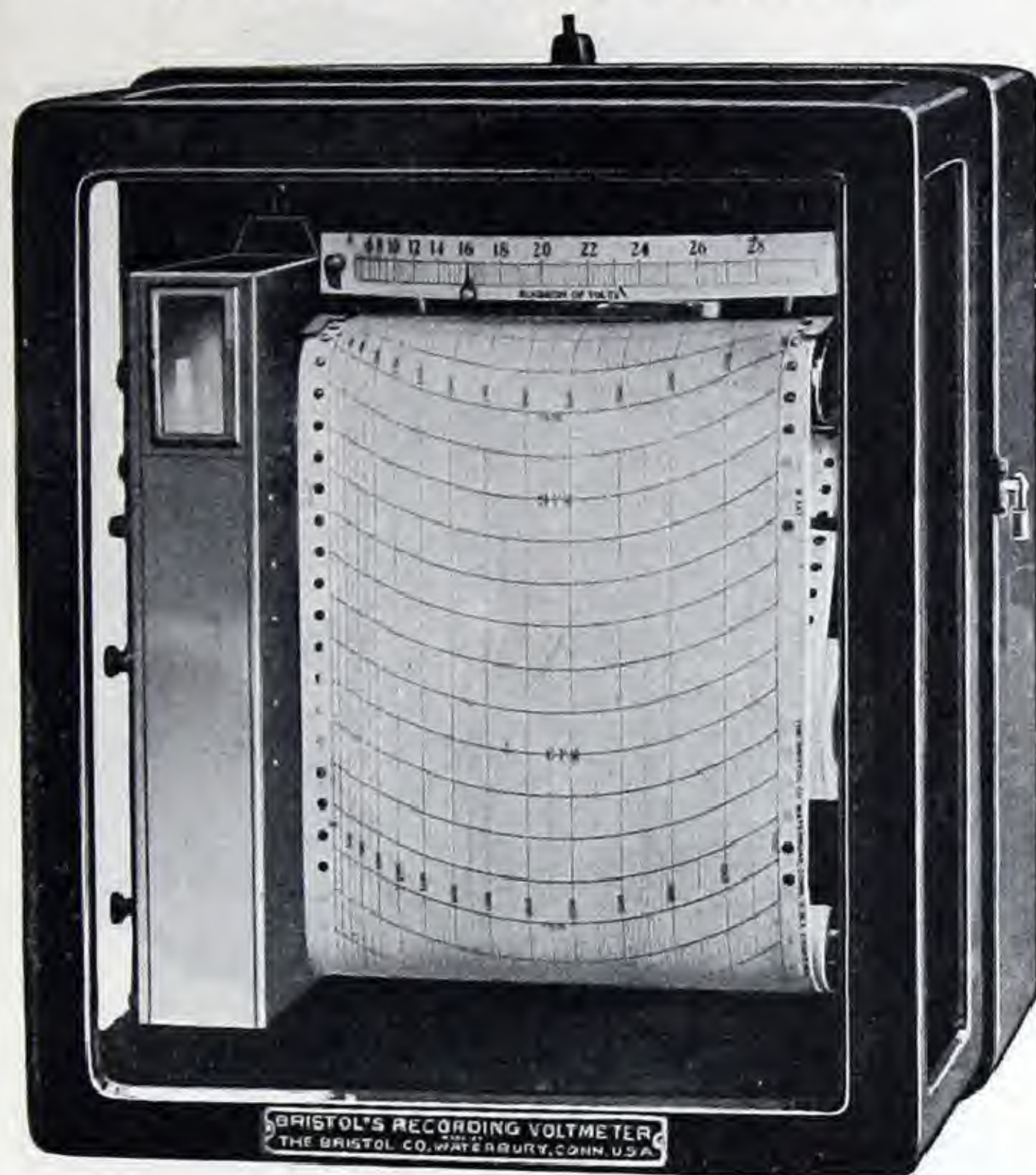
Extra for Telechron clock.

Prices on application.

Portable Model 712 single-phase only for round chart wattmeters prices on application.

BRISTOL'S STRIP TYPE RECORDERS

For Direct Current
VOLTMETERS—MILLIVOLTMETERS



Specify—Front or Back Connected
Portable, Switchboard or Wall Type

Model 525 Surface or Wall Type. Model 526 Portable Type

Minimum range offered 0-100 M.V. using a Weston direct marking movement and up to 750 volts maximum. For special requirements higher voltage can be furnished to order.

Several ranges can be furnished by means of taps to binding posts furnished for full scale ranges, also partial or set-up ranges and with zero in centre of scale. Required slightly over 1/10 ampere for operation and has uniform scale characteristics. No Flexible leads are supplied.

Also available with Dynamometer movement for D.C., but accuracy not better than 98%. Charts used on this movement have increasing scale characteristics. Minimum range 50 volts, maximum 750 volts, and can be furnished with several ranges. Requires 15 volt amperes at 100 volts for operation. No leads furnished.

For Alternating Current

A dynamometer movement is used. Minimum range offered is 50 volts. Maximum range unlimited if potential transformers are used. Can be furnished self-contained for voltages up to 750 volts, but normal maximum voltage offered for use with potential transformers is 100 volts. Can be furnished adjusted for several ranges and frequencies. Chart scale characteristic is increasing. Requires 15 volt-amperes at 100 volts for operation. No leads furnished.

Direct Current

Wall, Switchboard or Portable types with Weston movement up to 300 volts, spring motor clock..	Prices
Extra for zero centre.....	on
Extra for voltages over 300 to 750 volts.....	appli-
Extra for each range added under 300 volts.....	cation
Extra for each range added over 300 volts.....	
Extra for Telechron clocks.....	

Alternating Current

Wall, Switchboard or Portable types with Dynamometer movement up to 300 volts.....	Prices
Extra for voltages over 300 and up to 750 volts...	on
Extra for partial or set-up scale.....	appli-
Extra for Oil Damper.....	cation
Extra for each range added under 300 volts.....	
Extra for each range added over 300 volts.....	
Extra for Telechron clock.....	

Prices on transformers quoted on request.

BRISTOL'S STRIP TYPE RECORDERS

For Direct Current
AMMETERS



Specify—Front or Back Connected
Portable, Switchboard or Wall Type

Model 625 Switchboard or Wall Type. Model 626 Portable Type

Minimum range offered 0-1/10 ampere using a Weston movement. Shunts are used and maximum range depends on capacity of shunt in service or required for load conditions. Shunts having a 100 millivolt drop for full scale deflection are required. Chart provides for a uniform scale. Several shunts may be used with suitable switches on one instrument. Can be furnished with set-up or partial scales or zero centre scale if desired. Movement used requires only 5/100 amperes for operation.

Alternating Current

Although dynamometer movement can be used on D.C., the best accuracy is obtainable on A.C. Minimum range offered is 0-5 amperes although for special requirements can be used on 0-1 amperes. Maximum range is governed by ratio of transformer used. Self-contained range of 5 and 10 amperes can be furnished if desired.

Operation requires 8 watts at 60% power factor.

Direct Current

Wall, Switchboard or Portable types with Weston movement, not including shunts, spring motor clock.....	Prices
Extra for zero centre.....	on
Extra for set-up or partial scale.....	appli-
Extra for Telechron clock.....	cation

Alternating Current

Wall, Switchboard or Portable types with dynamometer movement, 5 amperes for use with transformers.....	Prices
Extra for Oil Damper.....	on
Extra for 5 and 10 ampere self-contained.....	appli-
Extra for Telechron clock.....	cation

Prices on transformers quoted on request.

BRISTOL'S STRIP CHART RECORDERS

For Alternating Current

Wattmeters



Portable, Switchboard or Wall Type
Specify—Front or Back Connected

Model 725 Switchboard or Wall Type. Model 726 Portable Type

Furnished with polyphase movements with normal 100 volt potential and 5 ampere current coils. Can be furnished with potential coil for 200, 400 and 500 volts. Potential transformers are recommended for all high voltages. Maximum current range is within the ratio of current transformers used.

Require 10-volt amperes for operation of potential circuit and 3-volt amperes for current circuit. Several potential ranges can be taken care of by using proper potential transformers or by proper resistance taps. Can be furnished with zero centre chart if desired. Can be used on any commercial frequency up to 133 cycles without inaccuracy of more than 1%.

Polyphase movements can be used on single phase two or three wires, or two phase, four wires with and without transformer, depending on load to be recorded. Charts are available reading from 0-500 watts up to 30,000 k.w.

5 amperes and up to 300 volts, wall, switchboard or portable types, spring motor clock.

Extra for polyphase 110 and 220 volts.

Extra for polyphase over 300 volts, but not exceeding 550 volts.

Extra for 10 ampere current coils, polyphase.

Extra for Oil Damper.

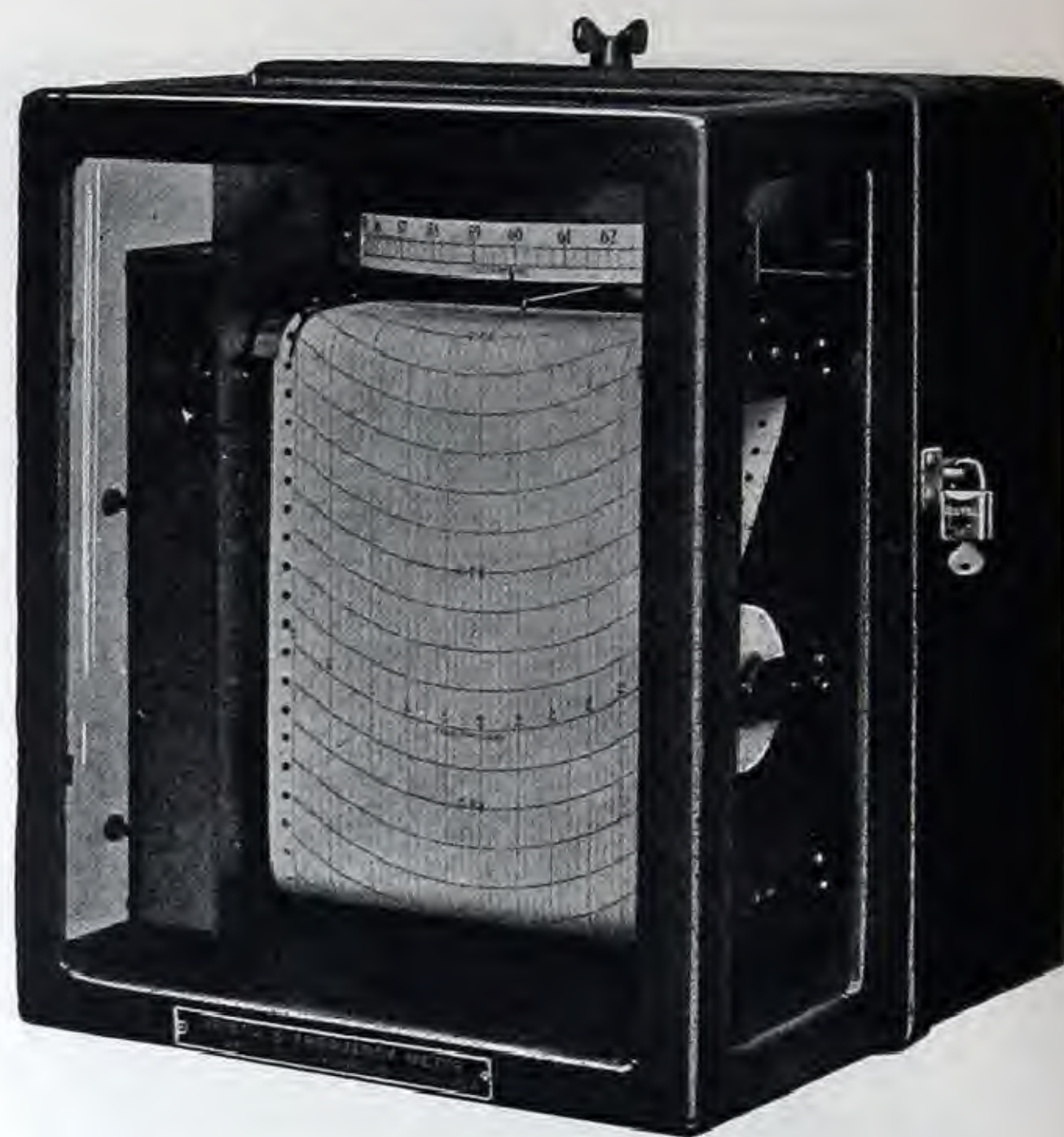
Extra for Telechron Clock.

Prices on application.

Prices on current and potential transformers quoted on request.

BRISTOL'S STRIP CHART RECORDERS

Frequency Meters



Model 1225 Switchboard or Wall Type
(Specify which)

Ranges of frequency in cycles of 55-75 and 35-45 are maximum and minimum values available. Furnished regularly for use on 110 volts. For higher voltages transformers of proper ratio are furnished. A direct marking ink recording system is used.

Charts

S-4311	45-55 cycles.....	3" per hour
S-4312	55-65 cycles.....	3" per hour
S-4316	57-67 cycles.....	3" per hour
S-4315	57-67 cycles.....	1" per hour

Wall or Switchboard types, spring motor clock for 110 volts.

Extra for Telechron Clock.

Prices on application.

BRISTOL'S STRIP RECORDER DATA

Indicating scale is furnished. Pen arm is provided with index so that reading can be observed at a distance. Charts are 90 feet in length, six inches wide and have effective scale width of $5\frac{1}{4}$ inches.

Clocks are furnished spring motor type or Telechron operated. Standard speeds for spring motor clocks are one, three and six inches per hour. Spring clock is made to provide same speed in inches per minute by a simple shift device. Telechron clocks are available for hour speed only or minute speeds only from six inches per minute up.

Rewind for chart is regularly furnished with spring motor clock, but is furnished to order with Telechron operated clocks. Oil damper is furnished on D.C. movement or to order with A.C. Ink filler, ink, clock key, padlock and two keys, chart directions and wiring diagrams are supplied with each instrument.

Cases for wall or switchboard mounting or portable use are available for all types of movements.

Prices on charts and accessories quoted on request.

SPEEDWAY ELECTRIC DRILLS

1/4 Inch Capacity in Steel



No. 53-C

Steel body is finished in chromium.

With oilless, self-aligning bearings, open grip handle, 1/4-inch keyless chuck and universal motor. Furnished with 8-foot rubber-covered cable and separable plug.

Over all length, 13 inches. No load speed, 2000 r.p.m. Normal load speed, 1200 r.p.m. Weight, 5 1/2 pounds.

List No. 53-C.....List Price, each \$27.00

5/16 Inch Capacity In Steel



No. 56-C

Steel body is finished in chromium.

With oilless, self-aligning bearings, closed grip handle, 5/16-inch keyless chuck and universal motor. Double gear reduction. With 8-foot rubber-covered cable and plug.

Over all length, 13 inches. No load speed, 1500 r.p.m. Normal load speed, 900 r.p.m. Weight, 6 1/2 pounds.

List No. 56-C.....List Price, each \$33.35

3/8 Inch Capacity in Steel

Made of steel, chromium finish.

With oilless, self-aligning bearings, keyless chuck, ball-bearing thrust, quick-make-and-

quick break trigger switch, large cooling fan and universal motor. With 8-foot rubber-covered cable and plug.

Over all length, 14 inches. Breast plate, 3/8 inch.

Weight, 8 pounds.

No. 57-C

List No. 57-C List Price, each..... \$46.50

1/2 Inch Capacity in Steel

Made of steel, chromium finish. With oilless, self-aligning bearings, 1/2-inch keyless chuck, ball-bearing thrust, quick-

make-and-break trigger switch, large cooling fan,

breast plate and universal motor. With 8-foot rubber-covered cable and plug. Over all length, 15 inches.

No load speed, 500 r.p.m. Normal load speed, 300 r.p.m.

Weight, 12 1/2 pounds.

List No. 60-C. List Price, each.....\$60.50

No. 60-C

SPEEDWAY PORTABLE DRILLS

Heavy Duty

Of ball bearing construction.

Operates on both AC and DC. Heavy duty switch, toggle type.

Jacobs 3-jaw key type chuck and chuck key; 8-foot heavy rubber lead cord with indestructible soft rubber split plug connection. Specify voltage when ordering.

No. 90

rubber lead cord with indestructible soft rubber split plug connection. Specify voltage when ordering.

List No.....	88	90	92
List Price.....	\$66.75	\$69.75	\$77.50
Capacity in Steel, inches.....	1/4	5/16	3/8
No Load Speed, r.p.m.....	1450	1100	850
Drilling Speed, r.p.m.....	875	650	500
Gear Reduction.....	13 to 1	17 to 1	22 to 1
Length Over All, inches.....	14	15	15
Weight, pounds.....	8	8 1/2	9

SPEEDWAY ELECTRIC DRILLS

1/2 Inch Capacity in Steel

Has a wood drilling capacity of 1 inch holes or better; average reaming capacity, 7/16 inch.

Has oversize 110 volt universal motor. Heavy duty trigger switch in side handle. Ball bearing construction.

With Jacobs Chuck, chuck wrench, 8-foot lead cord and plug.

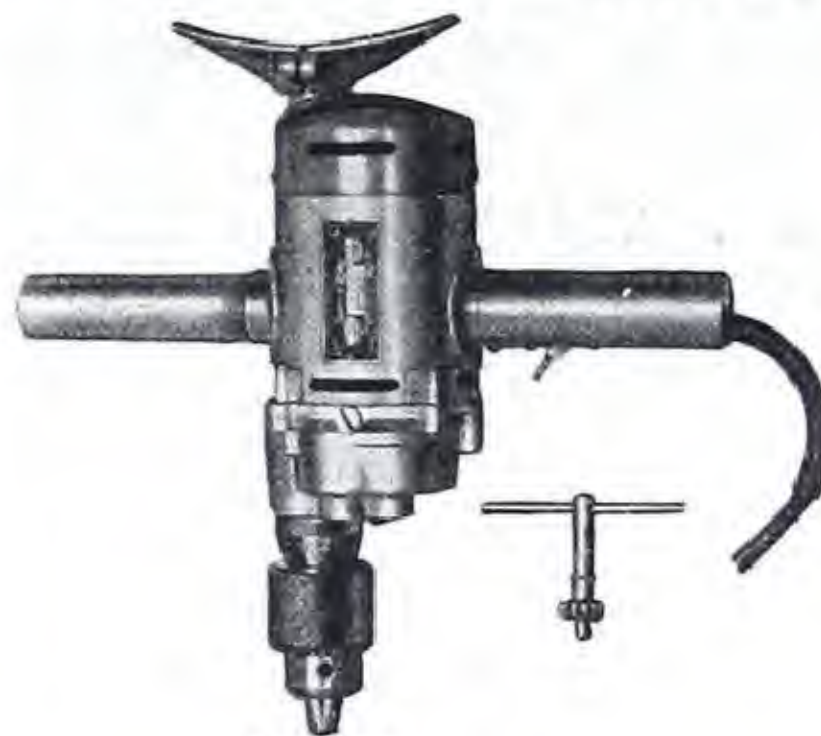
Length, 14 inches. Speed r.p.m. load, 350; no load, 700.

Weight, 14 pounds.

List No. 59

each..... \$100.75

List No. 220 Drill Stand, each..... \$34.90



No. 59

SPEEDWAY MASTER ELECTRIC DRILLS

CAPACITY IN STEEL

TYPE 94— 5/8 Inch

TYPE 95— 3/4 Inch

TYPE 96— 7/8 Inch

TYPE 97— 1 1/4 Inches

Reaming capacity averages 75 per cent of drilling capacity in steel. Capacity in wood ordinarily runs double capacity in steel and over.

Heavy duty trigger switches can be locked on contact. With 110-volt universal motor, 8-foot lead cord and plug.

No. 97

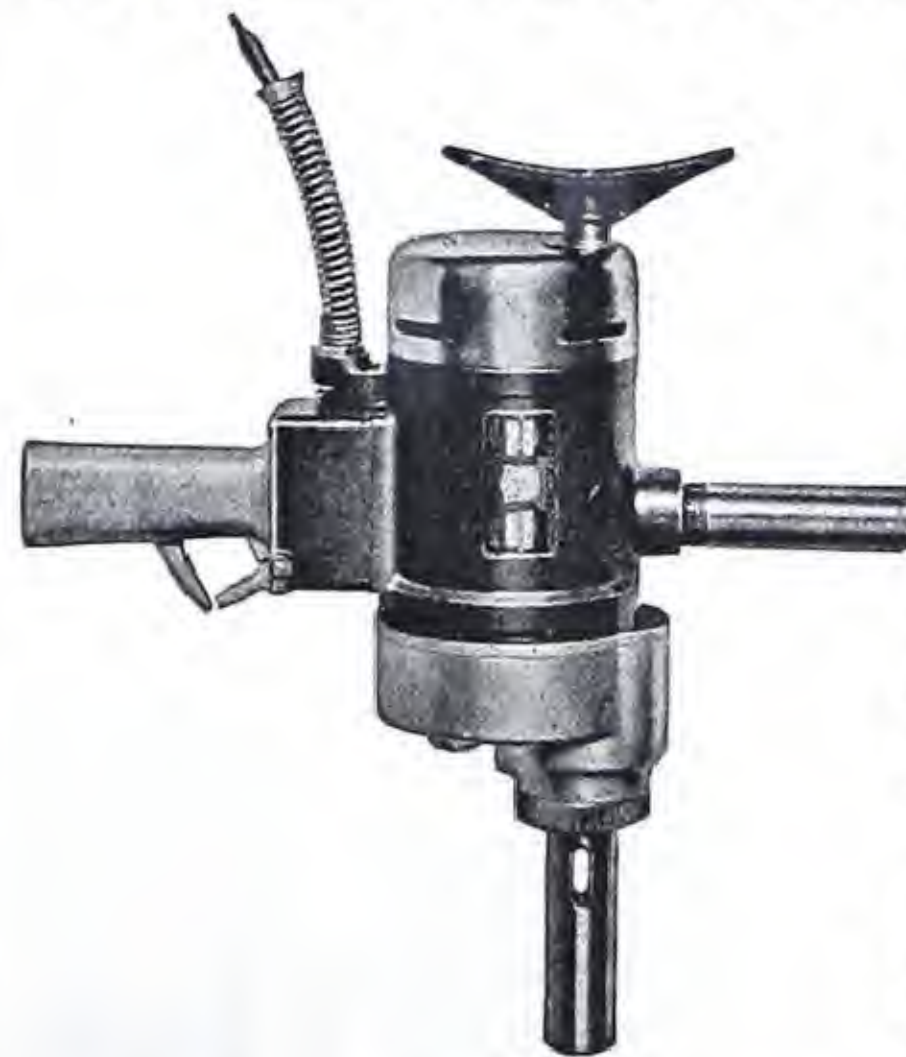
List Nos. 94 and 95 with Jacobs Chuck and Chuck Wrench; List Nos. 96 and 97 with Nos. 2 and 3 Morse Taper Sockets.

List No.	List Price Each	Cap. in Steel In.	Lgth. In.	Load Speed R.P.M.	No Load Speed R.P.M.	Wt. Lbs.
94.....	\$124.00	5/8	17 1/2	300	500	23
95.....	131.75	3/4	18	250	450	24
96.....	147.00	7/8	18 1/2	200	370	28
97.....	178.25	1 1/4	19	180	300	28

1/2-Inch Jacobs Chuck on Morse Taper Arbor for Morse Taper Sockets, for Nos. 96 and 97, List

Price, each..... \$15.50

List No. 223 Drill Stand, List Price, each..... 54.25



SPEEDWAY PORTABLE HAMMERS

110 Volts



No. 6

Primarily built for drilling into concrete, stone, brick, etc., light chipping, channeling, scaling and other uses where a great number of blows is required.

Operates at about 15 per cent of the power cost of operating air tools and without the expense and inconvenience of compressor, air piping hose, etc. Over handwork, the economy is from 80 to 90 per cent. Every tool is controlled by a switch mounted in the handle and equipped with flexible cord and plug. They may be attached to any lamp socket.

A man drilling by hand strikes from 40 to 65 blows per minute, this hammer, 1800 blows per minute. Power cost is negligible, about 15 cents a day for ordinary work. The hammer element is at all times free from the motor and the strength of the blow is constant. Cannot overload the machine, no burning out of armatures.

Drills $1\frac{1}{4}$ -inch diameter hole in concrete or soft stone, and drills 2 inches deep per minute.

Operated on both AC and DC. Watts, 275.

Weight, No. 6, 26 lbs; No. 10, 16 lbs.

List No. 6, $1\frac{1}{4}$ " Capacity, List Price, each \$225.00

List No. 10, $\frac{3}{4}$ " Capacity, List Price, each 147.25

Add \$1.55 for 220 or 32 volts.

For drilling speed in brick multiply by 2. For drilling speed in granite divide by 2 and use diamond drills.

Electric Hammer Stands

Useful for ceiling drilling, taking the strain off the operators.

List No.....	46	46S
List Price, each.....	\$54.25	\$31.00
Length Feed, inches.....	8	8
Minimum Height.....	7' 6"	5'
Maximum Height.....	12'	7' 8 $\frac{1}{2}$ "

Steels For Hammers

The Star drill is especially adapted for working in concrete, brick and soft stone and is regarded as the standard tool for practically all purposes.

4-Point Star Drills, Bull Points, Chisels, Blanks, and Diamond Points

For No. 6 or No. 10 Hammers. Class A.

These sizes are standard.

Dia. In.	List Prices Per Dozen						
	Drilling Length, Inches						
	5	8	12	18	24	36	48
$\frac{3}{8}$ or							
Under	\$24.80	\$29.45	\$32.55	\$37.20			
$\frac{7}{16}$	26.35	29.45	32.55	37.20			
$\frac{1}{2}$	29.45	32.55	34.10	38.75			
$\frac{9}{16}$	31.00	32.55	34.10	38.75			
$\frac{5}{8}$	31.00	32.55	34.10	38.75			
$\frac{3}{4}$		34.10	35.65	40.30	\$46.50		
$\frac{7}{8}$		34.10	37.20	41.85	48.05		
1		35.65	38.75	43.40	49.60	\$60.45	
$1\frac{1}{8}$		37.20	40.30	44.95	52.70	62.00	\$71.30
$1\frac{1}{4}$		38.75	41.85	46.50	54.25	63.55	72.85

Bush Hammers

For No. 6 or No. 10 Hammer. Class A.

List Price, each..... \$7.75

Channeling Tools

For No. 6 or No. 10 Hammer. Class A.

List Price, each..... \$4.65

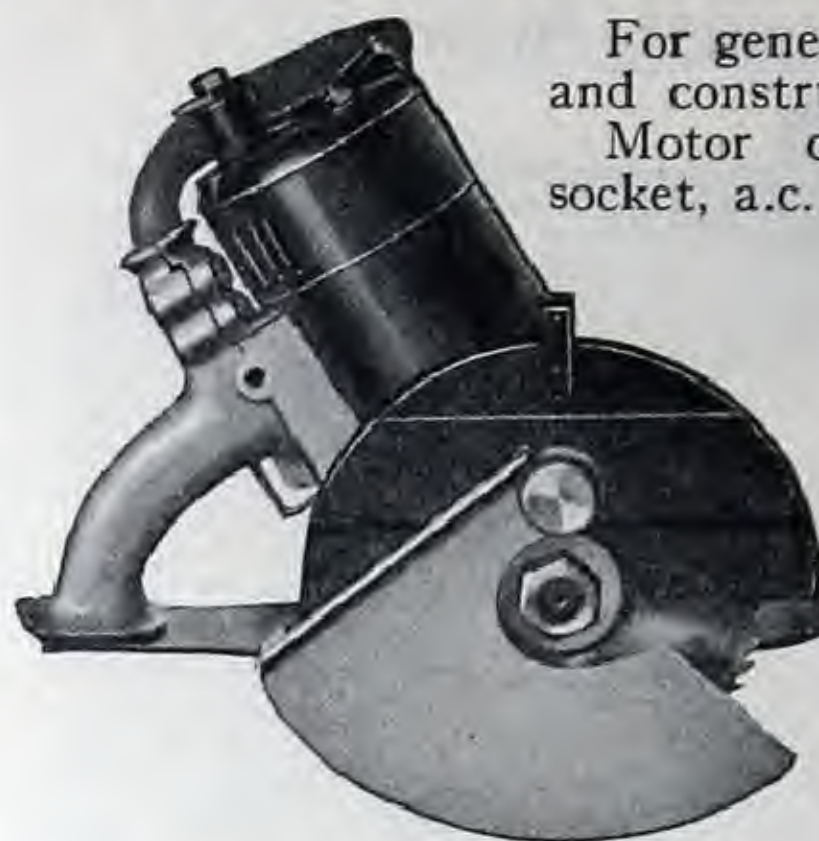
Mill Pick Chisels

For No. 6 or No. 10 Hammer. Class A.

List Price, each..... \$5.45

Prices on special tools upon application.

SPEEDWAY PORTABLE ELECTRIC SAWS



No. 175

For general maintenance, carpentry and construction.

Motor operates from any light socket, a.c. or d.c.

Equipped with 8 feet heavy rubber covered lead cord with soft rubber indestructible split plug connection. Choice of either rip or cross cut blade. A 6-inch blade provides cutting capacity up to $1\frac{3}{4}$ inches. A 7-inch blade with cutting capacity of $2\frac{1}{4}$ inches at extra cost.

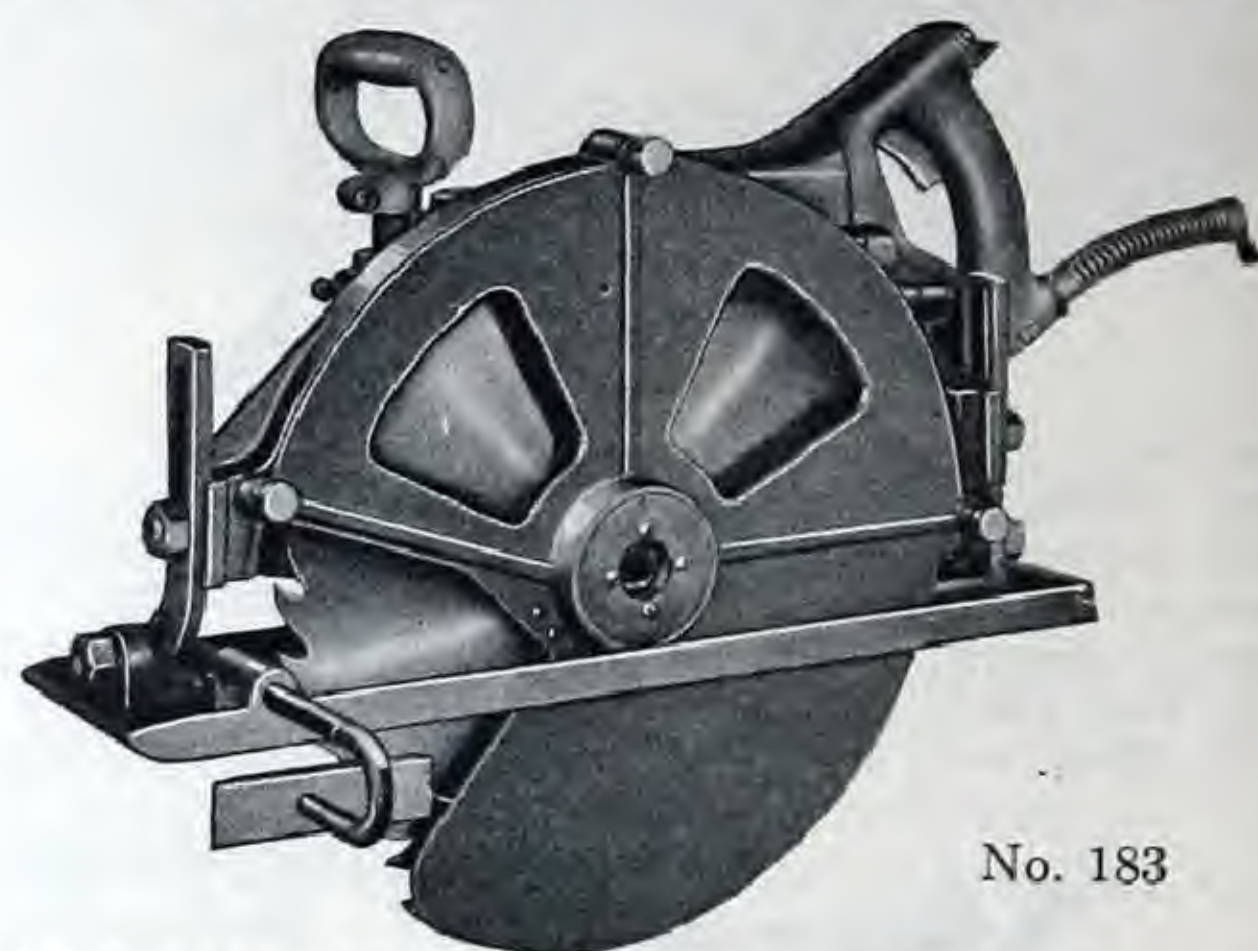
Length over all, 15 inches.

Weight, 15 pounds. Speed, 3800 r.p.m.

List No. 175, 110-Volt..... List Price, each \$60.50

List No. 175, 220-Volt..... List Price, each 62.00

List No. 175, 32-Volt..... List Price, each 62.00



No. 183

Slipper plate can be raised or lowered for adjustment of depth of cut. A ripping guide is mounted on the front of the slipper plate to facilitate long cuts.

Each machine is furnished with a light frame which permits the saw to be turned up side down and used as a table saw. Base plate tilts 45° to cut bevels.

Swinging saw guard automatically pushes out of the way when cutting pressure is applied and returns to position when pressure is released.

The machine is fitted with ball bearings. All gears and shafts are made from heat treated chrome nickel steel.

Furnished complete with necessary wrenches and a carrying case. Runs on either a.c. or d.c.

List No.....	183	184	185
List Price, each.....	\$302.25	\$248.00	\$209.25
Size of Blade, inches.....	12	10	8
Size of Cut, inches.....	$4\frac{3}{8}$	$3\frac{3}{8}$	$3\frac{5}{8}$
Motor, h. p.....	1	$\frac{3}{4}$	$\frac{3}{4}$
No Load Speed, r.p.m.....	1750	1800	4600
Weight, pounds.....	30	25	25

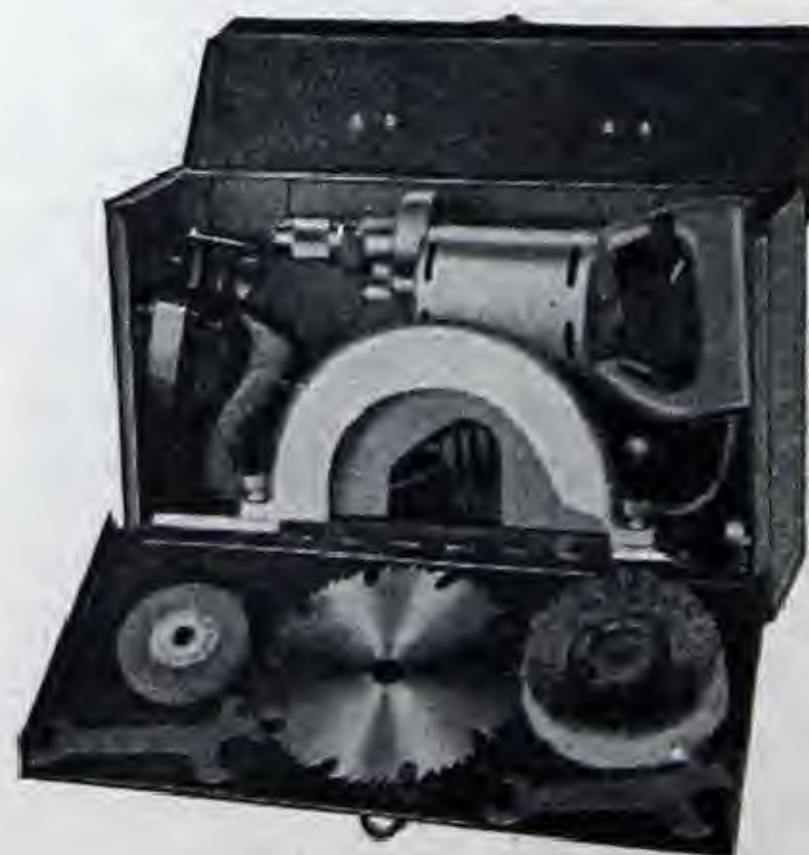
SAW KIT

For use with Nos. 53 and 56 Drills

Universal Motor

Five power driven portable electric tools are built into this kit. One power unit is adapted to all 5 to make an attractive price for so practical a set.

The set includes a portable saw, grinding wheel, buffer, scratch brush, motor stand, accessory arbor and steel carrying case. List No. 281. List Price, each (Drill extra) \$23.25



No. 281

SPEEDWAY SCREW-DRIVERS AND NUT-TIGHTENERS

This is a light and compact driver for small and medium sized screws. A simple change from screw-driver tang to nut-socket converts it into nut-tightener.

Housing is of drawn steel, electrically welded to handle.

The motor operates on both A.C. and D.C.; 32, 110, or 220 volts. Quick make and break switch, return spring type.

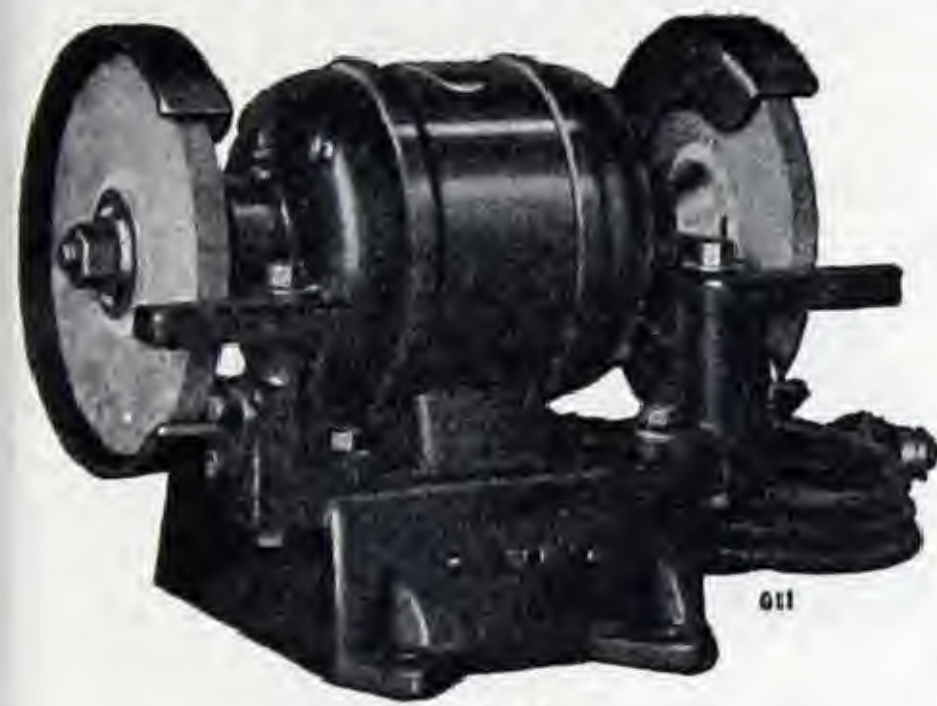
Capacity, No. 16 screws up to 2½ inches.

List No.	155	156
List Price, each	\$100.75	\$116.25
No Load Speed, r.p.m.	700	700
Driving Speed, r.p.m.	375	375
Clutch	Positive Drive	Positive and Slip Drive
Gear Reduction	26 to 1	26 to 1



No. 156

SPEEDWAY BENCH GRINDERS



No. 122

Oversize shaft and dust-proof ball-bearings are features of this tool.

Operates two 6-inch grinding wheels at 3500 r. p. m. Wheels are well guarded. Has adjustable tool rests.

Equipped with ¼-h.p. A.C. motor, 110 or 220 volts, not universal.

Weight, 39 lbs.

List No. 122, A.C. only, 110 volts	List Price..	\$31.00
Add for 32 or 220 volts		1.55

SPEEDWAY TOOL POST GRINDERS

Universal Motor



No. 108

Type 108 is a precision grinder combining correct speed with accuracy and ample power. Ball-bearing throughout. Speed of bare grinder is 10000 r.p.m.

Standard equipment includes one 2½- and one 4½-inch grinding wheels. Specify voltage.

List No. 108, List Price, each	\$54.25
Add \$1.55 for 32 or 220 volts.	

EXTRA EQUIPMENT FOR NOS. 108 AND 110 GRINDERS

List Price, A, Arm for 3" Internal 30000 r.p.m., each	\$31.00
List Price, D, Arm for 5" Internal 10000 r.p.m., each	31.00
List Price, B, Arm for 10" Internal 10000 r.p.m., each	46.50
List Price, E, Arm for 15" Internal 10000 r.p.m., each	54.25
List Price, C, Arm for Button Die Grinding, each...	54.25

SPEEDWAY PORTABLE DRILL STANDS

The usefulness of a portable drill is greatly increased with the added equipment of a drill stand as shown here.

This stand insures perfect alignment and makes drilling a much easier job. A type for each drill is available.

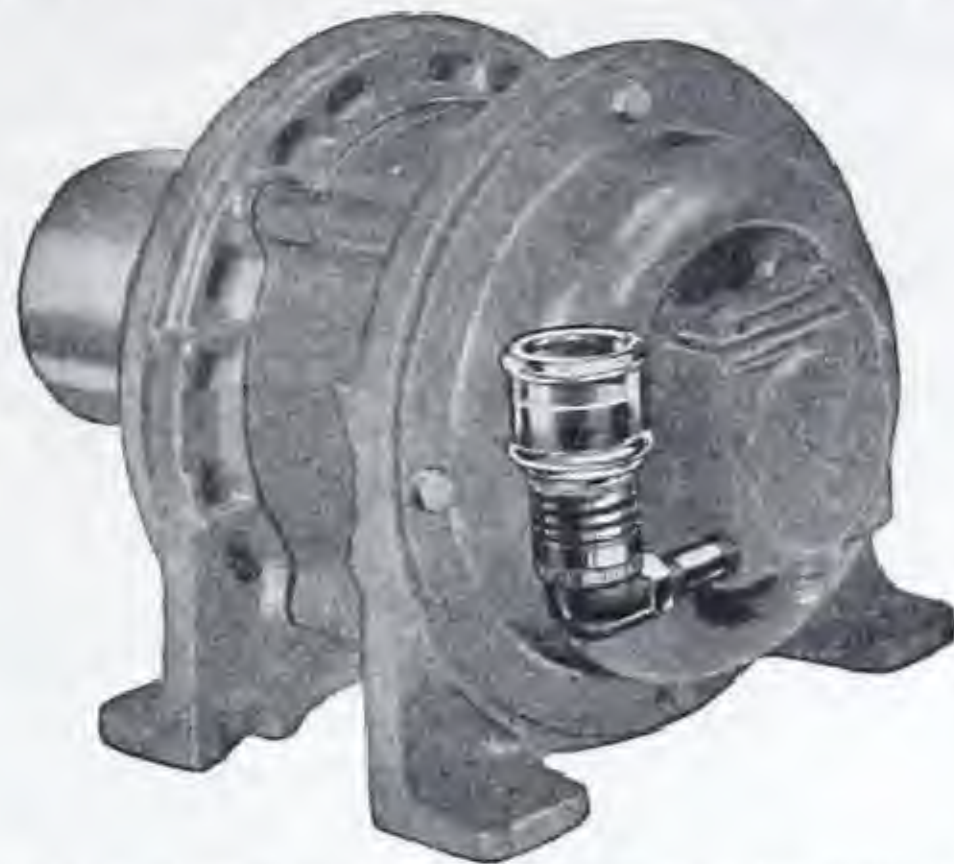
List No.	Class	For Use With Drills Types	Wgt. Lbs.	List Price
212...	B	53, 56, 57C	9	\$15.50
214...	B	60C	40	24.80
220...	A	59	41	34.90
221...	A	88, 90, 92	35	34.90
223...	A	94, 95, 96, 97	60	54.25



No. 214

SPEEDWAY OILERS

Types A and B Constant Level Oilers



Showing Type A Oil Bearing Installed

For ring-oiled and waste-packed bearings.

The oil level in the bearing is held at the same height as the opening of the short tube in inverted bottle cap. As soon as the oil gets below this level air enters the jar through this tube, and oil flows out through long tube until level is raised enough to again seal the air opening in the short tube. The oil level cannot vary more than a slight fraction of an inch.

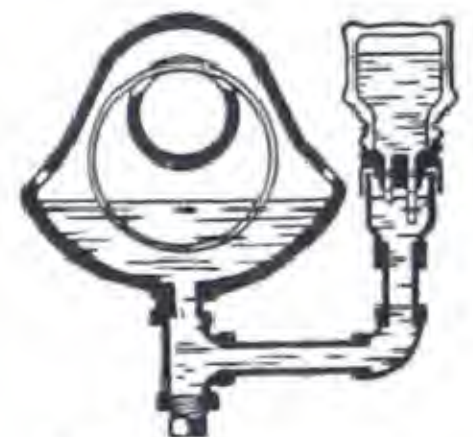
This oiler doubles the capacity of the oil reservoir, so bearings need inspection only half as often. Inspection is simplified and speeded up.

No oil is wasted by this oiler. Every drop goes to the bearing when it is needed.

A glance at the glass tells if oil level is correct. If not, the bottle can be refilled and replaced in an instant. Keep oil in the bottle and the level cannot vary.

Type A oilers are quickly and easily installed on most ring-oiled bearings by connecting directly to the side oil opening.

Type B oilers are used on ring-oiled bearings not having a side opening. They are connected as shown in illustration at right.



For Ring-Oiled Bearings Bottom Opening

List No. A or B, 1-oz. Oil Cap	List Price, Each, \$1.90
List No. A or B, 3-oz. Oil Cap,	List Price, Each, \$1.95

TYPE T THERMAL OILER

For plain sleeve bearings.

When Speedway Thermal Oilers are used on machine bearings it means fewer repairs, longer life and less depreciation.

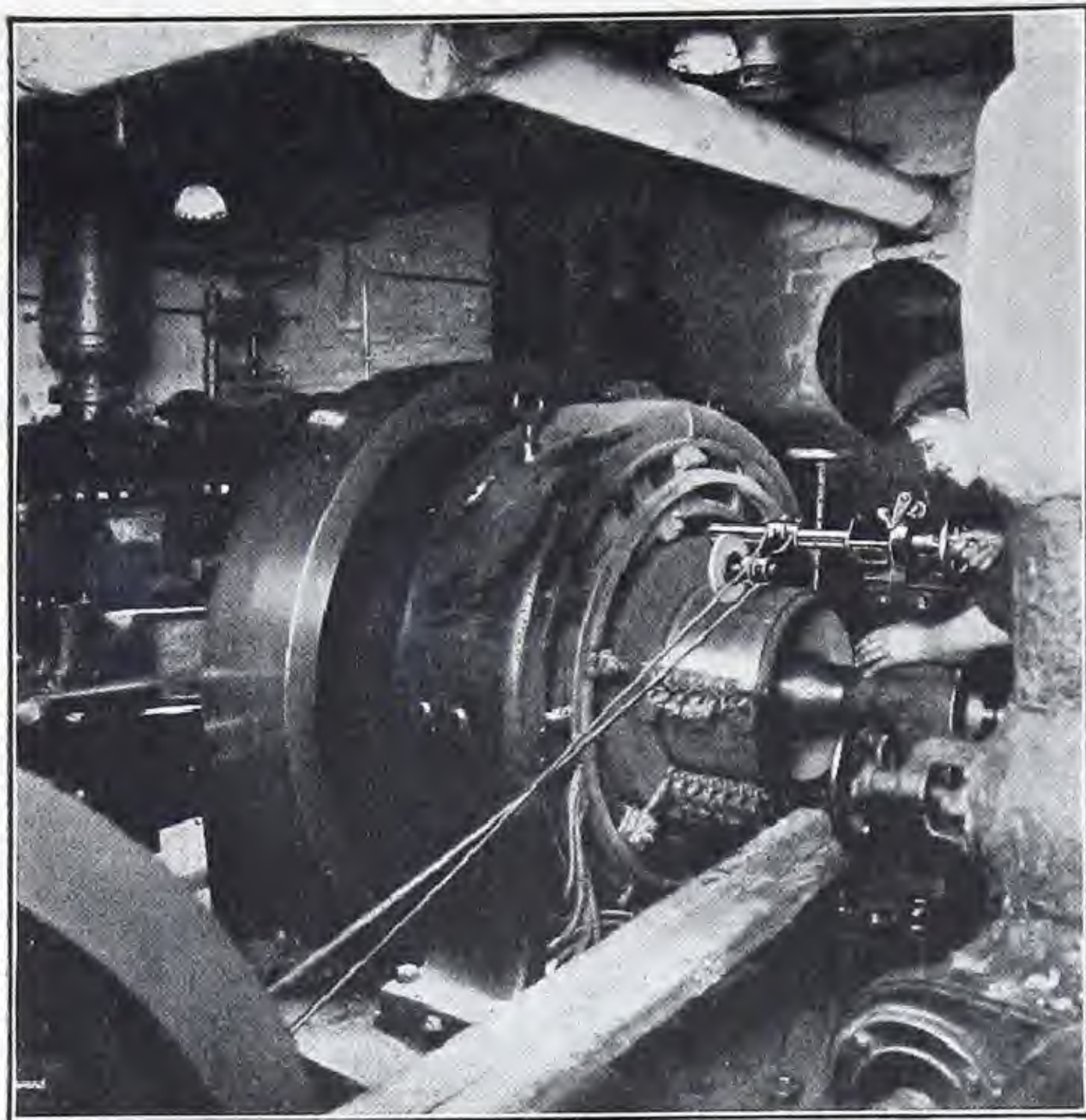
Oilers are entirely automatic and are so sensitive to the varying needs of a bearing that they operate on a temperature change of 2 degrees.

Main oil supply is held in the glass bottle A from which it flows as needed to the thermal chamber B. Any slight rise in temperature of bearing is communicated to air imprisoned in B, which expands, forcing oil out of small opening C. Ratio of air and oil in chamber B is always the same, thus insuring uniform operation.



List No. T-1 Oiler, 1-oz size, Glass Containers, List Price each	\$2.70
List No. T-3 Oiler, 3-oz. size, Glass Containers, List Price each	\$3.00

JORDAN COMMUTATOR TRUING DEVICE



Generator being trued with "Type J" device, standard pedestal holder on outboard bearing.

The Jordan Truing Device will true commutators and slip rings without removing the armature or rotating field from the machine. No time and labor are wasted to remove armature and replace same as is necessary for turning in lathe. Since the Jordan equipment uses a grinding wheel in place of a steel tool, all danger of digging into commutator is eliminated. A small film of copper may be removed, no copper is wasted by taking large cuts. Copper will not be dragged across from bar to bar, whether commutators are flush mica or undercut. Causes for short circuits are thus removed. The Jordan device will allow the armature to rotate in its own bearings at its regular operating speed and under its own power.

The type G device for commutator length of 6 to 9 inches is fastened to the brush yoke. It is especially desirable for smaller machines, elevator motors, small turbine generators and enclosed motors where space is limited.

The type E device for commutator length of 12 to 14 inches is used on larger machines, such as medium size belted and direct connected generators and motors. It is usually attached to the pedestal of machine.

The type J equipment is the most widely used and is recommended for all large machines, turbo generators, large direct connected machines, rotaries, synchronous motors, etc. It may be attached to either pedestal, rocker arm or frame of machine, depending upon conditions.

	List Price
Type G	
6" Face Commutator.....	\$100.00
9" Face Commutator.....	110.00
Type E	
12" Face Commutator.....	140.00
14" Face Commutator.....	150.00
Type J	
9" Face Commutator.....	135.00
12" Face Commutator.....	155.00
15" Face Commutator.....	170.00
18" Face Commutator.....	185.00
20" Face Commutator.....	195.00
24" Face Commutator.....	210.00
28" Face Commutator.....	225.00

Quotations include compound holder, round belting, 1 wheel, no motor included.

Type J Device is for use on motors and generators with high flange around bearing casing and is furnished with a special set of holders so that same can be used on any type of generator.

The extra holder for 9" and 12" Devices for use on above type machines \$30.00 and for larger size holders, \$45.00.

Special Idler with mule pulley stand for use on generators on which the brush holder ring overlaps the Commutator, and prevents the belt from travelling straight across the face of the commutator. List Price \$90.00.

CORRUGATED SWITCHBOARD MATTING



Switchboard Matting is especially adapted for use where high voltages are encountered. It is black, blooming stock, specially screened to remove all impurities. Same can be supplied with either plain or corrugated surfaces. Recommended thicknesses of mattings for the various mattings are as follows:

Thickness	Volts up to	List Price Per Sq. Ft.
1/4"	40,000	1.35
3/8"	60,000	2.16
1/2"	80,000	3.00
5/8"	100,000	3.75
3/4"	120,000	4.50

SWITCH HANDLE COVERS



Switch Handle Cover for high tension switches and handle covers, 1 1/8" inside diameter up to 8" in length. One or both ends open.

Switch Handle Covers, each, 35 cents.



Northern Electric Power Apparatus Specialists in 16 cities across the country assure Power users of a reliable source of information and assistance at all times.



IDEAL MOTOR MAINTENANCE EQUIPMENT

Commutator Resurfacers

Specify thickness, 2 to 6 inches.

Made in five grades: extra coarse, coarse, medium, finish and polish.



Knob Handle



Adjustable Handle



Tramway Handle



Vertical Adj. Handle



Railway Handle

(Specify Type Required)

L'gth	W'th	L'gth	W'th
2" x 1 1/2"		3" x 3"	
2" x 2"		4" x 1 1/2"	
3" x 1 1/2"		4" x 2"	
3" x 2"		4" x 3"	

(Specify thickness and grade)

Slip Ring Types



L'th	W'th
4" x 1"	
4" x 1 1/2"	
4" x 2"	
5" x 1 1/2"	
5" x 2"	

L'th	W'th
5" x 3"	
6" x 1 1/2"	
6" x 2"	
6" x 3"	
7" x 2"	
7" x 3"	
8" x 2"	

L'th	W'th
8" x 3"	
10" x 2"	
10" x 3"	
12" x 2"	
12" x 3"	
14" x 2"	
14" x 3"	

(Specify thickness and grade)

IDEAL MOTOR MAINTENANCE EQUIPMENT

Commutator Resurfacers

Specify thickness; 2 to 6 inches

Made in five grades: extra coarse, coarse, medium, finish and polish.



Fan, Auto or Small Motor Type
Standard Size: 3/4" x 1 1/2" x 3/8"



Pencil type (No handle)
Standard size: 6" x 5/8" x 3/8"



Straight Handle Types
L'th W'th L'th W'th
1" x 1" 2" x 1"
1 1/2" x 1 1/2" 3" x 1"
(Specify thickness and grade)

Double "U" Handle



L'th	W'th
7" x 5"	
8" x 5"	
8" x 6"	
8" x 8"	
9" x 5"	
9" x 6"	

L'th	W'th
10" x 4"	
10" x 5"	
10" x 6"	
10" x 8"	
12" x 4"	

L'th	W'th
12" x 5"	
12" x 6"	
12" x 8"	
14" x 4"	
14" x 6"	

L'th	W'th
14" x 8"	
16" x 6"	
16" x 8"	
16" x 10"	

(Specify thickness and grade)

"U" Handle



L'th	W'th
4" x 4"	
5" x 2"	
5" x 3"	
5" x 4"	
5" x 5"	
6" x 2"	

L'th	W'th
6" x 3"	
6" x 4"	
6" x 5"	
6" x 6"	
7" x 3"	
7" x 4"	

(Specify thickness and grade)

Prices on application

Saw Handle



L'th	W'th
8" x 2"	
8" x 3"	
8" x 4"	
9" x 4"	



Block Handle or Tool Type
For use with Precision Grinders
Equipped with 3" wood block handle

Cutting Face	Length
1" x 1"	5" or 8"
1 1/2" x 1 1/2"	5" or 8"
2" x 1"	5" or 8"
2 1/2" x 1 1/2"	5" or 8"
2" x 2"	5" or 8"
3" x 2"	5" or 8"
3" x 3"	5" or 8"

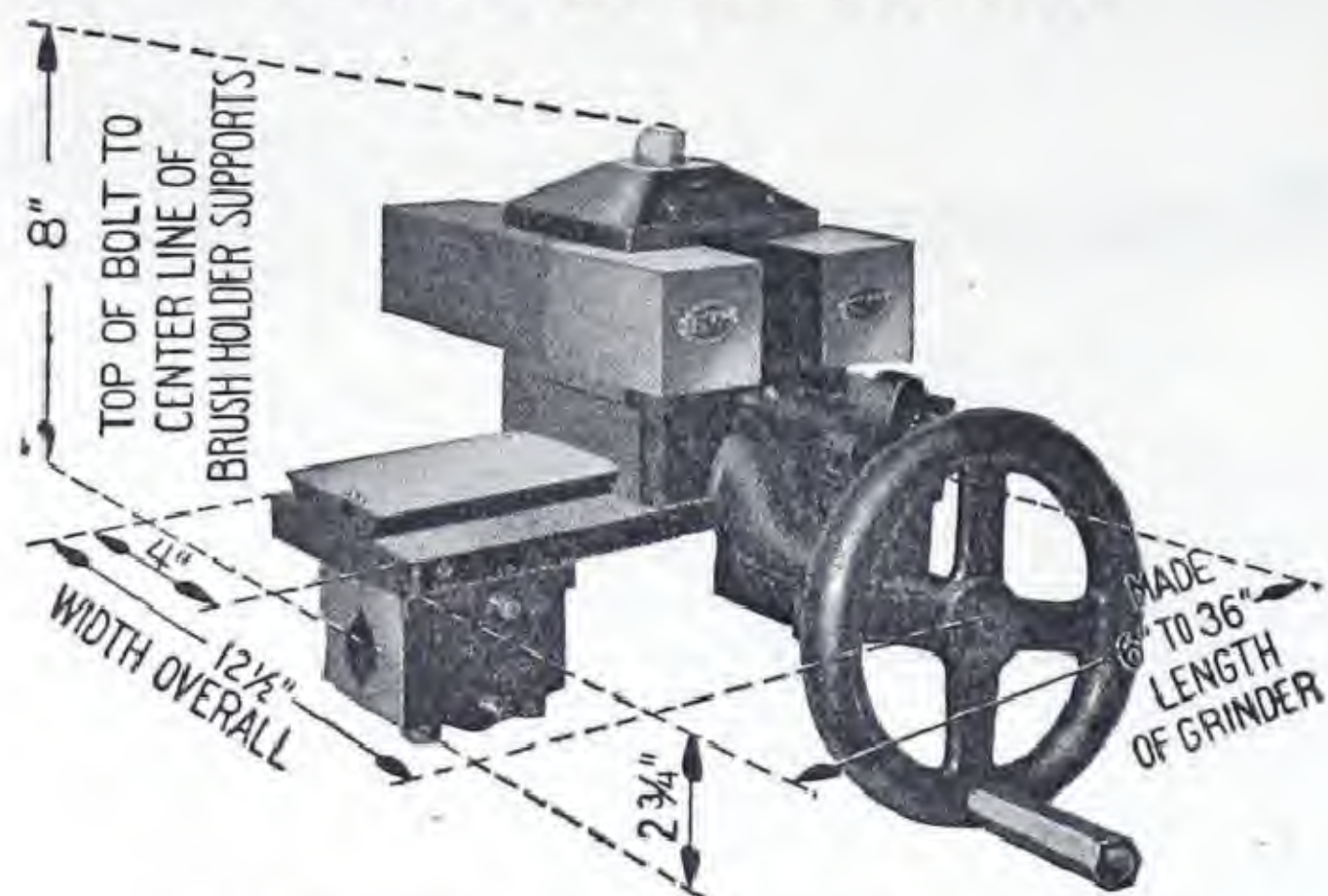
Can be made in any length.



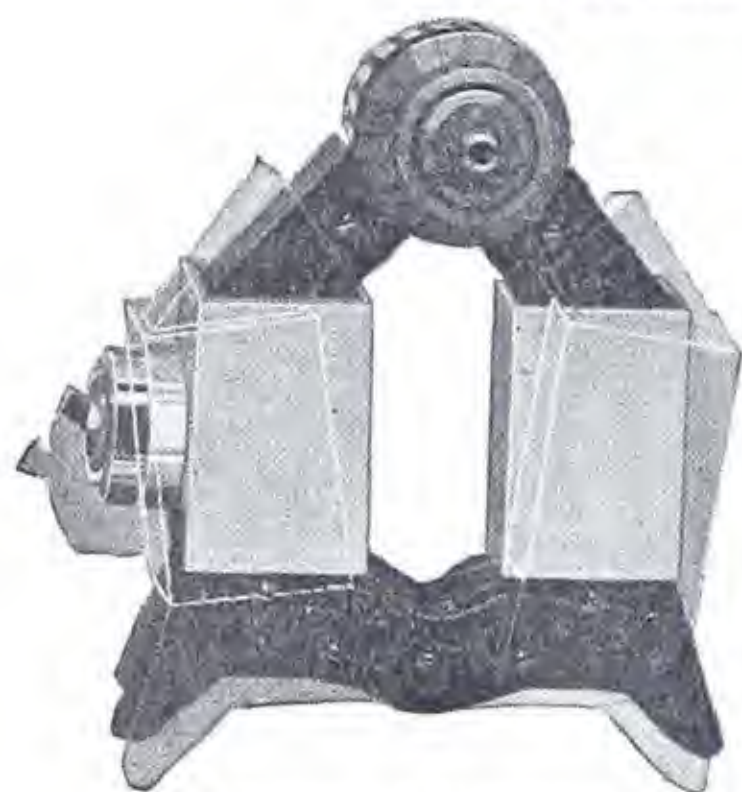
2 in 1 Tool, Handy Pocket Type
(Specify the two grades wanted)
Standard Sizes
6" x 2" x 1" 8" x 2" x 1"
Can be made in any size

IDEAL MOTOR MAINTENANCE EQUIPMENT

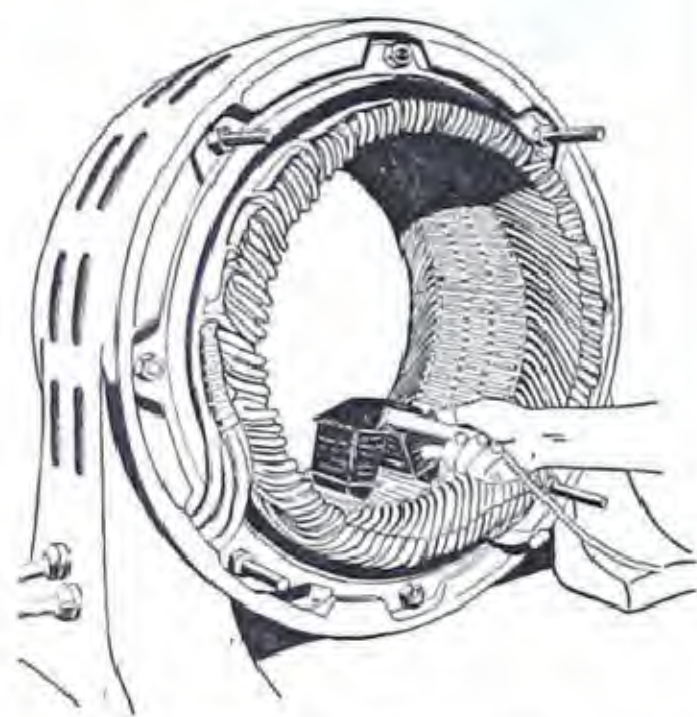
Portable Precision Grinders



New "Ideal Model" Precision Grinder
Adjustable Growlers



External Growler



Internal Growler

Slot Scrapers



Knife Blade Type



Two Pointed Type



CIRCULAR SLOTTING SAWS
("U" SHAPED SLOT)



MILLING CUTTERS
("V" SHAPED SLOT)



Wedge Drivers

Coil Tamping Tools



Prices on application.

IDEAL MOTOR MAINTENANCE EQUIPMENT

Power Mica Undercutter

For Small or Large Commutators and Continuous Heavy Duty Service.



3 in 1 Combination Machines—Blow Suction and Spray



JUMBO MODEL
SUPER-GIANT MODEL
GIANT MODEL
WHIZ MODEL
HOT AND COLD MODEL

Slotting Files



No. 1. Straight 3-Edge Cutting Type



No. 2. Knife Edge Type
(Supplied in "double-cut" only)



No. 3. Large 8" Type



No. 4. Small 7" Type



No. 5. Single End Type. (Specify
"draw-cut" or "double-cut")



Commutator Cement

Available in 1/2-lb., 1-lb. and 2-lb. cans.

Prices on application.

CHARGING RECEPTACLES



Double Pole—Capacity 100 to 450 Amperes

A compact, durable, and efficient charging connector for electric vehicles.

Numerous different forms of mounting for this receptacle are provided.

Type N. Nos. 1918, 1944, 2245, 2200, 2413

All Type "N" Plugs and Receptacles listed as 100 amperes and 150 amperes, are approved as switching devices for their listed capacities at 125 volts. The 150 ampere type "N" unit will operate satisfactorily with 75 amperes at 250 volts.

All Type "N" Plugs and Receptacles listed as 100 and 150 amperes capacity may be used at their rated capacity in amperes on 600 volts or less, A.C. or D.C., in series with line switch.

The Electric Vehicle Association of America and The Electric Vehicle Committee of Great Britain have both adopted as standard equipment receptacles and plugs having dimensions in accordance with this design.

Length over-all, No. 1918, 100 amperes, 4". Diameter 1 7/8".

Length over-all, No. 1944, 150 amperes, 6". Diameter 2 3/8".

List No.	Amperes Capacity	Description	Approx. Net Wgt.	List Price
1918	100	Receptacle without mounting, shell threaded on rear end.....	1 lb.	\$5.90
1944	150	do.	2 1/2 lbs.	8.80
2245	250	do.	4 1/8 lbs.	27.00
2200	350	do.	7 3/4 lbs.	60.80
2413	450	do.	10 1/2 lbs.	77.75

TRAIL CAR COUPLER RECEPTACLE



No. 1294

A single pole receptacle for car coupling suitable for handling current up to 150 amperes at 600 volts but it is not intended for breaking live circuits.

The current-carrying parts are insulated and are protected from dirt and mechanical injury by a strong iron case with spring lid.

Length over-all, cover closed, 8 1/4". Height over-all 5 1/8".

List No.	Description	Approx. Net Wgt.	List Price
1294	Receptacle complete with spring lid.	7 1/2 lbs.	\$15.20

TRAIL CAR COUPLER PLUG



No. 1293

This plug is for use with the receptacle shown above, and consists of handle into which the current-carrying parts are embedded and securely fastened in such a manner as to prevent mechanical or electrical injury to same under operating conditions.

Length over-all 7 7/8". Diameter 2 1/4".

1293	Plug complete.....	3 3/8 lbs.	\$15.20
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CHARGING RECEPTACLES



Type N. Nos. 1919, 1945, 2540, 2208, 2541
Double Pole—Capacity 100 to 450 Amperes

Illustration above shows Receptacle with iron vehicle clamp mounting with spring lid.

List No.	Amp. Capac.	Description	Approx. Net Wgt.	List Price Each
1919	100	Receptacle with M. I. vehicle mounting.....	3 1/8 lbs.	\$6.75
1920	100	Receptacle with Aluminum vehicle mounting.....	1 5/8 lbs.	7.60
1923	100	M. I. vehicle mounting with spring lid, without receptacle.....	2 lbs.	1.60
1924	100	Aluminum vehicle mounting with spring lid, without receptacle....	3/4 lb.	2.55
1945	150	Receptacle with M. I. vehicle mounting.....	5 1/4 lbs.	10.15
1946	150	Receptacle with aluminum vehicle mounting.	3 3/8 lbs.	11.85
1947	150	M. I. vehicle mounting with spring lid, without receptacle.....	2 3/4 lbs.	2.55
1948	150	Aluminum vehicle mounting with spring lid, without receptacle....	7/8 lb.	3.90
2540	250	Receptacle with M. I. vehicle mounting.....	6 3/8 lbs.	30.40
2208	350	Receptacle with M. I. vehicle mounting.....	12 3/4 lbs.	73.50
2541	450	Receptacle with M. I. vehicle mounting.....	15 1/2 lbs.	94.70

CHARGING PLUGS



Type N. No. 1953

Double Pole—Capacity 150 Amperes

Plugs are equipped with detachable lugs permitting of easily making soldered connections. The iron handles are equipped with special cable clamp, which prevents injury to the insulation on the cable and also takes the mechanical strain from the soldered connections.

Length over all, No. 1953 11 3/4".

Length over all, No. 2030 8 1/2".

List No.	Description	Approx. Net Wgt.	List Price Each
1953	Long handle Plug complete with cable clamp.....	4 1/2 lbs.	\$9.30
2030	Short handle Plug complete with cable clamp.....	3 1/2 lbs.	9.30
2045	Cable Clamp only for either type of Plug above mentioned.....	6 oz.	1.35

CHARGING PLUGS AND RECEPTACLES

CHARGING PLUGS



Type A No. 1289,
1291, 1771, 2401
Length over all, 6½"
Maximum Diameter, 2¼"

Capacity 65 Amperes Type A Double Pole

These charging plugs are made with moulded insulation, iron or aluminum handles.

List No.	Description	Approx. Net Wgt.	List Price Each
1289	Plug with moulded insulation handle.....	1½ lbs.	\$5.90
1291	Plug with aluminum handle.....	1½ lbs.	7.10
1771	Plug with hexagon end on iron handle and bronze collar.....	3 lbs.	5.90
2401	Plug without hexagon end on iron handle or on bronze collar.....	2¼ lbs.	5.90

CHARGING RECEPTACLES

For Vehicle and Industrial Use
Capacity 100 Amperes Double Pole
Takes Standard Types A and C Plugs

Type A No. 1209

Length over all cover closed 5⅜"; Height 4"

Dimensions of Base
3" x 3½"



These mountings are designed so that the receptacles may be attached to vehicles, walls, beams, posts or in any other convenient locations, either horizontally or vertically, as conditions may require.

Type A

List No.	Description	Approx. Net Wgt.	List Price Each
1209	Receptacle complete with cover..	3 lbs.	\$10.15
2002A	Internals without mounting with holes for mounting screws.....	1½ lbs.	8.45

CHARGING RECEPTACLES FOR RAILROAD CARS

Capacity 100 Amperes Double Pole
Takes Standard Types A and C Plugs



Type C No. 1569

Over all width, 9"

Length of Receptacle cover closed 7½"

Depth of Bracket 3"

Type No. 2253 same as No. 1569 but with cable outlet turned down.

Type C

The swivel type receptacle is for installing under railroad cars. The special trunnion mounting permits it to swing in either direction aligning itself with cable and plug should the train move with plug left in. This allows the plug to be pulled out by the movement of the train without injury to the receptacle or breaking the charging cable.

The dimensions and other mechanical and electrical details have been adopted as standard by the Master Car Builders.

List No.	Description	Approx. Net Wgt.	List Price Each
1569	Receptacle Complete.....	20 lbs.	\$16.90
2253	Receptacle Complete.....	20¼ lbs.	16.90

TYPE C CHARGING PLUG

Capacity 100 Amperes—Double Pole
Maximum length 7½"—Maximum width 2¼"



List. No. 1967

This plug is designed for service as in railroad yards, etc. It is approved as standard by the A.R.E.E. and M.C.B.A.

The clamp at the cable entrance grips the cable, relieving the terminals of all strain. Will take cable up to 1¼" outside diameter.

List No.	Description	Approx. Net Wgt.	List Price Each
1967	Plug complete with iron handle and cable clamp.....	2¾ lbs.	\$7.60
2036	Plug complete with aluminum handle and cable clamp.....	2¼ lbs.	8.45

CHARGING PLUG



Type N. No. 1915
Double Pole—Capacity 100 Amperes

The Type "N" Plug, like the receptacle of the same type, has a steel shell which fits closely into the cylindrical shell of the receptacle, thus providing a long supporting surface which takes all mechanical strain away from the current-carrying parts.

It is equipped with a special cable clamp for preventing abrasion of the insulation on the cable. This clamp also takes the mechanical strain from the soldered joints at the terminals.

Length over all, 5⅝". Diameter of steel shell, 1¾".

List No.	Description	Approx. Net Wgt.	List Price Each
1915	Plug complete with cable clamp..	1⅝ lbs.	\$5.90
1916	Cable Clamp only for plug.....	¼ lb.	.70

A.B.C. PLUGS AND RECEPTACLES

These Plugs and Receptacles have a variety of uses, as electrical connectors, in series with line switches, but must not be used for breaking circuits.

They are made in the portable type as illustrated; also for surface wall mounting and for flush mounting in walls and floors. In 50, 100, 150, 200 and 300 ampere capacities and for 125 and 600 volts D.C. or A.C. two to seven poles.

The metal contact parts are encased in moulded insulation of exceptional strength, mechanically and electrically.

The contacts are self-aligning, making insertion and withdrawal of plug smooth and easy, besides assuring positive contact.

The projections cast on the housings prevent reversal of polarity when inserting plugs.

Provision is made for simple and easy soldering of cables into terminals.

Portable Type

Plugs and Receptacles

50 Amps., 125 Volts A.C. or D.C.

List No.	Description	Price Each
2073	Plug complete.....	\$11.85
2074	Receptacle complete	12.15

List No.

2051	Removable filler block unit for plug, each.....	\$2.35
2052	Removable filler block unit for receptacle, each.....	2.35



KALAMAZOO TROLLEY WHEELS FOR HIGH SPEED ROADS



No. 1 V Groove
Diam. 6 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 1 1/2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Length of hub, 2 "
List Price, ea. \$2.80



No. 2 U Groove
Diam. 6 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 1 1/2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Length of hub, 2 "
List Price, ea. \$2.70



No. 3 Deep
Groove
Diam. 6 "
Width. 1 1/2 "
Dpth of groove 1 "
Length of hub 1 1/2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Length of hub, 2 "
List Price, ea. \$2.70



No. 5 V Groove
Diam. 5 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 1 1/2 "
Graphite bushing
for 1/2 " pin.
Graphite bushing
for 5/8 " pin to
order.
List Price, ea. \$2.40



No. 15 U Groove
Diam. 5 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 1 1/2 "
Graphite bushing
for 1/2 " pin.
Graphite bushing
for 5/8 " pin to
order.
List Price, ea. \$2.40



No. 22
Diam. 6 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Without bushing.
List Price, ea. \$3.60



KALAMAZOO TROLLEY WHEELS FOR HIGH SPEED ROADS



No. 12
Diam. 6 "
Width. 1 1/2 "
Dpth of groove 3/4 "
Lgth of hub... 1 1/2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Length of hub, 2 "
List Price, ea. \$2.70



No. 14 With or
Without Graphite
Bushing
Diam. 6 "
Width. 1 5/8 "
Dpth of groove 7/8 "
Lgth of hub... 2 "
Graphite bushing
for 5/8 " pin.
List Price, ea. \$3.00



No. 16
Extra Deep
"U" Groove
Diam. 6 "
Width. 1 3/4 "
Dpth of groove 1 "
Lgth of hub... 1 1/2 "
Graphite bushing
for 5/8 " pin.
Other dimensions
to order.
Graphite bushing
for 3/4 or 1 " pin.
Lgth of hub, 2 "
List Price, ea. \$3.10



FOR ANY STANDARD HARP



No. 7 Standard
U Groove
Diam. 4 3/8 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Lgth of hub... 1 1/2 "
Graphite bushing
for 1/2 " pin.
Graphite bushing
for 5/8 " pin to
order.
List Price, ea. \$1.64



No. 8 Standard
V Groove
Diam. 4 3/8 "
Width. 1 3/8 "
Dpth of groove 3/4 "
Length of hub 1 1/2 "
Graphite bushing
for 1/2 " pin.
Graphite bushing
for 5/8 " pin to order.
List Price, ea. \$1.64



No. 9 Extra Deep
Groove
Diam. 4 3/8 "
Width. 1 3/8 "
Dpth of groove 7/8 "
Length of hub 1 1/2 "
Graphite bushing
for 1/2 " pin.
Graphite bushing
for 5/8 " pin to order.
List Price, ea. \$1.80



KALAMAZOO TROLLEY HARPS

Malleable Iron



FOR 6-INCH WHEELS

No. 1—1 inch hole in shank. $1\frac{1}{2}$ inch between washers. $\frac{5}{8}$ inch piston steel pin. Washer No. 133. Spring No. 219. Pin No. 2. Other dimensions to order: $\frac{3}{4}$ inch Pin No. 6. $\frac{3}{4}$ inch Washer No. 134.

List Price, each..... \$2.00

No. 2— $\frac{3}{4}$ inch rod in shank. $1\frac{1}{2}$ inch between washers. $\frac{5}{8}$ inch piston steel pin. Washer No. 133. Spring No. 219. Pin No. 2. Other dimensions to order: $\frac{3}{4}$ inch Pin No. 6. $\frac{3}{4}$ inch Washer No. 134.

List Price, each..... \$2.20

No. 4—1 inch hole in shank. 2 inches between washers. $\frac{5}{8}$ inch Pin. Washer No. 133. Spring No. 219. Pin No. 3. Other dimensions to order: $\frac{3}{4}$ inch piston steel Pin No. 4. $\frac{3}{4}$ inch Washer No. 134.

List Price, each..... \$2.20

No. 3— $\frac{3}{4}$ inch rod in shank. $1\frac{1}{2}$ inches between washers. $\frac{5}{8}$ inch cold rolled steel pin. Washer No. 130. Spring No. 218. Pin No. 5.

List Price, each..... \$2.00

FOR 5-INCH WHEELS

No. 5— $\frac{3}{4}$ inch rod in shank. $1\frac{1}{2}$ inches between washers. $\frac{1}{2}$ inch piston steel pin. Washer No. 129. Spring No. 218. Pin No. 1. Other dimensions to order: $\frac{5}{8}$ inch Pin No. 2. $\frac{5}{8}$ inch Washer No. 130.

List Price, each..... \$2.00

FOR 4-INCH WHEELS

No. 8— $\frac{3}{4}$ inch rod in shank. $1\frac{1}{2}$ inches between washers. $\frac{1}{2}$ inch piston steel pin. Washer No. 129. Spring No. 214. Pin No. 1. Other dimensions to order: $\frac{5}{8}$ inch Pin No. 2. $\frac{5}{8}$ inch Washer No. 130.

List Price, each..... \$2.00

FOR No. 10 WHEEL ONLY



No. 6— $\frac{3}{4}$ inch rod in shank. 3 inches between washers. $\frac{5}{8}$ inch piston steel pin. Washer No. 130. Spring No. 218. Pin No. 7; malleable iron.

List Price, each. \$2.00

FOR 6-INCH WHEELS

No. 7—2 inch hole in shank. $1\frac{1}{2}$ inches between washers. $\frac{5}{8}$ inch piston steel pin. Washer No. 130. Spring 218. Pin No. 5. Furnished only in brass.

List Price, each. \$4.00



WASHERS AND SPRINGS FOR KALAMAZOO HARPS



No. 134
For Nos. 1, 2,
and 4 Harp, $\frac{3}{4}$
Pin.



No. 125
Plain, $\frac{1}{16}$ inch
thick
Diam. $1\frac{1}{4}$ inch.



No. 126
Plain, $\frac{1}{16}$ inch
thick
Diam. $1\frac{1}{4}$ inch.



No. 218
For Nos. 3, 5, 6 and 7 Harp.



No. 214
For No. 8 Harp.

No. 133

For Nos. 1, 2,
and 4 Harp. $\frac{5}{8}$
pin.



No. 129
For Nos. 5 and 8
Harp. $\frac{1}{2}$ -inch pin.



No. 130
For Nos. 3, 5, 6,
7 and 8 Harp. $\frac{5}{8}$
pin.



No. 219
For Nos.
1, 2, and
4 Harp.

Springs List No. 214, 218 and 219. List Price \$0.20 per pair
Washers List No. 129, 130, 133, 134 and 135. List Price each
\$0.04. Washers, List No. 125, and 126. List Price, \$1.50 per C

PINS FOR KALAMAZOO HARPS.

List No.	Dia. Inches	Length Inches	Distance Between centre of poles	Used with Harps Nos.	List Price Each
1	$\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{11}{32}$	5, 7, 8	\$0.15
2	$\frac{5}{8}$	$2\frac{7}{8}$	$2\frac{7}{16}$	1, 2	.18
3	$\frac{5}{8}$	$3\frac{1}{2}$	$2\frac{7}{8}$	4	.19
4	$\frac{3}{4}$	$3\frac{7}{16}$	$2\frac{13}{16}$	4	.24
5	$\frac{5}{8}$	$2\frac{5}{8}$	$2\frac{1}{4}$	3, 5, 7, 8	.18
6	$\frac{3}{4}$	$2\frac{7}{8}$	$2\frac{7}{16}$	1, 2	.24

GRAPHITE BUSHINGS

List No.	Outside Diam.	Length Inches	Hole Inches	List Price Each
1	$\frac{7}{8}$	$1\frac{1}{2}$	$\frac{1}{2}$	\$0.36
2	1	$1\frac{1}{2}$	$\frac{5}{8}$	.50
3	1	2	$\frac{5}{8}$	.60
4	$1\frac{1}{8}$	$1\frac{1}{2}$	$\frac{3}{4}$	.60
5	$1\frac{1}{8}$	2	$\frac{3}{4}$	.70

STAR SLEET CUTTER



Star Sleet Cutter

For many years, railway properties have been looking for a Sleet Cutter that would fit their Harp and Wheel; and which could be quickly, yet rigidly, fastened into place.

All this will be found only in the new Kalamazoo Locking-type Sleet Cutter.

There are three cutting teeth properly arranged to take care of any height of overhead. Made in both iron and brass. Specify material and diameter of wheel when ordering.

It can be installed by one man in ten seconds and removed in five, without recourse to tools.

It can be used without locking device if desired, by using a wire hook formed in your own shops.

List Prices

	Iron Each	Brass Each
Complete.....	\$1.10	\$1.30
Cutter only.....	.90	1.10
Locking Arms.....	.30	.30

STAR SLEET WHEELS



No. 30



No. 30

Sleet Cutter Wheels

List No.	Diam.	Width of Flange	Depth of Groove	Length of hub	List Price
30	4 1/4"	1 3/8"	3/4"	1 1/2"	\$1.90
31	5 "	1 3/8"	3/4"	1 1/2"	2.20

TO BUYERS OF POWER APPARATUS



Quotations and information on all the lines listed below will be gladly given through our 16 branches throughout Canada. Let us quote you.

Cutler Hammer, Inc.
Motor Controls.

Condit Electrical Mfg. Corp.
Oil Circuit Breakers.

Ferranti Electric Ltd.
Transformers, Surge Absorbers.

J. P. Tubular Heater Co.
Electric Heating Systems.

Sangamo Electric Limited,
Watt-hour Meters,
Peak Load Controllers.

N. Slater Co. Limited,
Cutouts and Disconnects.

Telegraph Condenser Co.
Power Static Condensers.

Weston Electric Instrument Corp.
Indicating Instruments of all kinds.
Radio Test Equipment.

Mather & Platt Ltd.
Motors and Generators, All Types,
A.C. and D.C. Complete line of
Centrifugal Pumps.

A. Reyrolle & Co. Limited.
Metal Clad Switchgear.

Ilg Electric Ventilating Co.
Ventilating Fans and Blowers.

Hewittic Electric Co.
Rectifiers (Glass Bulb)

USEFUL DATA International Electrical Units

The following resolutions were adopted by the International Congress of Electricians, held at Chicago, in 1893, and are now recognized as the International Units of Value for their respective purposes.

Resolved, That the several governments represented by the delegates of the International Congress of Electricians be and they are hereby recommended to formally adopt as legal units of electrical measure the following:—

1. As a unit of resistance, the International Ohm, which is based upon the ohm equal to 10^9 units of resistance of the c.g.s. system of electromagnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury at a temperature of melting ice, 14.4521 grams in mass, of a constant cross sectional area, and of the length 106.3 cm.

2. As a unit of current, the International Ampere, which is one-tenth of the unit of current of the c.g.s. system of electromagnetic units, and which is represented sufficiently well for practical use by the unvarying current which, when passed through a solution of nitrate of silver in water, in accordance with the accompanying specification (A), deposits silver at the rate of 0.001118 grams per second.

3. As a unit of electromotive force, the International Volt, which is the e.m.f. that, steadily applied to a conductor whose resistance is one International Ohm, will produce a current of one International Ampere, and which is represented sufficiently well for practical use by 1000/1434 of the e.m.f. between the poles or electrodes of the voltaic cell, known as Clark's cell, at a temperature of 15°C., and prepared in the manner described in the accompanying specification (B).

4. As the unit quantity, the International Coulombe, which is the quantity of electricity transferred by current of one International Ampere in one second.

5. As the unit of capacity, the International Farad, which is the capacity of a conductor charged to a potential of one International Volt by one International Coulombe of electricity.

6. As the unit of work, the Joule, which is 10^7 units of work in the c.g.s. system, and which is represented sufficiently well for practical use by the energy expended in one second by an International Ampere in an International Ohm.

7. As the unit of power, the Watt, which is equal to 10^7 units of power in the c.g.s. system, and which is represented sufficiently well for practical use by the work done at the rate of one joule per second.

8. As the unit of induction, the Henry, which is the induction of the circuit when the e.m.f. induced in this circuit is one International Volt, while the inducing current varies at the rate of one International Ampere per second.

Note.—Specifications (A) and (B), omitted here may be found in the original publication and in the electrical hand-books.

Insulation Resistance

The insulation resistance of an insulated conductor is the electrical resistance offered by the insulation, to an impressed voltage tending to produce leakage current through the same. It is usually expressed in megohms for a specified length (as a mile, a kilometer or 1000 feet) at a standard temperature (as 15.6° Centigrade or 60° Fahrenheit).

The insulation resistance of a single conductor cable may be expressed by the formula—

$$R = K \log_{10} \frac{D}{d}$$

where R = insulation in megohms per mile

K = megohms constant—mile unit

D = 1. For single conductor cables:—diameter over insulation.

2. For multiple conductor cables:—diameter over insulation of an equivalent single conductor cable which is equal to diameter of round conductor + 3 times thickness of conductor insulation + twice the thickness of belt insulation.

d = diameter of copper conductor.

From this formula the insulation resistance of any wire may be computed after finding by experiment the value of the constant K for the given dielectric.

The value of K is given below for some dielectrics at 60° Fahr.

Dielectric	Value of Constant K
Paper (Impregnated).....	1000-2700
Rubber (Vulcanized).....	700-4000
Varnished Cambric.....	700-2280

USEFUL DATA Terminology Standards for Wires and Cables

Taken from

Standardization Rules of the A.I.E.E., 1932 Edition

Wire—A slender rod or filament of drawn metal.

Conductor—A wire or combination of wires not insulated from one another, suitable for carrying a single electric current.

Stranded Conductor—A conductor composed of a group of wires, or of any combination of groups of wires.

Cable—(1) A stranded conductor (single conductor cable) or

(2) A combination of conductors insulated from one another (multiple-conductor cable).

Strand—One of the wires, or groups of wires, of any stranded conductor.

Stranded Wire—A group of small wires used as a single wire.

Cord—A small flexible insulated cable.

Concentric Lay Conductor—A conductor composed of a central core surrounded by one or more layers of helically-laid wires or groups of wires.

Concentric Lay Cable—A multiple conductor cable composed of a central core surrounded by one or more layers of helically-laid insulated conductors.

Rope-lay Conductor or Cable—A conductor or cable composed of a central core surrounded by one or more layers of helically-laid groups of wires.

N-Conductor Cable—A combination of N-conductors insulated from one another.

N-Conductor Concentric Cable—A cable composed of an insulated central conducting core with (N-1) tubular stranded conductors laid over it concentrically and separated by layers of insulation.

Duplex Cable—Two insulated stranded conductors, twisted together.

Twin Cable—Two insulated stranded conductors laid parallel, having a common covering.

Triplex Cable—Three insulated single conductor cables twisted together.

Twisted Pairs—Two small insulated conductors, twisted together, without a common covering.

Twin Wire—Two small insulated conductors, laid parallel, having a common covering.

Sector Cable—A sector cable is a multiple conductor cable in which the cross section of each conductor is substantially a sector, an ellipse or a figure intermediate between them.

Round Conductor—A round conductor is either a solid or stranded conductor of which the cross section is substantially circular.

Split Conductor Cable—Is one in which each conductor is composed of two or more insulated conductors usually connected in parallel.

Shielded Conductor Cable—A cable in which the insulated conductor or conductors is/are enclosed in a conducting envelope or envelopes.

Sectional Area of Cables—The cross-sectional area of a cable shall be considered to be the sum of the cross-sectional areas of its component wires, when measured perpendicular to their axes.

Flexible Stranding—Conductors of special flexibility should ordinarily be made with wires of regular A.W.G. sizes, the number of wires and size being given. The approximate gauge number or approximate circular mils of such flexible stranded conductors may be stated.

Correction for Lay—The resistance and mass of a stranded conductor are greater than in a solid conductor of the same cross-sectional area, depending on the lay (i.e., the pitch of the twist of the wires). Two per cent shall be taken as the standard increment of resistance and of mass. In cases where the lay is definitely known, the increment should be calculated and not assumed.*

Direction of Lay—The direction of lay is the lateral direction in which the strands of a cable run over the top of the cable as they recede from an observer looking along the axis of the cable.

*Note.—The lays specified by the U.S. Bureau of Standards, Circular No. 31, have been used and are now adopted as standard by this Company.

These lays are 15.7 times the pitch diameter of the layers of wires for standard concentric strands and 12 times the pitch diameter of the layers of ropes for rope lay strand.

(Continued next page.)

USEFUL DATA

Terminology Standards for Wires and Cables

Taken from
Standardization Rules of the A.I.E.E., 1932 Edition
(Continued).

The correction for increase in mass and resistance in rope lay strand is 2 per cent for the wires in each rope and an additional 3.42 per cent for the ropes in the cable, making a total increase of 5.42 per cent. For any other lay the per cent increase in resistance or mass may be calculated by substituting the value for N in the formula.

$$\frac{493}{N^2} \text{ (per cent)}$$

Length of lay in inches

Where $N = \frac{\text{Pitch diam. of layer of wires in inches}}{\text{Pitch diam. of layer of wires in inches}}$

Properties of Copper

The following International Electrotechnical Commission (I.E.C.) Rules were adopted by the A.I.E.E. in January, 1914, and are still in effect, and shall therefore be taken as normal values for standard annealed copper of 100 per cent conductivity.

1. At a temperature of 20°C. the resistance of a wire of standard annealed copper, one meter in length and of a uniform section of 1 square millimeter is $1/58 \text{ ohm} = 0.017241 \text{ ohm}$.

2. At a temperature of 20°C. the density of standard annealed copper is 8.89 grams per cubic centimeter.

3. At a temperature of 20°C. the "constant mass" temperature coefficient of resistance of standard annealed copper, measured between two potential points rigidly fixed to the wire is:—

$$\begin{aligned} 0.00393 &= \frac{1}{254.45} \dots \text{per degree Centigrade.} \\ 0.002183 &\dots \text{per degree Fahrenheit.} \end{aligned}$$

4. As a consequence it follows from (1) and (2) that, at a temperature of 20°C. the resistance of a wire of standard annealed copper of uniform section, one meter in length and weighing one gram, is $(1/58) \times 8.89 = 0.15328 \dots \text{ohm}$. * This value is known as the INTERNATIONAL ANNEALED COPPER STANDARD.

It follows therefore, from the above that

Specific Gravity.....	8.89	at 20°C.
Weight per cubic inch.....	0.32117 lbs.	"
Ohm (meter-millimeter ²).....	0.017241	"
Ohms (mil. foot).....	10.371	"
Ohms (mile, pound) }.....	875.20	"
Pounds (mile, ohm) }	10371	"
Resistance in ohms per 1000 feet at 20°C..	$\frac{10371}{d^2}$	
" " " " " " " "	31.393	
" " " " " " " "	Wt. per 1000 ft.	

$$\begin{aligned} \text{Resistance in ohms per mile at 20°C.....} &= \frac{54759}{d^2} \\ \text{Resistance in ohms per kilometer at 20°C..} &= \frac{34026}{d^2} \end{aligned}$$

$$\begin{aligned} \text{Weight in pounds per 1000 feet at 20°C...} &= 0.003027 \times d^2 \\ \text{Weight in pounds per mile at 20°C.....} &= 0.0159826 \times d^2 \\ \text{Weight in pounds per kilometer at 20°C...} &= 0.009931 \times d^2 \\ \text{Weight in kilograms per kilometer at 20°C.} &= 0.0045046 \times d^2 \end{aligned}$$

(Where d = diameter of solid wire in mils).

*Value of Matthiessen's Standard = 0.15302 ohm at 20°C. This was the standard used previous to the adoption of the International Annealed Copper Standard.

USEFUL DATA

Electrostatic Capacity

The electrostatic capacity of a cable is the property of the insulation to hold a charge of electricity. It is ordinarily expressed in microfarads for a standard length (as a mile, a kilometer or 1000 feet) at a standard temperature (as 15.6° Centigrade or 60° Fahrenheit).

The electrostatic capacity of a single conductor cable may be expressed by the formulae:—

$$C = \frac{.0388K}{\log \frac{10D}{d}}$$

where C = capacity in microfarads per mile

D = internal diameter of sheath

d = diameter over copper conductor

K = specific inductive capacity of the dielectric.

The value of K is given below for some dielectrics at 60° Fahr.

Dielectric	Sr. Inductive Capacity (K)
Air.....	1.0
Paper (Impregnated).....	3.7
Rubber (Vulcanized).....	6.0
Varnished Cambric.....	5.5

OHM'S LAW

Ohm's law is stated as follows:—"The electric current along a conductor equals the electromotive force divided by the resistance."

In electrical units, Ohm's Law is:—

$$\text{Current in amperes} = \frac{\text{E. M. F. in volts}}{\text{Resistance in ohms}} \text{ or } C = \frac{E}{R}$$

By transposing the symbols of this equation:—

$$R = \frac{E}{C} \text{ and } E = CR$$

POWER

Power in watts equals the energy current multiplied by the voltage.

For Direct Current Systems:—

$$W \text{ (Watts)} = E \text{ (Volts)} \times C \text{ (Amperes)} = \frac{E^2}{R} = C^2 R$$

For Alternating Current Systems:—

Single-phase $W = E \times C \times P.F.$ (Power Factor)

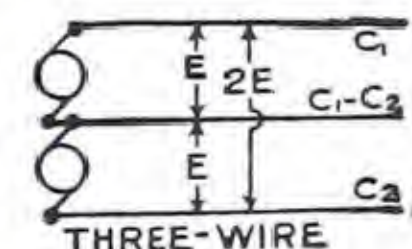
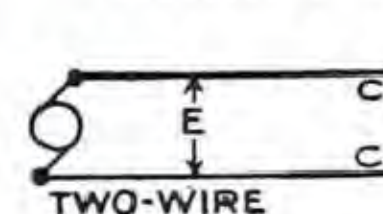
Two-phase (4-wire) $W = 2 \times E \times C \times P.F.$

Three-phase (3-wire) $W = \sqrt{3} \times E \times C \times P.F.$

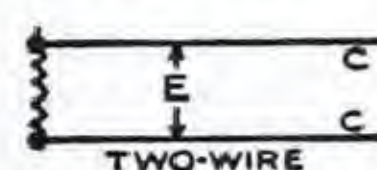
Equivalents of Electrical Units

1 Kilowatt = 1000 watts.	1 horse-power = 746 watts.
1 " = 1.34 horse-power.	1 " = 33000 ft.-lbs. per min.
1 " = 44257 foot-pounds per minute.	1 B.T.U. = 778 foot-pounds.
1 " = 56.87 B.T.U. per minute.	1 " = 0.293 watt-hours.

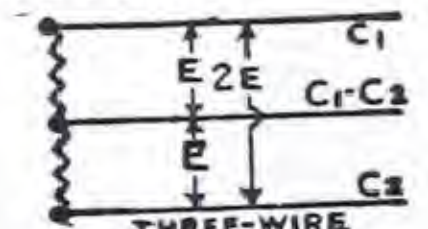
DIRECT CURRENT SYSTEMS



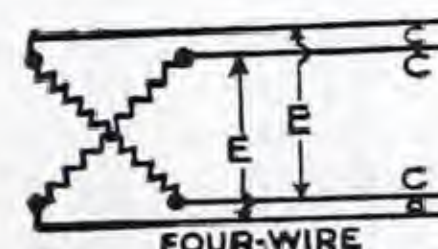
ALTERNATING CURRENT SYSTEMS



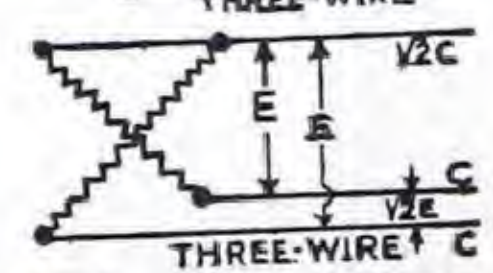
Single-Phase



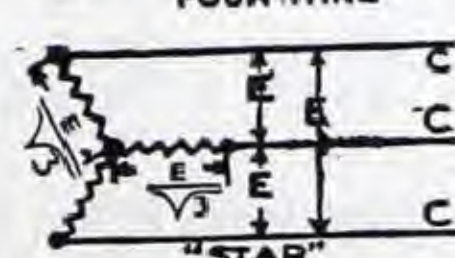
THREE-WIRE



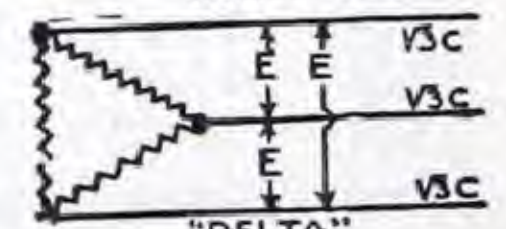
Two-Phase



THREE-WIRE



Three-Phase



"DELTA"

USEFUL DATA

Direct Current Wiring Formulae Copper Conductors

The problem of designing an electric circuit is one of determining the size of conductor to be used to limit the voltage drop to a specified amount when the length of wire and the power to be carried are known. Also, whether the size required for the allowable voltage drop is sufficient to carry the current.

The size of wire may be estimated from the following formula:

$$\text{Circular mils} = \frac{\text{Amperes} \times \text{one way feet} \times 20.7}{\text{Volts drop}}$$

Example 1

A two-wire circuit is to carry 100 amperes a distance of 400 feet with 5 volts drop. What is the size of conductor?

$$\text{Circular mils} = \frac{\text{Amperes} \times \text{one way feet} \times 20.7}{\text{Volts drop}} = \frac{100 \times 400 \times 20.7}{5} = 165,600 \text{ C.M.}$$

Nearest size is No. 3/0 A.W.G.

Example 2

A line 600 feet long is made up of No. 2 A.W.G. copper wire. What current will it carry with 10 volts drop?

$$\text{Amperes} = \frac{\text{Volts drop} \times \text{circular mils}}{\text{One way feet} \times 20.7} = \frac{10 \times 66370}{600 \times 20.7} = 53.5 \text{ amps.}$$

Example 3

A line 1000 feet long made up of No. 4/0 A.W.G. wire, carries a current of 100 amperes. Find volts drop.

$$\text{Volts drop} = \frac{\text{Amperes} \times \text{one way feet} \times 20.7}{\text{Circular Mils}} = \frac{100 \times 1000 \times 20.7}{21160} = 9.8 \text{ volts}$$

Sparkling Distances—A. I. E. E. Standardization Rules

Table of sparking distances in air between opposed sharp needlepoints, for various root-mean-square sinusoidal voltages, in inches and in centimeters.

(At 25°C. and 760 mm. barometer)

Kilovolts Sq. Root of Mean Measure	Distance		Kilovolts Sq. Root of Mean Measure	Distance	
	Inches	Cm.		Inches	Cm.
5	0.225	0.57	140	13.95	35.4
10	0.47	1.19	150	15.00	38.1
15	0.725	1.84	160	16.05	40.7
20	1.0	2.54	170	17.10	43.4
25	1.3	3.3	180	18.15	46.1
30	1.625	4.1	190	19.20	48.8
35	2.0	5.1	200	20.25	51.4
40	2.45	6.2	210	21.30	54.1
45	2.95	7.5	220	22.35	56.8
50	3.55	9.0	230	23.40	59.4
60	4.65	11.8	240	24.45	62.1
70	5.85	14.9	250	25.50	64.7
80	7.1	18.0	260	26.50	67.3
90	8.35	21.2	270	27.50	69.8
100	9.6	24.4	280	28.50	72.4
110	10.75	27.3	290	29.50	74.9
120	11.85	30.1	300	30.50	77.4
130	12.90	32.8	...	...	...

Needle spark-gap may be used for voltages from 10 kv. to 50 kv.

USEFUL DATA

Tables of Allowable Current-Carrying Capacities of Wires

The following table, showing the allowable carrying capacity of copper wires and cables of 98 per cent conductivity, according to the standard adopted by the American Institute of Electrical Engineers, must be followed in placing interior conductors.

For insulated aluminum wire the safe carrying capacity is 84 per cent of that given in the following tables for copper wire with the same kind of insulation.

Sizes A.W.G.	Diam. of Solid Wire in Mils	Area in Circular Mils	Table A Rubber Insul'n Amperes	Table B Varnished Cloth In- sul'n, amp.	Table C Other Insul'n Amperes
18	40.3	1,624	3	....	5
16	50.8	2,583	6	....	10
14	64.1	4,107	15	18	20
12	80.8	6,530	20	25	25
10	101.9	10,380	25	30	30
8	128.5	16,510	35	40	50
6	162.0	26,250	50	60	70
4	204.3	41,740	70	85	90
2	257.6	66,370	90	110	125
1	289.3	83,690	100	120	150
0	325.0	105,500	125	150	200
00	364.8	133,100	150	180	225
000	409.6	167,800	175	210	275
....	....	200,000	200	240	300
0000	460.0	211,000	225	270	325
....	....	250,000	250	300	350
....	....	300,000	275	330	400
....	....	350,000	300	360	450
....	....	400,000	325	390	500
....	....	500,000	400	480	600
....	....	600,000	450	540	680
....	....	700,000	500	600	760
....	....	800,000	550	660	840
....	....	900,000	600	720	920
....	....	1,000,000	650	780	1,000
....	....	1,100,000	690	830	1,080
....	....	1,200,000	730	880	1,150
....	....	1,300,000	770	920	1,220
....	....	1,400,000	810	970	1,290
....	....	1,500,000	850	1,020	1,360
....	....	1,600,000	890	1,070	1,430
....	....	1,700,000	930	1,120	1,490
....	....	1,800,000	970	1,160	1,550
....	....	1,900,000	1,010	1,210	1,610
....	....	2,000,000	1,050	1,260	1,670

Size of Conduits for the Installation of Wires and Cables

The following tables apply only to complete conduit systems, and do not apply to short sections of conduit used for the protection of exposed wiring from mechanical injury.

Table I—Two-wire and Three-wire Systems

Size of Wire	Number of Wires in One Conduit								
	1	2	3	4	5	6	7	8	9
	Minimum Size of Conduit in Inches								
14	1/2	1/2	1/2	1/2	3/4	1	1	1	1
12	1/2	1/2	3/4	3/4	3/4	1	1	1	1 1/4
10	1/2	3/4	3/4	1	1	1	1 1/4	1 1/4	1 1/4
8	1/2	3/4	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4
6	1/2	1	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2
5	3/4	1 1/4	1 1/4	1 1/4	1 1/2	2	2	2	2
4	3/4	1 1/4	1 1/4	1 1/2	2	2	2	2	2 1/2
3	3/4	1 1/4	1 1/4	1 1/2	2	2	2	2 1/2	2 1/2
2	3/4	1 1/4	1 1/2	1 1/2	2	2	2 1/2	2 1/2	2 1/2
1	3/4	1 1/2	1 1/2	2	2	2 1/2	2 1/2	3	3
0	1	1 1/2	2	2	2 1/2	2 1/2	3	3	3
00	1	2	2	2 1/2	2 1/2	3	3	3	3 1/2
000	1	2	2	2 1/2	3	3	3	3 1/2	3 1/2
0000	1 1/4	2	2 1/2	2 1/2	3	3	3 1/2	3 1/2	4
200000CM	1 1/4	2	2 1/2	3	3	3	3 1/2	3 1/2	4
225000	1 1/4	2 1/2	2 1/2	3	3	3 1/2	...	...	...
250000	1 1/4	2 1/2	2 1/2	3	3	3 1/2	...	...	...

USEFUL DATA

Size of Conduit for The Installation of Wires and Cables—Continued

Table I—Two-wire and Three-wire Systems
Number of Wires on One Conduit

Size of Wire	1	2	3	4	5	6	7	8	9
	Minimum Size of Conduit in Inches								
300000	1 1/4	2 1/2	3	3	3 1/2	3 1/2			
350000	1 1/4	2 1/2	3	3 1/2	3 1/2	4			
400000	1 1/4	3	3	3 1/2	4	4			
450000	1 1/2	3	3	3 1/2	4	4 1/2			
500000	1 1/2	3	3	3 1/2	4	4 1/2			
550000	1 1/2	3	3 1/2	4	4 1/2	5			
600000	2	3	3 1/2	4	4 1/2	5			
650000	2	3 1/2	3 1/2	4					
700000	2	3 1/2	3 1/2	4 1/2					
750000	2	3 1/2	3 1/2	4 1/2					
800000	2	3 1/2	4	4 1/2					
900000	2	3 1/2	4	4 1/2					
950000	2	4	4	5					
1000000	2	4	4	5					
1100000	2 1/2	4	4 1/2	6					
1200000	2 1/2	4 1/2	4 1/2	6					
1250000	2 1/2	4 1/2	4 1/2	6					
1300000	2 1/2	4 1/2	5	6					
1500000	2 1/2	4 1/2	5	6					
1600000	2 1/2	5	5	6					
1700000	3	5	5	6					
1750000	3	5	5	6					
1800000	3	5	6	6					
1900000	3	5	6						
2000000	3	5	6						

Where single conductor, single braid, solid wires only, are used, four No. 10 wires may be installed in a half-inch conduit and up to seven No. 14 wires in a three-quarter inch conduit. Three No. 12 wires may be installed in a half-inch conduit, four No. 10 wires in three-quarter inch conduit and three No. 8 wires in a three-quarter inch conduit.

Table II—Three-Conductor Convertible System

Size of Wires			Size Conduit Electrical Trade Size
Two	14 and one	10	3/4"
"	12	"	3/4"
"	10	"	1"
"	8	"	1"
"	6	"	1 1/4"
"	5	"	1 1/4"
"	4	"	1 1/2"
"	3	"	1 1/2"
"	2	"	1 1/2"
"	1	"	2"
"	0	"	2"
"	00	"	2 1/2"
"	000	"	2 1/2"
"	0000	"	3"
"	250000	"	3"
"	300000	"	3"
"	400000	"	3 1/2"
"	500000	"	4"
"	600000	"	4"
"	700000	"	4 1/2"
"	800000	"	4 1/2"

For groups or combinations not included in the above tables, consult the inspection department. For such groups or combinations, it is recommended that the conduit be of such size, that the sum of the cross-sectional areas of the several conductors will not be more than 40 per cent of the interior cross-sectional area of the conduit.

n. Wires in vertical conduits shall be supported at the following intervals:

No. 14	to No. 8	not greater than 100 feet
No. 00	" No. 0000	" " " 80 "
No. 0000	" 350000 C.M.	" " " 60 "
350001 C.M.	" 500000 C.M.	" " " 50 "
500001 C.M.	" 750000 C.M.	" " " 40 "
	above 750000 C.M.	" " " 35 "

USEFUL DATA

Comparison Between Weight and Measures

Linear Measure						Statute
Inches	Feet	Yards	Fathoms	Rods	Furlongs	Mile
12	1.0					
36	3.	1.0				
72	6.	2.	1.0			
198.	16.5	5.5	2.75	1.0		
7920	660.0	220.0	110.0	40.	1.0	
63360	5280.	1760.	880.	320.	8.	1.0

Gunter's Chain

Nautical Measure

			U.S. Naut.				Statute
Inches	Links	Chains	Mile	Miles	Feet	Leag. Deg.	Miles
7.92	1.0	...	1.0	6080.2	...	...	1.1516
792.0	100.	1.0	3.	18240.6	1.0	...	3.455
63360.	8000	80.	1.0 60.	364812.0	20.	1.0	69.097

Square Measure

Sq. Inches	Sq. Feet	Sq. Yards	Sq. Rods	Acres	Sq. Mile
144.	1.0				
1296.	9.	1.0			
39204.	272.25	30.25	1.0		
6272640.	43560.0	4840.0	160.	1.0	
...	...	3097600.	102400.	640.	1.0

An acre is 69.5701 yards square; or 208.710321 feet square.

A township is 6 miles square=36 sections.

A section is 1 mile square.

Cubic Measure

Cu. Inches	Cu. Feet	Cu. Yard
1728	1.0	
46656	27.	1.0

Avoirdupois Weight

Grains	Drams	Ounces	Pounds	Cwts.	Short Ton
27.344	1.0				
437.5	16.	1.0			
7000.	256.00	16.	1.0		
...	...	1600.	100.	1.0	
...	...	32000.	2000.	20.	1.0

1 Avoirdupois pound=1.21528 Troy Pound.

1 Long Ton=2240 pounds.

Apothecaries' or Troy Weight

Grains	Scruples	Penny-weights	Drams	Ounces	Pound
20.0	1.0				
24.	1.2	1.0			
60.	3.0	2.5	1.0		
480.	24.	20.0	8.	1.0	
5760.	288.	240.	96.	12.	1.0

Liquid or Wine Measure

					Cu. Ins. of Pure Water	
Gills	Pints	Quarts	Gallons	Barrel	Amer.	Imp.
4.0	1.0				28.875	34.6593
8.	2.	1.0			57.750	69.3185
32.	8.	4.	1.0		231.0	277.274
1008.	252.	126.	31.5	1.0		

Dry Measure (American)

					Cu. Inches
Pints	Quarts	Dry Gallons	Pecks	Bushel	
2.0	1.0				67.2
8.	4.	1.0			268.8
16.	8.	2.	1.0		537.6
64.	32.	8.	4.	1.0	

USEFUL DATA

Table of Factors

To Find Amperes Per Phase for Any Given Load—Alternating Current

One, Two and Three-Phase Circuits

To find the amperes per phase, multiply the load expressed in kilowatts by the factor under the proper voltage and power factor.

Volts	POWER FACTOR			
	100%	90%	80%	70%
Three Phase Circuits				
110	5.256	5.84	6.57	7.51
220	2.628	2.92	3.28	3.75
370	1.562	1.735	1.952	2.231
380	1.521	1.690	1.900	2.170
390	1.482	1.646	1.852	2.117
440	1.314	1.460	1.640	1.877
550	1.050	1.166	1.312	1.500
1100	.5256	.584	.657	.751
2200	.2628	.292	.328	.375
2400	.2400	.266	.3000	.342
3300	.1750	.1944	.2187	.250
6600	.0875	.0972	.1093	.125
10000	.0578	.0640	.0722	.0825
13200	.0438	.0486	.0546	.0625
16500	.0350	.0388	.0437	.0500
22000	.0263	.0292	.0328	.0375
33000	.0175	.0194	.0219	.0250

Two Phase Circuits

110	4.54	5.04	5.67	6.48
220	2.27	2.52	2.83	3.24
440	1.13	1.26	1.41	1.62
1100	.454	.504	.567	.648
2200	.227	.252	.283	.324

Single Phase Circuits

110	9.09	10.01	11.36	12.98
220	4.54	5.05	5.68	6.49
440	2.27	2.52	2.84	3.24
1100	.909	1.01	1.136	1.298
2200	.454	.505	.568	.649

ALTERNATING CURRENT

TRANSMISSION LINE CALCULATION

(Regulation Chart)

The characteristic of a transmission line which limits the load it may carry is called its regulation. Regulation is the variation in voltage which occurs at the receiver end when the load is thrown on and off, and is expressed as a percentage of the receiver voltage.

USEFUL DATA

ALTERNATING CURRENT

TRANSMISSION LINE CALCULATION (Cont'd)

To find Regulation, Regulation Volts, and Line Drop.

Place a straight-edge across the chart from the point on the left corresponding to the spacing of the transmission line, to the point on the right corresponding to the resistance of the conductor per mile. The intersection with the scale for the required power factor will give a value "V" (regulation factor) which can be used in the following formulae:—

For two-phase (4-wire) and three-phase lines:—

$$\text{Regulation Volts} = \frac{1000 K.V.A. \times IV}{E}$$

or

$$\text{Per Cent Regulation} = \frac{100000 K.V.A. \times IV}{E^2}$$

Where $K.V.A.$ = Kilovolt-amperes of load at receiver end.

E = Line voltage at the load or receiver end.

l = Length of line in miles (one way).

V = Regulation factor obtained from chart.

For single-phase lines use $2V$ instead of V in the above formulae.

The line drop, or difference in voltage between the supply end and the receiver end of the line, is the same as the regulation for lines less than 20 miles long, but for longer lines the effect of the charging current must be taken into account by the formulae:—

$$\text{Line drop} = \text{Regulation volts} - EK \left(\frac{l}{1000} \right)^2 \quad \text{or}$$

$$\text{Per cent Line Drop} = \text{Per cent Regulation} - 100K \left(\frac{l}{1000} \right)^2$$

(Per cent of E)

Where $K=2.16$ for 60 cycles and 0.375 for 25 cycles.

It is seen that the voltage due to the charging current is proportional to the line voltage E and to the square of the number of miles, but is independent of the sizes and spacing of the conductors within the assigned limit of accuracy. The constant K does not need to be used in the formula for regulation, since the charging current is present both at no load and full load.

To Obtain Size of Wire for a given Regulation.

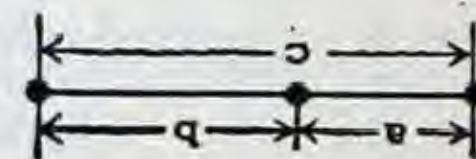
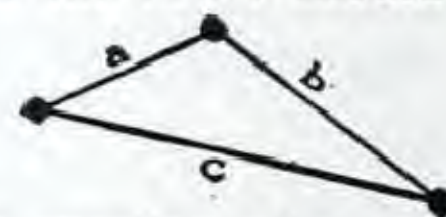
"V," the regulation factor, is first found from the equation

$$V = \frac{\text{Per cent Regulation} \times E^2}{100000 K.V.A. \times l}$$

Lay a straight-edge across the chart from a point on the left corresponding to the spacing of the transmission line to a point in the centre corresponding to the value of "V." The nearest size of conductor can be seen, at a glance, on the resistance scale at the right.

Correction for Spacing.

When the wires of a three-phase line are not spaced at the corners of an equilateral triangle, but are at irregular distances $a-b-c$ from one another, then the spacing to be taken for use on the chart should be $= \sqrt[3]{abc}$



The spacing of a two-phase line is the average distance between wires of the same phase. The distance between wires of different phases is not considered.

The following examples will serve to make clear the application of the above formulae and use of the chart.

Example "A"

Find the Regulation and line drop for the following:—

3,000 K.V.A. at receiver end—66,000 volts—90 per cent power factor—three-phase—60 cycles—conductor No. 3 A.W.G. copper—length of line 100 miles—spacing 8 feet.

Placing the straight-edge across the chart from 8-foot spacing, at 60 cycles for copper on the left to No. 3 copper conductor on resistance scale on the right, the intersection with the 90 per cent power factor scale at centre is $1.344 = "V."$

$$\text{Percent Regulation} = \frac{100,000 K.V.A. \times IV}{E^2}$$

$$= \frac{100,000 \times 3000 \times 100 \times 1.344}{66000 \times 66000} = 9.26\%$$

$$\text{Per cent line drop} = \text{Per cent Regulation} - 100K \left(\frac{l}{1000} \right)^2$$

$$= 9.26 - 100 \times 2.16 \left(\frac{100}{1000} \right)^2 = 7.10\%$$

USEFUL DATA

Alternating Current Transmission Line Calculation Connection for Spacing (Cont'd)

Example "B."

Find the size of copper to give approximately 10 per cent voltage drop for the following:—

250 K.V.A. at receiver end—2,200 volts—85 per cent power factor—three phase—60 cycles—flat spacing—Wire 2 feet apart—3 miles long.

$$\text{Find the value of "V"} = \frac{\text{Per cent Regulation} \times E}{100,000 K.V.A. \times l}$$

$$= \frac{10 \times 2200 \times 2200}{100,000 \times 250 \times 3} = .64$$

$$\text{Equivalent spacing } S = \sqrt[3]{abc}$$

$$= \sqrt[3]{2 \times 2 \times 4} = 2.52 \text{ feet.}$$

Place straight-edge at 2½-foot spacing through 0.64 on regulation factor scale for 85 per cent power factor and line cuts resistance scale at 0.36 or nearest size of copper is No. 000 A.W.G.

Example "C"

Find the voltage drop on the following two-phase line—15,000 K.V.A. at receiver end—100,000 volts—95 per cent power factor—two-phase—25 cycles—No. 2/0 A.W.G. aluminum—80 miles of line—10-foot spacing.

Placing the straight-edge from 10-foot spacing for 25 cycles aluminum to the resistance for No. 2/0 aluminum conductor the value of "V" at intersection with 95 per cent power factor is found to be 0.750

$$\text{Line drop} = \frac{1000 K.V.A. \times l V}{E} - EK \left(\frac{l}{1000} \right)^2$$

$$= \frac{1000 \times 15000 \times 80 \times .75}{100000} - 100000 \times 0.375 \left(\frac{80}{1000} \right)^2$$

$$= 9000 - 240 = 8760 \text{ volts}$$

Example "D"

Find the Regulation of the following single-phase line:—300 K.V.A. at receiver end—11,000 volts—single-phase—60 cycles—50 per cent power factor—No. 1/0 A.W.G. copper—15 miles of line with 3-foot spacing.

With spacing and size of wire find "V" from the chart for 50 per cent power factor=0.851

$$\text{Per cent Regulation} = \frac{100000 K.V.A. \times 2Vl}{E^2}$$

$$= \frac{100000 \times 300 \times 2 \times .851 \times 15}{11000 \times 11,000} = 6.33\%$$

Example "E"

Find the K.V.A. which can be delivered at end of the following line with 8 per cent regulation:—

88,000 volts at receiver end—three-phase—25 cycles—85 per cent power factor—No. 2/0 A.W.G. aluminum—75 miles with 8-foot flat spacing.

$$\text{Equivalent spacing } S = \sqrt[3]{abc}$$

$$S = \sqrt[3]{8 \times 8 \times 16} = 10.08 \text{ feet}$$

With values of spacing and size of wire obtain value of "V" from chart for 85 per cent power factor. V=0.755.

$$K.V.A. = \frac{\text{Per cent Reg'tion} \times E^2}{V \times 100000 \times l} = \frac{8 \times 88000 \times 88000}{.755 \times 100000 \times 75} = 10900$$

Advised Voltages for Various Line Lengths				Conductor Spacing for Various Voltages	
Length of Line	Voltage	Volts	Interaxial Distances		
0- 1 Mile	500- 1000	volts	5000	28 inches	
1- 2 "	1000- 2300	"	15000	40 "	
2- 3 "	2300- 6600	"	30000	48 "	
3- 10 "	6600- 13200	"	45000	60 "	
10- 15 "	13200- 22000	"	60000	72 "	
15- 20 "	22000- 44000	"	75000	84 "	
20- 40 "	44000- 66000	"	90000	96 "	
40- 60 "	66000- 88000	"	105000	108 "	
60-100 "	88000-110000	"	120000	120 "	

USEFUL DATA

Alternating Current Transmission Line Calculation Connection for Spacing

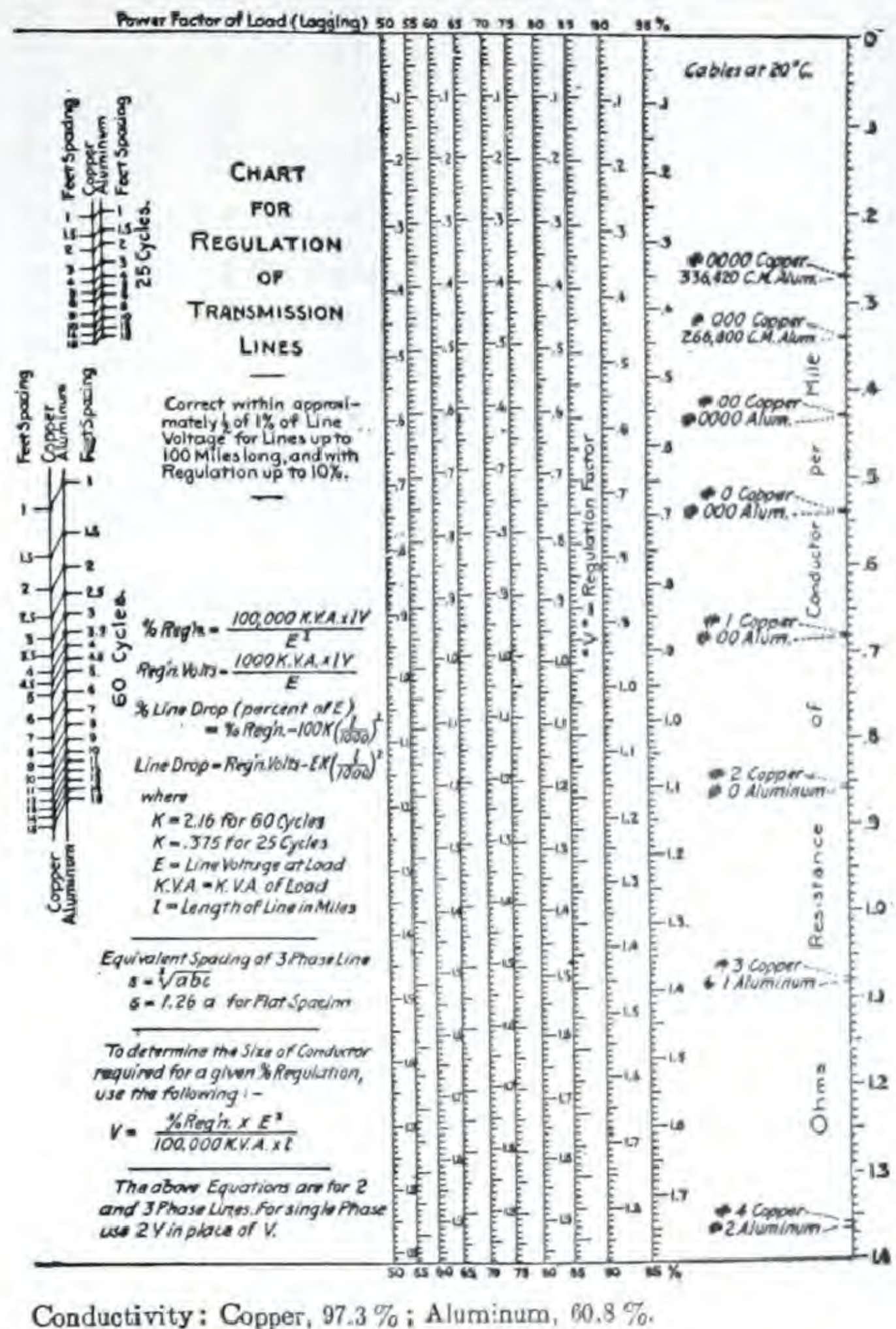
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D. Van Nostrand Co.

New York

1913.



Illumination Terms—Abbreviations

B.E.—Bowl enamel	Ltg. Ser.—Lighting service
B.F.—Bowl frosted	M.—Mill type
Bl.—Blue	Med.—Medium
Cand.—Candelabra	Mog.—Mogul
C.H.—Country home	Proj.—Projection
Cl.—Clear	Sp.—Special
Col.—Colored red, blue, green or yellow	St. Ry.—Street railway
Day.—Daylight	St. Sr.—Street series
Flood.—Flood lighting	Wh.—White coated
Fr.—Frosted	115.—110, 115 and 120
F.T.—Flame tinted	230.—220, 230, 240 and 250
Gen'l.—General	575.—255, 550, 575, 600, 625 and 650
L.C.—Locomotive cab	
L.H.—Locomotive headlight	

Coefficient of Reflection of Colored Surfaces

1 White.....81%	9 Satin Green.....67%
2 Ivory White.....76%	10 Primrose.....67%
3 Gray White.....73%	11 Buff.....59%
4 Ivory.....72%	12 Shell Pink.....57%
5 Caen Stone.....50%	13 Pale Azure.....36%
6 Lichen Gray.....70%	14 Salmon Pink.....51%
7 Pearl Gray.....70%	15 Silver Gray.....50%
8 Light Gray.....67%	16 Bright Sage.....43%

USEFUL DATA

Comparison of Fahrenheit and Centigrade Scales

Centigrade to Fahrenheit		Fahrenheit to Centigrade	
0	32	32	0.00
5	41	40	4.44
10	50	50	10.00
15	59	60	15.55
20	68	70	21.11
25	77	80	26.67
30	86	90	32.22
35	95	100	37.78
40	104	110	43.33
45	113	120	48.89
50	122	130	54.44
55	131	140	60.00
60	140	150	65.56
65	149	160	71.11
70	158	170	76.67
75	167	180	82.22
80	176	190	87.78
85	185	200	93.33
90	194	210	98.89
95	203	212	100.00
100	212	...	...

Temp. C. = $5/9$ (temp. F. - 32).Temp. F. = $32 + 9/5$ temp. C.

Boiling point of water (212° F.) Freezing point of water (32° F.)

Table of Physical Constants of Metals

Metals	Sym- bol	Specific Gravity	Pounds Per Cubic Foot	Pounds per Cubic Inch	Melting Point in Deg. Fahr.
Aluminum, Cast	Al	2.56	159.82	0.09249	1218
" Drawn	"	2.70*	168.56	.09755	1218
" Annealed	"	2.66	166.06	.09610	1218
Antimony	Sb	6.69*	417.65	.2417	1166
Brass, Cu 66.27 Zn 33.5 Cast....	..	8.37	522.52	.3024	1660
Brass, Cu 60.94, Zn 38.65 Cast....	..	8.41	525.02	.3038	1635
Bronze, Cu 90.27, Sn 9.58, Cast....	..	8.67	541.25	.3132	1840
Bronze, Cu 80.95, Sn 18.84, Cast..	..	8.74	545.62	.3158	1635
Cadmium.....	Cd	8.67*	541.25	.3132	610
Chromium.....	Cr	6.92*	432.00	.2500	2768
Cobalt.....	Co	8.71*	543.75	.3147	2692
Copper, Cast.....	Cu	8.87	553.74	.3205	1981
" Wrought.....	"	8.90	555.61	.3215	"
" Drawn, AIEE	"	8.89*	554.99	.3212	"
Gold.....	Au	19.33*	1206.74	.6983	1945
Iron, Cast.....	Fe	7.22	450.73	.2608	2786
" Wrought.....	"	7.70	480.70	.2782	"
" Wire.....	"	7.77	485.07	.2807	"
" Pure.....	"	77.865*	491.00	.2841	"
Lead.....	Pb	11.37*	709.81	.4108	621
Magnesium.....	Mg	1.72*	107.38	.06214	1204
Manganese.....	Mn	7.40*	461.97	.2673	1300
Mercury.....	Hg	13.55*	845.90	.4895	-37.7
Nickel.....	Ni	8.80*	549.37	.3179	2646
Platinum.....	Pt	21.45*	1339.09	.7749	3191
Potassium.....	K	0.87*	54.31	.03143	144
Silver.....	Ag	10.60*	661.74	.3830	1761
Sodium.....	Na	0.971*	60.62	.03508	208
Steel, Bessemer....	..	7.852	490.19	.2837	...
Steel, Soft.....	..	7.854	490.31	.2837	...
Tin, Pure.....	Sn	7.30*	455.73	.2637	450
Tungsten.....	W	18.85*	1176.77	.6810	5432
Vanadium.....	V	5.50*	343.36	.1987	3118
Zinc, Cast.....	Zn	6.861	428.32	.2479	787
" Pure.....	"	7.19*	448.86	.2598	"

*Values taken from U.S. Bureau of Standards—1912.

NOTE—

Water at 39.1 deg. Fahr.=4°C.=62.425 pounds to the cubic foot.

Water at 39.1 deg. Fahr.=4°C.= 0.036126 pound to the cubic inch.

USEFUL DATA

Tubular Comparison of Wire Gauges

(Bureau of Standards)

Gauge No.	Diameter in Mils			
	American Wire Gauge (A.W.G.) (B. & S.)	Steel Wire Gauge (Stl. W.G.)	Birmingham Wire Gauge (Stub's) (B.W.G.)	British Standard Wire Gauge (S.W.G.)
0000	460.	393.8	454.	400.
000	409.6	362.5	425.	372.
00	364.8	331.0	380.	348.
0	324.9	306.5	340.	324.
1	289.3	283.0	300.	300.
2	257.6	262.5	284.	276.
3	229.4	243.7	259.	252.
4	204.3	225.3	238.	232.
5	181.9	207.0	220.	212.
6	162.0	192.0	203.	192.
7	144.3	177.0	180.	176.
8	128.5	162.0	165.	160.
9	114.4	148.3	148.	144.
10	101.9	135.0	134.	128.
11	90.74	120.5	120.	116.
12	80.81	105.5	109.	104.
13	71.96	91.5	95.	92.
14	64.08	80.0	83.	80.
15	57.07	72.0	72.	72.
16	50.82	62.5	65.	64.
17	45.26	54.0	58.	56.
18	40.30	47.5	49.	48.
19	35.89	41.0	42.	40.
20	31.96	34.8	35.	36.
21	28.46	31.7	32.	32.
22	25.35	28.6	28.	28.
23	22.57	25.8	25.	24.
24	20.10	23.0	22.	22.
25	17.90	20.4	20.	20.
26	15.94	18.1	18.	18.
27	14.20	17.3	16.	16.4
28	12.64	16.2	14.	14.8
29	11.26	15.0	13.	13.6
30	10.03	14.0	12.	12.4
31	8.93	13.2	10.	11.6
32	7.95	12.8	9.	10.8
33	7.08	11.8	8.	10.0
34	6.31	10.4	7.	9.2
35	5.62	9.5	5.	8.4
36	5.00	9.0	4.	7.6
37	4.45	8.5	....	6.8
38	3.97	8.0	....	6.0
39	3.53	7.5	....	5.2
40	3.15	7.0	....	4.8

Short Cuts to Remember the A. W. G. Wire Table

A wire which is three sizes larger than another wire has half the resistance and twice the weight and area.

A wire which is ten sizes larger than another wire has one-tenth the resistance and ten times the weight and area.

It will be found easy to remember that a No. 10 copper wire, which can be used as a base, has the following approximate values: 1 ohm resistance per 1,000 ft. at 20° C.; a diam. of 0.10 inch; a cross-section of 10,000 C.M.; and weighs 31.4 lbs. per 1,000 feet. (It may be easier to remember that a No. 5 copper wire weighs approximately 100 lbs. per 1,000 feet.)

Between gauge No. 6 and No. 12 inclusive, the reciprocal of any number equals the diameter in inches within 3 per cent.

To find the resistance, drop one cipher from the number of circular mils; the result is the number of feet per ohm.

To find the weight, drop four ciphers from the number of circular mils and multiply by the weight of No. 10 wire.

USEFUL DATA
The Metric System

Tables of Comparison of Metric and Customary Units

Units of Length

Unit	Meters	Inches	Feet	Yards	Miles
Meters					
1 Milli.	0.001	0.03937	0.00328	....	....
1 Centi.	.01	.3937	.03280	....	....
1 Deci.	.10	3.937	.32808	0.10936	....
1 Meter	1.0	39.37	3.28033	1.09361	0.000621
1 Deka.	10.	....	32.80833	10.96311	.006214
1 Hecto.	100.	....	328.0833	109.36111	.062137
1 Kilo.	1000.	....	3280.833	1093.6111	.62137

Units of Area

Units	Sq. Meters	Sq. Inches	Sq. Feet	Acres
1 Sq. Centi.	0.0001	0.155	0.001076	....
1 Sq. Deci.	.01	15.5	.107639	....
1 Centaire	1.	1549.997	10.76387	0.00025
1 Arc	100.	154999.69	1076.387	.02471
1 Hectaire	10000.	....	....	2.47104
1 Sq. Kilo.	1000000.	....	....	247.104

Units of Volume

Units	Cubic Meters	Cubic Inches	Cubic Yards
Meters			
1 Cu. Centi.	0.000001	0.0610234	....
1 Cu. Deci.	.001	61.02338	....
1 Stere	1.	61023.38	1.307943
1 Cu. Deka.	1000.	....	1307.9428
1 Cu. Hecto.	1000000.	....	1307942.8

Units of Weight

Units	Grams	Grains	Ounces Avoir- dupois	Pounds Avoir- dupois
1 Milligram	0.001	0.01543	....	....
1 Centigram	.01	.15432	....	....
1 Decigram	.1	1.54324	....	....
1 Gram	1.	15.43236	0.03527	0.002205
1 Dekagram	10.	....	.35274	.022046
1 Hectogram	100.	....	3.52740	.220462
1 Kilogram	1000	....	35.27396	2.204622
1 Myriagram	10000.	....	....	22.046223
1 Quintal	100000.	....	....	220.462234
1 Metric Ton	1000000.	....	....	2204.62234

Units of Capacity Liquid Measure (British Units)

Units	Liters	Gallons	Quarts	Pints	Gills
Meters					
Liters					
1 Milli.	0.001	....	....	0.00176	0.00704
1 Centi.	.01	....	....	0.1761	.07043
1 Deci.	.1	....	....	.17608	.70432
1 Liter	1.	0.2201	0.8804	1.7608	7.0432
1 Deka.	10.	2.201	8.804	17.608	70.432
1 Hecto.	100.	22.01	88.04	176.08	704.32
1 Kilo.	1000.	220.1	880.4	1760.8	7043.2

- 1 Liter=61.028 cubic inches (British Standard).
- 1 Liter=61.025 cubic inches (United States Standard).
- 1 Imperial Gallon=277.274 cubic inches.
- 1 U.S. Gallon=231. cubic inches.

Units of Capacity Dry Measure (British Units)

Units	Liters	Bushels	Pecks	Dry Quarts	Dry Pints
1 Liter	1.	0.02751	0.11004	0.88032	1.7606
1 Dekaliter	10.	.2751	1.1004	8.8032	17.6064
1 Hectoliter	100	2.751	11.004	88.032	176.064
1 Kiloliter	1000.	27.51	110.04	880.32	1760.64

- 1 British Bushel=2218.19 cubic inches.
- 1 U.S. Bushel=2150.42 cubic inches.

USEFUL DATA
The Metric System

(Continued)

Decimal and Millimeter Equivalents of Fractions of
One Inch

8ths	16ths	32nds	64ths	Inches	Millimeters	8ths	16ths	32nds	64ths	Inches	Millimeters
..	..	..	1	0.0156	0.397	..	..	..	33	0.5156	13.10
..	..	1	2	.0313	.794	..	..	17	34	.5313	13.50
..	..	..	3	.0469	1.19	..	..	..	35	.5469	13.89
..	1	2	4	.0625	1.59	..	9	18	36	.5625	14.29
..	..	..	5	.0781	1.98	..	..	..	37	.5781	14.68
..	..	3	6	.0938	2.38	..	..	19	38	.5938	15.08
..	..	..	7	.1094	2.78	..	..	..	39	.6094	15.48
1	2	4	8	.1250	3.18	5	10	20	40	.6250	15.88
..	..	..	9	.1406	3.57	..	..	..	41	.6406	16.27
..	..	5	10	.1563	3.97	..	..	21	42	.6563	16.67
..	..	..	11	.1719	4.37	..	..	..	43	.6719	17.07
..	3	6	12	.1875	4.76	..	11	22	44	.6875	17.47
..	..	..	13	.2031	5.16	..	..	..	45	.7031	17.80
..	..	7	14	.2188	5.56	..	..	23	46	.7188	18.26
..	..	..	15	.2344	5.95	..	..	..	47	.7344	18.65
2	4	8	16	.2500	6.35	6	12	24	48	.7500	19.05
..	..	..	17	.2656	6.75	..	..	..	49	.7656	19.45
..	..	9	18	.2813	7.15	..	..	25	50	.7813	19.85
..	..	..	19	.2969	7.54	..	..	..	51	.7969	20.24
..	5	10	20	.3125	7.94	..	13	26	52	.8125	20.64
..	..	..	21	.3281	8.33	..	..	..	53	.8281	21.03
..	..	11	22	.3438	8.73	..	..	27	54	.8438	21.43
..	..	..	23	.3594	9.13	..	..	..	55	.8594	21.83
3	6	12	24	.3750	9.53	7	14	28	56	.8750	22.23
..	..	..	25	.3906	9.92	..	..	..	57	.8906	22.62
..	..	13	26	.4063	10.32	..	..	29	58	.9063	23.02
..	..	..	27	.4219	10.72	..	..	..	59	.9219	23.42
..	7	14	28	.4375	11.11	..	15	30	60	.9375	23.81
..	..	..	29	.4531	11.51	..	..	..	61	.9531	24.21
..	..	15	30	.4688	11.91	..	..	31	62	.9688	24.61
..	..	..	31	.4844	12.30	..	..	..	63	.9844	25.00
4	8	16	32	.5000	12.70	8	16	32	64	1.0000	25.40

USEFUL INFORMATION

Data on Solid Copper Wire

Size B. & S. Gauge	Diameter in Mills	Carrying Capacity in Amperes		Circular Mills	Pounds per Thousand Feet (Bare)	Pounds Per Mile (Bare)	Ohms per Thousand Feet	Ohms Per Mile
		Rubber Insulation	Other Insulation					
0000	460	225	325	211600	640.5	3380	.0500	.264
000	410	175	275	168100	507.9	2680	.0630	.333
00	365	150	225	133100	402.8	2130	.0795	.420
0	325	125	200	105500	319.5	1680	.1000	.528
1	289	100	150	83690	253.3	1340	.126	.665
2	258	90	125	66370	200.9	1060	.159	.840
3	229	80	100	52640	159.3	840	.201	1.06
4	204	70	90	41740	126.4	665	.253	1.34
5	182	55	80	33100	100.2	528	.319	1.68
6	162	50	70	26250	79.46	420	.403	2.13
8	128	35	50	16510	49.98	264	.641	3.38
10	102	25	30	10380	31.43	166	1.02	5.39
12	81	20	25	6530	19.77	105	1.62	8.55
14	64	15	20	4197	12.43	65.5	2.58	13.6
16	51	6	10	2583	7.82	41.3	4.09	21.6
18	40	3	5	1624	4.92	26.0	6.51	34.4
19	36	...	...	1288	3.90	20.6	8.21	43.4
20	32	...	...	1022	3.09	16.3	10.4	54.9

Data on Copper Cable

Size	Carrying Capacity in Amperes		Number of Wires in Cable	Diameter of Each Wire in Mills	Diameter of Bare Cable in Mills	Pounds per Thousand Feet (Bare)	Pounds per Mile (Bare)	Ohms per Thousand Feet	Ohms per Mile
	Rubber Insula- tion	Other Insula- tion							
14 B. & S.	15	20	7	24.3	72.9	13	68	....	....
12 B. & S.	20	25	7	30.6	91.8	20	105	....	....
10 B. & S.	25	30	7	38.6	115.8	32	168	....	....
8 B. & S.	35	50	7	48.6	146.0	51	269	.654	3.453
6 B. & S.	50	70	7	61.2	184.	81	427	.410	2.165
5 B. & S.	55	80	7	68.8	206.	102	544	.326	1.721
4 B. & S.	70	90	7	77.2	232.	129	682	.259	1.368
3 B. & S.	80	100	7	86.7	260.	163	867	.205	1.082
2 B. & S.	90	125	7	97.4	292.	205	1,089	.162	.855
1 B. & S.	100	150	19	66.4	332.	258	1,368	.121	.639
0 B. & S.	125	200	19	74.5	373.	326	1,733	.102	.539
00 B. & S.	150	225	19	83.7	418.	411	2,192	.0811	.4282
000 B. & S.	175	275	19	94.0	470.	518	2,745	.0642	.3390
0000 B. & S.	225	325	19	105.5	528.	653	3,484	.0509	.2688
250,000 C.M.	250	350	37	82.2	575.	772	4,080	.0431	.2276
300,000 C.M.	275	400	37	90.0	630.	926	4,984	.0360	.1901
350,000 C.M.	300	450	37	97.3	681.	1,080	5,476	.0300	.1584
400,000 C.M.	325	500	37	104.0	728.	1,240	6,566	.0270	.1426
450,000 C.M.	365	550	37	110.3	772.	1,390	7,480	.0240	.1267
500,000 C.M.	400	600	37	116.2	814.	1,540	8,222	.0216	.1140
550,000 C.M.	425	640	61	95.0	855.	1,700	9,032	.0196	.1035
600,000 C.M.	450	680	61	99.2	893.	1,850	9,852	.0180	.0950
650,000 C.M.	475	720	61	103.2	929.	2,010	10,688	.0166	.0876
700,000 C.M.	500	760	61	107.1	964.	2,160	11,506	.0154	.0813
750,000 C.M.	525	800	61	110.9	998.	2,320	12,304	.0144	.0760
800,000 C.M.	550	840	61	114.5	1,031.	2,470	13,136	.0135	.0713
900,000 C.M.	600	920	61	121.5	1,093.	2,780	14,864	.0120	.0634
1,000,000 C.M.	650	1000	61	128.0	1,152.	3,090	16,498	.0108	.0570
1,250,000 C.M.	750	1180	91	117.3	1,281.	3,860	20,534	.0090	.0475
1,500,000 C.M.	850	1360	91	128.4	1,412.	4,630	24,610	.00719	.03796
1,750,000 C.M.	975	1515	127	117.3	1,547.	5,400	28,700	.00629	.03321
2,000,000 C.M.	1050	1670	127	125.5	1,631.	6,180	32,800	.00539	.02846

USEFUL INFORMATION

Standard Iron Pipe Size Copper and Aluminum Tubing

Size	Outside Diameter	Inside Diameter	Copper Tubing				Aluminum Tubing			
			Weight Pounds per Foot	Amperes Carrying Capacity	Span Normal Con't'ons	Span Severe Con't'ons	Weight Pounds per Foot	Amperes Carrying Capacity	Span Normal Con't'ons	Span Severe Con't'ons
1/8"	.405"	.281"	.26	....	....	....	....	....	....	....
1/4"	.540"	.375"	.45	....	....	....	.146	....	....	....
3/8"	.675"	.494"	.65	....	....	....	.195	....	....	....
1/2"	.840"	.625"	.95	350	8 ft.	5 ft.	.292	275	11 ft.	6 ft.
3/4"	1.050"	.822"	1.31	450	10 ft.	8 ft.	.390	350	14 ft.	8 ft.
1"	1.315"	1.062"	1.79	600	12 ft.	11 ft.	.581	460	16 ft.	11 ft.
1 1/4"	1.660"	1.368"	2.63	780	14 ft.	13 ft.	.784	600	19 ft.	13 ft.
1 1/2"	1.900"	1.600"	3.15	900	16 ft.	15 ft.	.935	680	22 ft.	15 ft.
2"	2.375"	2.062"	4.20	1100	20 ft.	18 ft.	1.25	875	26 ft.	18 ft.
2 1/2"	2.875"	2.500"	6.04	1600	24 ft.	21 ft.	2.00	1170	32 ft.	22 ft.
3"	3.500"	3.062"	8.72	2000	28 ft.	25 ft.	2.62	1450	36 ft.	27 ft.
3 1/2"	4.000"	3.500"	11.45	....	....	....	3.14	....	....	....
4"	4.500"	4.000"	13.33	....	....	....	....	....	....	....

Extra Heavy Iron Pipe Size Copper Tubing

Size	Outside Diameter	Inside Diameter	Weight Pounds per Foot	Amperes Carrying Capacity	Span Normal Conditions	Span Severe Conditions
1/8"	.405"	.205"	.388	....	....	....
1/4"	.540"	.294"	.650	....	....	....
3/8"	.675"	.421"	.870	....	....	....
1/2"	.840"	.542"	1.330	400	7 ft.	7 ft.
3/4"	1.050"	.736"	1.750	500	9 ft.	9 ft.
1"	1.315"	.951"	2.478	700	11 ft.	11 ft.
1 1/4"	1.660"	1.272"	3.465	900	14 ft.	14 ft.
1 1/2"	1.900"	1.494"	4.462	1000	16 ft.	16 ft.
2"	2.375"	1.933"	5.733	1400	20 ft.	19 ft.
2 1/2"	2.875"	2.315"	8.715	1900	22 ft.	21 ft.
3"	3.500"	2.892"	11.760	2250	25 ft.	24 ft.
3 1/2"	4.000"	3.358"	14.385	....	....	....
4"	4.500"	3.818"	17.325	....	....	....

The carrying capacity of copper or aluminum tubing is based on a thirty degree Centigrade rise over an ambient temperature of fifty degrees Centigrade.

Spans for normal conditions are based on 1/4" radial ice with a sag equal to the outside diameter of the tubing used, and 1/2" radial ice without permanent deflection, and short circuit currents of not over 10,000 amperes.

Spans for severe conditions are based on 1" radial ice with sag equal to the outside diameter of the tubing used, and 2" radial ice without permanent deflection, and short circuit currents of not over 30,000 amperes.

Decimal Equivalents

Fractions Decimals

1/64 = .015625
1/32 = .03125
3/64 = .046875
1/16 = .0625
5/64 = .078125
3/32 = .09375
7/64 = .109375
1/8 = .125
9/64 = .140625
5/32 = .15625
11/64 = .171875
3/16 = .1875
13/64 = .203125
7/32 = .21875
15/64 = .234375
1/4 = .25

Fractions Decimals

17/64 = .265625
9/32 = .28125
19/64 = .296875
5/16 = .3125
21/64 = .328125
11/32 = .34375
23/64 = .359375
3/8 = .375
25/64 = .390625
13/32 = .40625
27/64 = .421875
7/16 = .4375
29/64 = .453125
15/32 = .46875
31/64 = .48375
1/2 = .5

Fractions Decimals

33/64 = .515625
17/32 = .53125
35/64 = .546875
9/16 = .5625
37/64 = .578125
19/32 = .59375
39/64 = .609375
5/8 = .625
41/64 = .640625
21/32 = .65625
43/64 = .671875
11/16 = .6875
45/64 = .703125
23/32 = .71875
47/64 = .734375
3/4 = .75

Fractions Decimals

49/64 = .765625
25/32 = .78125
51/64 = .796875
13/16 = .8125
53/64 = .828125
27/32 = .84375
55/64 = .859375
7/8 = .875
57/64 = .890625
29/32 = .90625
59/64 = .921875
15/16 = .9375
61/64 = .953125
31/32 = .96875
63/64 = .984375

USEFUL INFORMATION

Data on Aluminum and Copper
Bus Bars

Size in Inches	Pounds Per Foot Aluminum	Pounds Per Foot Copper	Size in Inches	Pounds Per Foot Aluminum	Pounds Per Foot Copper
1/8 x 1	.146	.482	3/8 x 3	1.318	4.334
1/8 x 1 1/2	.220	.722	3/8 x 4	1.758	5.778
1/8 x 2	.293	.963	3/8 x 5	2.197	7.223
1/4 x 1	.293	.963	3/8 x 6	2.637	8.667
1/4 x 1 1/2	.440	1.445	3/8 x 8	3.517	11.556
1/4 x 2	.568	1.926	3/8 x 10	4.394	14.445
1/4 x 2 1/2	.732	2.408	1/2 x 1	.586	1.926
1/4 x 3	.879	2.889	1/2 x 1 1/2	.880	2.889
1/4 x 4	1.172	3.852	1/2 x 2	1.172	3.852
1/4 x 5	1.465	4.815	1/2 x 2 1/2	1.464	4.815
1/4 x 6	1.758	5.778	1/2 x 3	1.758	5.778
1/4 x 8	2.344	7.704	1/2 x 4	2.344	7.704
1/4 x 10	2.930	9.630	1/2 x 5	2.930	9.630
3/8 x 1	.439	1.445	1/2 x 6	3.516	11.556
3/8 x 1 1/2	.659	2.167	1/2 x 8	4.688	15.408
3/8 x 2	.878	2.889	1/2 x 10	5.859	19.260
3/8 x 2 1/2	1.098	3.611			

The carrying capacity of copper or aluminum bus bars varies considerably with frequency and arrangement. We will gladly give recommendations to fit certain conditions. Refer your problems to us.

Weight per Lineal Foot of Standard Sizes
Round or Square Copper

Size in Inches	Square Lbs. Per Foot	Round Lbs. Per Foot	Size in Inches	Square Lbs. Per Foot	Round Lbs. Per Foot
3/8	.542	.4256	1 1/2	8.67	6.8109
7/16	.737	.5794	1 5/8	10.18	7.9931
1/2	.964	.7567	1 3/4	11.08	9.2702
9/16	1.220	.9578	1 7/8	13.55	10.6420
5/8	1.510	1.1824	2	15.42	12.1082
11/16	1.820	1.4307	2 1/4	19.51	15.3251
3/4	2.170	1.7027	2 1/2	24.09	18.9161
13/16	2.540	1.9982	2 3/4	29.05	22.8913
7/8	2.950	2.3176	3	34.69	27.2435
15/16	3.390	2.6605	3 1/4	40.71	31.9722
1	3.860	3.0270	3 1/2	47.22	37.0808
1 1/8	4.880	3.8312	3 3/4	54.44	42.5680
1 1/4	6.010	4.7228	4	61.67	48.4330
1 3/8	7.240	5.7228	...	...	...

USEFUL INFORMATION

Conversion Tables

To convert	Multiply by
Atmospheres to lbs. per sq. inch	14.70
British Thermal Units to calories	0.252
Calories to British thermal units	3.968
Centimetres to inches	0.3937
Cubic centimetres to cubic inches	0.06103
Cubic feet to cubic metres	0.02832
Cubic feet to Imp. gallons	6.228
Cubic inches to cubic centimetres	16.39
Cubic inches to litres	0.01639
Cubic metres to cubic feet	35.32
Cubic metres to cubic yards	1.308
Cubic meters to gallons	222.0
Cubic yards to cubic metres	0.7645
Feet to metres	0.3048
Foot lbs. per second to horse-power	0.001818
Foot pounds to kilogrammetres	0.1382
Force de cheval to horse-power	0.9863
Imp. Gallons to litres	4.5438
Imp. Gallons to cubic feet	0.1606
Grains to grams	0.06480
Grams to grains	15.43
Grams to ounces	0.03527
Grams to lbs.	0.00220
Horse-power to ft. lbs. per second	550.0
Horse-power to force de cheval	1.0139
Horse-power to watts	746.0
Inches to centimetres	2.540
Inches to millimetres	25.40
Kilogrammetres to foot pounds	7.233
Kilograms to lbs.	2.205
Kilograms to tons	0.00098
Kilometres to miles	0.6214
Kilos. per metre to lbs. per foot	0.672
Knots to feet per hour	6080.0
Kilos. per sq. mm. to tons per sq. in.	0.635
Litres to cubic inches	61.03
Litres to Imp. gallons	0.2205
Litres of water at 62°F. to lbs.	2.205
Metres to feet	3.281
Metres to yards	1.094
Miles to kilometres	1.609
Millimetres to inches	0.0394
Ounces to grams	28.35
Pounds of water at 62°F. to litres	0.4536
Pounds to grams	453.6
Pounds to kilograms	0.4536
Pounds per foot to kilos per metre	1.488
Pounds per sq. in. to atmospheres	0.06803
Square centimetres to sq. inches	0.1550
Square feet to square metres	0.09290
Square inches to sq. centimetres	6.452
Square kilometres to sq. miles	0.3861
Square metres to square feet	10.76
Square metres to square yards	1.196
Square miles to square kilometres	2.590
Square yards to square metres	0.8361
Temperature conversion;	
F° to C°	C° = 5/9 (F° - 32°)
C° to F°	F° = 9/5 C° + 32°
Absolute = °F + 461°	
°C + 274°	
Tons per sq. in. to kilos. per sq. mm.	1.575
Tons to kilograms	1016.0
Watts to horse-power	0.00134
Yards to metres	0.9144

USEFUL INFORMATION

Comparison of Heads of Water in Feet with Pressures in Various Parts

One foot of water at 39.1° Fahr.=62.425 lb. on the sq. foot;
 One foot of water at 39.1° Fahr.=0.4335 lb. on the square inch;
 One foot of water at 39.1° Fahr.=0.0295 atmosphere;
 One foot of water at 39.1° Fahr.=0.8826 inch of mercury at 32°;
 One foot of water at 39.1° Fahr.=773.3 feet of air at 32° and atmospheric pressure;
 One lb. on the square foot, at 39.1° Fahr.=0.01602 foot of water;
 One lb. on the square inch, at 39.1° Fahr.=2.307 feet of water;
 One atmosphere of 29.922 in. of mercury=33.9 feet of water;
 One inch of mercury at 32°=1.133 feet of water;
 One foot of air at 32°, and 1 atmosphere=0.001293 foot of water;
 One foot of average sea-water=1.026 feet of pure water;
 One foot of water at 62° F.=62.355 lb. per sq. foot;
 One foot of water at 62° F.=0.43302 lb. per sq. inch;
 One inch of water at 62° F.=0.5774 ounce=0.036085 lb. per square inch;
 One lb. of water on the square inch at 62° F.=2.3094 feet of water;
 One ounce of water on the square inch at 62° F.=1.732 inches of water.

Heat Values

Coal—14000 B.T.U. per lb.
 Natural gas—1000 B.T.U. per cu. ft.
 Oil—135000 B.T.U. per gal.
 Prod. gas—150 B.T.U. per cu. ft.
 City Gas—500 B.T.U. per cu. ft.
 Electricity—3412 B.T.U. per Kw. hour.

Pumps

The power required for pump drive, for pumping water, can be determined as follows:

$$\text{H.P.} = \frac{G \times 8.33 \times H}{33,000 \times E} \text{ for U.S. gallons.}$$

$$\text{or} = \frac{G \times 10 \times H}{33,000 \times E} \text{ for Imperial gallons.}$$

Where G=gallons per minute, H=total head in feet and E=pump efficiency, and 8.33 and 10 equal respectively weights, in pounds, of one U.S. and one Imperial gallon of pure water.

Useful Memoranda

One Imperial Gallon	= 277.41	Cub. ins.
	1.2	U.S. gallons
	10	lbs. fresh water
One U.S. Gallon	= .83	Imperial Gallon
	231.	cubic ins.
	8.355	lbs.
One cubic foot water	= 62.42	lbs.
	6.24	Imperial Gallons
	7.48	U.S. Gallons
One pound water	= 27.69	cubic ins.
	.083	U.S. gallon
One ton water	= 35.9	Cubic feet
	244.	Imperial gallons
	268.8	U.S. gallons.



THREE NORTHERN ELECTRIC RULES THAT INSURE PROFIT



1. Know your overhead. All operating expenses, rent, bad accounts, clerical salaries—everything except time and material is overhead. Divide this expense by the amount of business you do and you have your overhead percentage.
2. Get your materials from Northern Electric.
3. Use the table below to figure your prices.

Per Cent of Net Profit Desired	Per Cent of Overhead Expense						
	15	20	25	30	35	40	45
5	25	33	43	54	67	82	100
10	33	43	54	67	82	100	122
15	43	54	67	82	100	122	150
20	54	67	82	100	122	150	185
25	67	82	100	122	150	185	233

Example:—

Your overhead is 30% and you wish to make 10% net on this job. 67 is the factor shown by the intersection of these two lines and you, therefore, add 67% to your estimated prime cost (time and material). This establishes your selling price and brings you the profit you desire.



RESUSCITATION FROM ELECTRICAL SHOCK

By The Prone Pressure Method

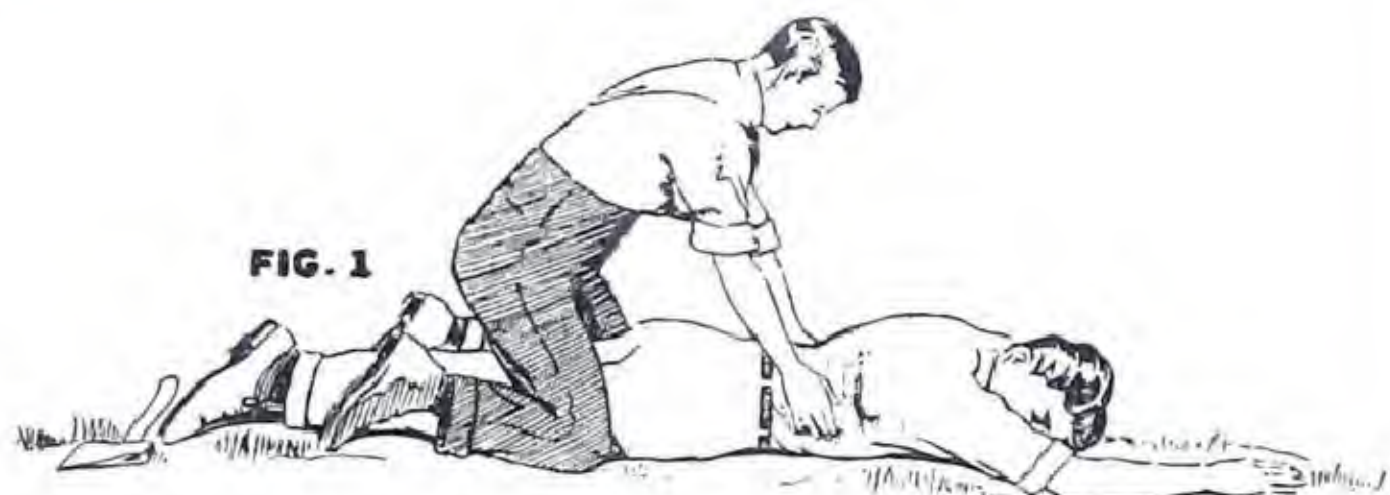
FOLLOW THESE INSTRUCTIONS EVEN IF VICTIM APPEARS DEAD

I. Free the victim from the circuit immediately.

Quickly release victim from current, being careful to avoid receiving a shock. Use any dry non-conductor (rubber gloves, clothing, rope, board), to move either the victim or the conductor. Beware of using metal or any moist material. If necessary, shut off current.

II. Instantly attend to the victim's breathing.

1. As soon as the victim is clear of the conductor rapidly feel with your finger in his mouth and throat and remove any foreign body (tobacco, false teeth, etc.). If mouth is tight shut, pay no more attention to it until later. Do not stop to loosen the patient's clothing, but immediately begin actual resuscitation. Every moment of delay is serious. Proceed as follows:



(a) Lay the patient on his belly, one arm directly extended overhead, the other bent at elbow and with face to one side, resting on the hand or forearm, so that nose and mouth are free for breathing (see Fig. 1).

(b) Kneel straddling the patient's hips, with knees just below the patient's hip bones or opening of pants pockets; place the palms of your hand on the small of his back; with fingers spread over the lower ribs, the little finger just touching the lowest rib, the thumb alongside, of your fingers; tips of fingers just out of your sight, as in Fig. 1.



(c) While counting one, two, and with arms held straight swing forward slowly so that the weight of your body is gradually, but not violently brought to bear upon the patient. (See Fig. 2). This act should take from two to three seconds.

RESUSCITATION FROM ELECTRICAL SHOCK

(Continued)



(d) While counting three, immediately swing backward so as to remove the pressure, thus returning to the position shown in Fig. 3.

(e) While counting four, five—rest.

(f) Repeat deliberately twelve to fifteen times a minute the swinging forward and backward—a complete respiration in four or five seconds. Time with your breathing.

(g) As soon as this artificial respiration has been started and while it is being continued, an assistant should loosen any tight clothing about the patient's neck, chest or waist. Keep patient warm.

2. Continue resuscitation (if necessary four hours or longer) without interruption, until natural breathing is restored, or until a physician declares rigor mortis (stiffening of the body) has set in. If natural breathing stops after being restored, use resuscitation again.

3. Do not give any liquid by mouth until the patient is fully conscious. Place ammonia near the nose, determining safe distance by first trying how near it may be held to your own. Assistant should hit patient's shoe heels about twenty (20) times with a stick or something similar and repeat this operation every five minutes until breathing commences.

4. Give the patient fresh air, but keep him warm. When patient revives keep him lying down and do not raise him. If doctor has not arrived, give patient one teaspoonful of aromatic spirits of ammonia in a small glass of water if he can swallow.

5. Carry on resuscitation at closest possible point to the accident. Do not move patient until he is breathing normally without assistance. If absolutely necessary to move, he should be placed on a hard surface, such as a door or a floor of conveyance. Do not stop or interrupt resuscitation for an instant.

III. Send for doctor.

If alone with victim, do not neglect immediate and continued resuscitation in order to call a doctor, start at once, the first few minutes are valuable. If other persons are present, send one of them for a doctor without a moment's delay.

An up-to-date list of doctors, with telephone numbers, must be posted in a conspicuous place.

The prone pressure method of artificial respiration described in rule (Section II) is equally applicable to resuscitation from electrical shock as well as cases of suspended respiration due to drowning, inhalation of gas, smoke or fumes or to other causes.

Do not stop or interrupt resuscitation until patient breathes or rigor mortis (stiffening of the body) sets in.

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